

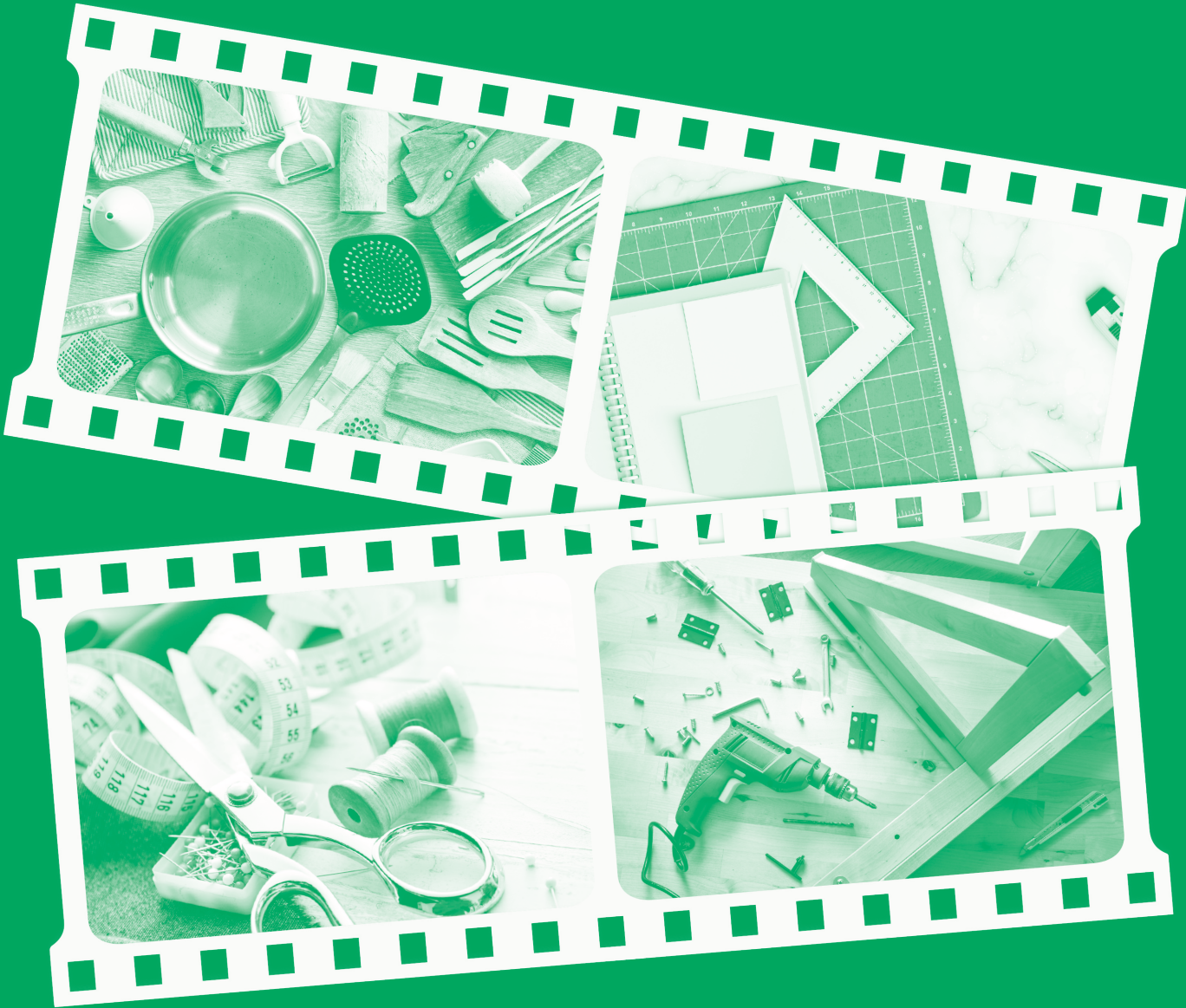
ESSENTIAL



Career Technology

Basic 7

Facilitator's Guide



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Basic 7

Facilitator's Guide

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Introduction

The Career Technology curriculum, which is called the Common Core Programme (CCP), follows the Kindergarten-Primary standards-based school curriculum that was implemented the 2019/2020 academic year. The CCP is designed for learners in JHS 1 to JHS 3 (Basic 7 to Basic 9) as part of a holistic learning experience that prepares them for post-secondary education or the world of work.

The CCP focuses on the 4Rs (Reading, wRiting, aRithmetic and cReativity) and core competencies that will give learners the ability to apply knowledge innovatively to solve everyday problems. Personal projects, community projects and community service have been integrated into the CCP as part of a comprehensive assessment programme. The aim of this curriculum is to promote better high school education that meets the different learning needs of the young people in the country and addresses the shortfalls in the current school curriculum in relation to learning and assessment.

Learning with the CCP

The CCP for learners in junior high school emphasises a set of high, internationally-benchmarked career and tertiary education-readiness standards. Learners need to acquire these standards for post-secondary education or the workplace, or both. The standards articulate what learners are expected to know, understand and be able to do by focusing on their social, emotional, cognitive and physical development. The CCP runs from JHS 1 (Basic 7) through to JHS 3 (Basic 9).

The three domains of learning – cognitive, psychomotor and affective – are at the centre of the CCP. The aim of these learning domains is to help produce character-minded learners who can play active roles in dealing with the increasing challenges that face Ghana and the global society.

The features that shape the CCP are:

- learning and teaching approaches: the core competencies, so-called 4Rs and pedagogical approaches
- learning context: engagement service and project
- learning areas: mathematics, science, computing, languages (English, Ghanaian Languages, French and Arabic), career technology, social studies, physical and health education, creative arts and design and religious and moral education.

(See Figure 1 on page x of the Career Technology CCP Curriculum.)

Learning and teaching approaches

Core competencies

The core competencies describe the relevant global skills for learning that the CCP will help learners develop in addition to the so-called 4Rs. The global skills for learning will help learners become critical thinkers, problem-solvers, creators, innovators, good communicators and collaborators who will be digitally literate. They will become culturally and globally sensitive citizens who will be life-long learners who have a keen interest in their personal development.

Pedagogical approaches

The CCP emphasises creative and inclusive pedagogies that are anchored in authentic and enquiry-based learning, collaborative and cooperative learning, differentiated learning, and holistic learning as well as cross disciplinary learning. The so-called 4Rs refer to Reading, wRiting, aRithmetic and cReativity, in which all learners must become fluent.

Large class teaching

Teachers who teach large classes can use peer work to engage learners. Working in pairs or in groups, will encourage learners to take greater responsibility for their own learning. Teachers need to be available when learners are working in groups so that they can help and guide learners and groups.

Pair and group work might reduce anxiety for some learners and make it easier for them to speak to their peers and ask questions without feeling intimidated.

Support for learners with special needs

It is important to understand what learners with special needs need when teaching different topics. Sometimes splitting a class between teachers who are teaching the same grade can help as teachers can focus on certain groups. Co-teaching is one of the best ways to support learners with disabilities and it encourages teachers to collaborate, plan and learn together. Teachers can work together to plan their lessons. They can use the resources available in their classrooms to support learners with special needs. For example, one teacher can work in a small group with learners who have hearing disabilities, while another teacher teaches the rest of the group.

Learning context

This Facilitator's Guide supports the CCP by emphasising the engagement of learners in classroom activities and projects (both inside and outside the classroom). These projects can involve individual or group tasks that all learners are required to complete by the end of JHS 3 (Basic 9). The CCP project provides learners with contexts in which they can demonstrate creativity and inventiveness in different areas of human endeavour. Community service offers opportunities for learners to nurture, love and care for, and solve problems in their community.

Learning areas and Career Technology

The CCP comprises the following learning areas:

1. Languages (English, Ghanaian Languages, French, Arabic)
2. Mathematics
3. Science
4. Creative Arts and Design (CAD)
5. Career Technology (CT)
6. Social Studies
7. Computing
8. Religious and Moral Education (RME)
9. Physical and Health Education (PHE)

Rationale

Career Technology offers training for job opportunities as an integral part of everyday life because industrial technology is the backbone of most national economies. With the introduction of Career Technology, Ghana can use its many professions to create the jobs it needs to boost the development of the country.

The Career Technology course is expected to:

- Improve the nation's economy by bridging the connection between schooling, employment, productivity and trade.
- Enhance learners' outcomes in employment-related skills and competencies.

The main strengths of Career Technology as a CCP include:

- It provides learners with basic knowledge, skills and values to enable them to function in society.
- It creates the opportunity for learners to develop special aptitudes and talents through elective courses.
- Learners are able to solve real-life problems as content is built around problems in the society.
- The integration of subjects reinforces learners' understanding of concepts.

Philosophy

The Ministry of Education promotes two basic philosophies – teaching and learning philosophy.

The focus of the teaching philosophy:

- Effective Career Technology education should be inquiry-based so that it will ensure sustainable development.
- It must provide learners with opportunities to expand, change, enhance and modify the ways in which they view the scientific, technological, industrial, and economic world.
- Teaching CT is based on learner-centred technology. Teaching and learning approaches engage learners physically and cognitively so that they can develop knowledge, skills and attitudes.
- Learners should develop the ability to think critically, and collaborate and communicate with others. They should learn to be creative and develop new ideas, and learn to solve problems in an activity-driven environment.

The focus of the learning philosophy:

- Career Technology recognises the unique endowment of every learner.
- Learning CT promotes the development of learners' individual talents that are based on creativity, innovation, critical thinking, and their ability to express their ideas graphically.
- Learners work at their own pace without discrimination or comparison.
- Activities provide learners with opportunities to brainstorm, make decisions, express their ideas, and assess and evaluate their own ideas.
- Learners are able to discover their talents and develop their core competencies, and their functional and foundational skills.
- The classroom, workshops and laboratories encourage learners to participate and collaborate inclusively. They will learn to understand and respect their skills, abilities and experiences as well as those of others.

Aims

Teaching Career Technology involves both general and subject objectives.

General aims

This Facilitator's Guide works in conjunction with the new curriculum to help individuals develop so that they will become creative, innovative, technologically minded, digital literates and problem-solvers who will develop the ability to think critically.

Subject aims

Career Technology aims to:

- educate the learner using the Head, Heart and Hands (3H) therapy
- develop the learner's thinking capacity, reasoning power and understanding of the environment
- provide learners with the opportunity to respond and act creatively according to intuition
- instil in learners a lifelong independent and critical mind for analytical and problem-solving skills such as critical analysis, creativity and innovation
- instil in learners the ability to challenge stereotypes about gender disability, religion, ethnicity, economic status and so on that would limit them in certain careers
- develop their emotional balance, material, spiritual, cultural and intellectual life
- strengthen each learner's power of imagination, creative thinking, self-expression, critical analysis, synthesis and evaluation
- predispose the learner to the technical and vocational identities of Career Technology and entrepreneurial skills needed for industrialisation
- develop in the learner the sense of appreciation and appraisal of Career Technology skills in the specific areas for future development.

The objectives of the curriculum are outlined in more details on page xv of the Career Technology CCP Curriculum.

Learning domains

This Facilitator's Guide works with the curriculum's concept of three integral learning domains that should be the basis for instruction and assessment:

- cognitive (knowledge, understanding and application)
- psychomotor (practical skills)
- affective (attitudes and values).

Knowledge, understanding and application

Under this domain, learners acquire knowledge through learning experiences. They may also show understanding of concepts by comparing, summarising, rewriting, and so on in their own words and constructing meaning from instruction. The learner may also apply the knowledge acquired in new contexts.

At a higher level, learners may be required to analyse an issue or a problem and at a much higher level, they may be required to synthesise knowledge by integrating a number of ideas to formulate a plan, solve a problem and compose a story. Furthermore, learners may be required to evaluate, estimate and interpret a concept. At the highest level, learners may be required to create, invent, compose, design and construct. These learning behaviours: knowing, understanding, applying, analysing, synthesising, evaluating and creating, fall under the domain of knowledge, understanding and application, which are described in more detail on page xvii of the Career Technology CCP Curriculum.

Suggested teaching activities:

- Teachers select teaching and learning activities that will ensure maximum learner participation.
- Teachers avoid rote learning and drill-oriented approaches and emphasise participatory teaching and learning.
- They reorganise the suggested teaching and learning activities and add to them where necessary.
- Teachers help learners apply their knowledge in dealing with issues both in and out of school and help learners become problem-solvers.

Suggested evaluation activities:

- Teachers design sets of tasks and assignments that will challenge learners to apply their knowledge to issues and problems.
- Teachers engage learners in creating new and original items or compositions.
- Teachers assist learners in developing positive attitudes for activities.
- They emphasise the issues of conceptualisation, planning and making.
- Teachers guide learners to transform what they know, understand and can do into creating products.
- They observe and guide learners as they work independently or in groups.
- Teachers select and plan other learning activities to assist learners in acquiring, developing and demonstrating the subject-specific practices and core competencies required.

Note:

- Career Technology should be taught as a practical subject. Learners are to be taught and evaluated practically.
- There will be a few theoretical lessons, but the theory must be reinforced by practical skills.

Practical skills

Practical skills involve using tools and equipment to demonstrate manipulative skills and carry out practical operations, plan to solve practical problems and produce items. The teaching and assessment of practical skills should involve projects, case studies and creative practical tasks.

The basic skills required for effective practical work include handling tools, equipment and materials (manipulative skills), observation, craftsmanship, perception, creativity and communication.

Handling tools, equipment and materials	Learners should be able to handle and use tools, equipment and materials properly for practical skills through creative activities.
Observation	Learners should be able to use their senses to make accurate observation of skills and techniques during demonstrations.
Craftsmanship	Craftsmanship involves the skilful and efficient handling of materials and tools to accomplish specific tasks according to the level of the learners.
Perception	Learners should be able to respond to their environment using all their senses (sight, hearing, smell, touch, taste and movement).
Creativity	Learners should be encouraged to be creative or original and use new methods when working on projects and creating artefacts and products. They should not copy existing work.
Communication	Learners should be guided to develop the oral and written communication skills they will need for group work, reporting and appreciation.

The required attitudes and values that are expected of learners is outlined on pages xxi and xxii in the Career Technology CCP Curriculum.

Instructional expectations

Teachers can use discussions in the classroom, workshops, sites and laboratories to help learners achieve the expectations of Career Technology. These discussions can guide learners to realise that people use their creativity to solve problems.

Examples:

1. People use the products of Career Technology to provide food, clothing, shelter and furniture for their homes, schools, churches, mosques, palaces and workplaces. Creating these products provides job opportunities for many people.
2. Teachers can guide learners to identify problems that affect the individual, family, community and the country at home, at school and in the community.
3. Teachers can guide class discussions about the effects of these problems on their education, health and sanitation, cultural beliefs and practices, job creation and employment and so on.
4. Learners can use interviews, visits, observations, reading and group or class discussions and so on to investigate the causes of these problems.
5. Teachers can guide learners (working on their own or in groups) using brainstorming, discussions, exploration with available tools, materials, instruments and techniques to design and create projects that will help solve identified problems.
6. They can ask learners to plan, display and share their artefacts in exhibitions and performances with peers and other members of the community.
7. Teachers can guide learners to appreciate, appraise and critique their works, document the outcomes, reflect creatively on their findings and use the feedback to modify products or create new projects.

Core competencies

The core competencies are a set of skills that teachers need to help learners develop. These skills will help learners engage with the subject matter as they learn the subject. The core competencies listed below appear in each section of this Facilitator's Guide and are outlined in more detail on pages xxxi and xxxii of the Career Technology CCP Curriculum:

- Critical thinking and problem solving (CP)
- Creativity and innovation (CI)
- Communication and collaboration (CC)
- Cultural identity and global citizenship (CG)
- Personal development and leadership (PL)
- Digital literacy (DL).

Assessment

In the CCP, the ideal is that assessment involves assessment for learning, assessment of learning and assessment as learning, which are described in the text that follows.

In Career Technology, assessment is based on the three domains of learning. When developing assessment procedures, teachers should select indicators in such a way that they will be able to assess a representative sample from a given module. Each indicator in the curriculum is seen as a criterion to be achieved by the learners. When teachers develop assessment items or questions that are based on a representative sample of the indicators taught, the assessment is called *criterion-referenced assessment*. In many cases, a teacher cannot assess all the indicators that are taught in a term or a year. The assessment procedure they use (class assessments, homework, projects and group work presentations) must be developed in such a way that the different procedures complement each other to provide a representative sample of indicators that are taught over a period of time.

The following three domains are outlined in more detail on pages xxiii and xxiv of the Career Technology CCP Curriculum:

- Assessment for learning (AfL)
- Assessment of learning (AoL)
- Assessment as learning (AaL).

School-based assessment (SBA) covers all forms or modes of assessment that can be undertaken by a learner, teacher and head teacher to monitor a learner’s achievement over a period of time. Data collection and keeping records of the data are central to the conduct of SBA.

Assessment for learning	Assessment of learning	Assessment as learning
Class exercises	Class assessment task (CAT)	Portfolio
Quizzes	End-of-term assessment	Journal entries
Class tests (written, oral, aural and/ or practical)	End-of-year assessment	Project work
Class assessment task (CAT)	Checklist	Questionnaire

Samples of relevant records that can be kept about a learner’s learning:

- learner’s progress record (cumulative record)
- learner’s report card
- school-based assessment per term.

Reporting school-based assessment (SBA) in the CCP

The CCP provides levels of proficiency for learners to attain and descriptors for all three grade levels.

Level of proficiency	Benchmark	Grade level descriptor
1. Highly proficient (HP)	80% +	Learner shows high level of proficiency in knowledge, skills and values and can transfer them automatically and flexibly through authentic performance tasks.
2. Proficient (P)	68%–79%	Learner demonstrates a sufficient level of proficient knowledge, skills and core understanding; can transfer them independently through authentic performance tasks.
3. Approaching proficiency (AP)	54%–67%	Learner is approaching proficiency in terms of knowledge, skills and values with little guidance and can transfer understanding through authentic performance tasks.
4. Developing (D)	40%–53%	Learner demonstrates a developing level of knowledge, skills and values, but needs help throughout to perform authentic tasks.
5. Emerging (E)	0%–39%	Learner is emerging with minimal understanding in terms of knowledge, skills, and values, but needs a lot of help.

In addition to the school-based assessment (SBA), a national standards assessment test is conducted in Basic 8 to provide national level indicators on learners' achievements.

Suggested time allocation

Four periods per week (each 50 minutes)

Four periods per week (200 minutes) should be allocated in two double periods (100 minutes) so that practical aspects of the subject can be covered fully.

Two or more teachers are required to teach CT

The subject is initially designed to be managed by one teacher. However, two or more teachers will be required to handle the subject as we do not have teachers now who can teach both Home Economics and pre-technical skills.

Pedagogical approaches

Pedagogical approaches include the approaches, methods, strategies, appropriate relevant teaching and learning resources that will help ensure that every learner benefits from the teaching and learning process.

Teachers should:

- use creative approaches to create learning-centred classrooms
- position inclusion and equity at the centre of quality teaching and learning
- use differentiation and scaffolding as teaching and learning strategies
- use information and communication technology (ICT) as a pedagogical tool
- identify subject-specific instructional expectations to make the subject relevant
- integrate all assessment strategies
- use questioning techniques that promote deep learning.

This Facilitator's Guide provides teaching methodology for lessons and concepts to ensure that the correct pedagogical approach is used. However, the approach may have to be changed based on the skills levels of learners in a class. Teachers must use their own experience and discretion to adapt the methodologies as necessary.

Learning-centred pedagogy

A learning-centred classroom creates the opportunity for learners to engage in meaningful hands-on activities that relate what they are learning to the real world. Learners should discuss ideas, become actively engaged in looking for answers and work in groups to solve problems. They should also do research to find information, and analyse and evaluate information. The aim of a learning-centred classroom is to enable learners take ownership of their learning.

Inclusion

Inclusion means ensuring access and learning for all learners particularly those who are disadvantaged. This Facilitator's Guide contains advice about how to teach a particular concept to large classes in lessons and to learners with special needs.

Differentiation and scaffolding

Differentiation is a process whereby teachers accommodate differences (in learning styles, interest and readiness to learn) between learners so that each learner has the best possible chance of learning. Differentiation can be applied to content, tasks, questions, outcomes, groupings and support. Scaffolding refers to breaking a task up into smaller units.

Technique	Process	Example
Differentiation by task	Teachers set different tasks for learners with different abilities.	When sketching, some learners can be asked to sketch free hand while others trace the outline of a diagram.
Differentiation by support	The teacher gives the support learners need.	The teacher refers learners who struggle to the Guidance and Counselling Unit for academic support.
Differentiation by outcome	The teacher allows learners to respond at different levels.	Learners who struggle with a topic are given more time for complicated tasks.
Scaffolding	The teacher uses a variety of instructional techniques to help learners make progress.	Break up a task, experience or concept into smaller parts and provide learners with the support they need to master each part.

Information communication technology (ICT)

Information communication technology (ICT) has been integrated into the Career Technology curriculum as part of the core of education, alongside reading, writing and numeracy. Thus, the curriculum is designed to use ICT as a teaching and learning tool to enhance deep and independent learning. For example, for certain topics, teachers direct learners to use multimedia to support the teaching and learning process.

Expected outcomes

Improved outcomes include:

- improved teaching and learning processes
- improved consistency and quality of teaching and learning
- increased opportunities for more learner-centred pedagogical approaches
- improved inclusive education practices
- improved collaboration, creativity and higher order thinking skills
- enhanced flexibility and a differentiated approach of delivery.

Using ICT as a teaching and learning tool gives learners access to large quantities of information online and offline. It also provides the framework for analysing data to investigate patterns and relationships. Once learners have made their findings, using ICT can help them organise, edit and print information in different ways.

Learners need to be exposed to different ICT tools including calculators, radios, cameras, cell phones, television sets and computers and related software such as Microsoft Office packages (Word, PowerPoint and Excel) as teaching and learning tools. The exposure learners are given from JHS 1 to JHS 3 (Basic 7 to Basic 9) to use ICT will build their confidence and increase their levels of motivation to use ICT in later years, both as a tool when studying and in life in general. ICT uses for teaching and learning is expected to enhance learners' quality and competence levels.

Organisation and structure of the curriculum

This guide follows the curriculum. Content has been organised under the key headings below. The content standards are organised by grade level. Within each grade level, the contents are grouped by modules and then by topics that have related indicators:

- Class is the grade level or year.
- Modules refer to the main branches of the content.
- Topics are larger groups of related indicators. Indicators from different topics may be closely related.
- Content standards are groups of related indicators.
- Indicators are learning outcomes that define what learners should know and be able to do.

Curriculum coverage table

This section includes the Basic 7 curriculum coverage table and a table with time allocations per topic.

Basic 7: Curriculum coverage table

Module 1: Personal hygiene and food hygiene			
Content standard	Indicator	Page references	
		LB	TG
Topic 1.1: Personal hygiene and food hygiene			
B7.1.1.1 Demonstrate knowledge of basic concept of staying healthy.	B7.1.1.1.1: Discuss the need to stay healthy.	2–4	1–6
	B7.1.1.1.2: Describe ways to maintain personal hygiene.	5–7	
	B7.1.1.1.3: Discuss food hygiene.	8–12	
Topic 1.2: Personal, workshop and food laboratory safety			
B7.1.2.1 Demonstrate knowledge of preventing accidents in the workshop/site and laboratory.	B7.1.2.1.1: Describe accidents in the workshop, site laboratory.	13–15	7–12
	B7.1.2.1.2: Explain the need for keeping the workshop/site and the laboratory safe.	16–20	
Topic 1.3: Environmental health			
B7.1.3.1 Demonstrate knowledge of basic concept of environmental health.	B7.1.3.1.1: Discuss the factors of environmental health.	22–25	13–18
	B7.1.3.1.2: Demonstrate the preventive measures of environmental health.	26–29	
Module 1 Revision questions		30	19

Module 2: Materials for production			
Content standard	Indicator	Page references	
		LB	TG
Topic 2.1: Compliant materials			
B7.2.1.1 Demonstrate knowledge of basic concept of compliant materials.	B7.2.1.1.1: Describe compliant materials.	32–33	20–24
	B7.2.1.1.2: Distinguish between types of compliant materials.	34–35	
	B7.2.1.1.3: Explain how compliant materials are manufactured/produced.	36–37	
Topic 2.2: Resistant materials			
B7.2.2.1 Demonstrate knowledge of basic concept of resistant materials.	B7.2.2.1.1: Describe resistant materials.	38–39	25–33
	B7.2.2.1.2: Distinguish between types of resistant materials.	39–47	
	B7.2.2.1.3: Explain how each of the resistant materials is manufactured or produced.	48–58	
Topic 2.3: Smart and modern materials			
B7.2.3.1 Demonstrate understanding of the properties of smart and modern materials.	B7.2.3.1.1: Explore the general properties of smart and modern materials.	61–63	34–36

Topic 2.4: Food commodities (animal and plant sources)			
B7.2.4.1 Demonstrate knowledge of basic food commodities.	B7.2.4.1.1: Discuss food commodities.	64–65	37–40
Module 2 Revision questions		66	40–41

Module 3: Tools, equipment and processes			
Content standard	Indicator	Page references	
		LB	TG
Topic 3.1: Measuring and marking out			
B7.3.1.1 Demonstrate understanding of measuring and marking out tools and equipment for production.	B7.3.1.1.1: Classify and use measuring and marking out tools and equipment for production.	68–83	42–53
	B7.3.1.1.2: Demonstrate how to care for and maintain measuring and marking out tools and equipment used for production.	84–86	
Topic 3.2: Cutting and shaping			
B7.3.2.1 Demonstrate understanding of cutting/ shaping tools and equipment for production.	B7.3.2.1.1: Identify cutting and shaping tools and equipment used for production.	87–90	54–65
	B7.3.2.1.2: Use appropriate skills in cutting, chopping, slicing, dicing and shaping products.	91–100	
	B7.3.2.1.3: Demonstrate how to care for and maintain cutting and shaping tools used for production.	101–102	
Topic 3.3: Joining and assembling			
B7.3.3.1 Demonstrate understanding of joining and assembling materials, tools and equipment used for production.	B7.3.3.1.1: Describe joining and assembling materials, tools and equipment used for making artefacts/products.	103–113	66–76
	B7.3.3.1.2: Use appropriate skills for joining and assembling artefacts using the materials, tools and equipment.	113–119	
Topic 3.4: Kitchen essentials			
B7.3.4.1 Demonstrate knowledge and understanding of the kitchen essentials.	B7.3.4.1.1: Describe kitchen essentials	120	77–80
	B7.3.4.1.2: Demonstrate skills in the classification of kitchen essentials.	120–122	
Topic 3.5: Finishes and finishing			
B7.3.5.1 Demonstrate knowledge of finishes and finishing.	B7.3.5.1.1: Identify finishes and finishing applied to products/artefacts.	123–128	81–83
Module 3 Revision questions		129–130	83–84

Module 4: Technology			
Content standard	Indicator	Page references	
		LB	TG
Topic 4.1: Simple structures and mechanisms			
B7.4.1.1 Demonstrate understanding of structures in construction.	B7.4.1.1.1: Outline the uses of structures in construction.	133–134	85–89
	B7.4.1.1.2: Discuss the causes of structural failures in construction.	135–138	
	B7.4.1.1.3: Design and make simple structures.	138–139	
Module 4 Revision questions		140	89

Module 5: Designing and making artefacts and products

Content standard	Indicator	Page references	
		LB	TG
Topic 5.1: Communicating designs			
B7.5.1.1 Demonstrate knowledge and skills of drawing materials, instruments/ equipment, lines and their applications, and freehand sketching.	B7.5.1.1.1: Identify drawing materials, instruments and equipment used for graphic communication.	142–143	90–94
	B7.5.1.1.2: Discuss the types of lines used in graphic communication.	144–145	
	B7.5.1.1.3: Make sketches of lines, curves, objects, and write the letterings.	146	
	B7.5.1.1.4: Make sketches of objects.	147–148	
Topic 5.2: Designing			
B7.5.2.1 Demonstrate understanding of designing.	B7.5.2.1.1: Work with a given design brief.	149	95–97
	B7.5.2.1.2: Generate ideas.	149	
Topic 5.3: Planning for making artefacts and products			
B7.5.3.1 Demonstrate understanding of planning for making artefacts/products.	B7.5.3.1.1: Discuss the factors to consider when planning a meal.	150–151	98–101
	B7.5.3.1.2: Demonstrate skills in planning for preparing food using moist methods of cooking.	152–153	
Topic 5.4: Making artefacts from compliant, resistant materials			
B7.5.4.1 Demonstrate skills of making artefacts/products.	B7.5.4.1.1: Demonstrate skills in preparing food using moist methods of cooking.	154–155	102–107
	B7.5.4.1.2: Demonstrate skills of making artefacts/ products in sewing and crocheting.	156–158	
	B7.5.4.1.3: Make mock-ups using compliant materials.	159	
Module 5 Revision questions		160	108

Module 6: Entrepreneurial skills

Content standard	Indicator	Page references	
		LB	TG
Topic 6.1: Career pathways and career opportunities			
B7.6.1.1 Demonstrate awareness of own learning styles, interests, biases, beliefs and reasons for pursuing Career Technology.	B7.6.1.1.1: Evaluate own learning styles, interests and reasons for pursuing Career Technology.	162–164	109–111
Topic 6.2: Establishing and managing a small business enterprise			
B7.6.2.1 Demonstrate understanding of establishing and managing a small business enterprise.	B7.6.2.1.1: Explain what is meant by 'entrepreneurship' and 'entrepreneur'.	164	112–115
	B7.6.2.1.2: Describe the characteristics of a successful entrepreneur.	165–167	
	B7.6.2.1.3: Explain the advantages and disadvantages of being an entrepreneur.	167–168	
	B7.6.2.1.4: Identify entrepreneurial opportunities in the locality.	168	
Module 6 Revision questions		169	115

The coverage table is based on the current three terms per year for dates declared for the 2022 school year. Allowance has been given for 7 weeks of exams (2, 2, 3). This means that 29 weeks of teaching (12, 10, 7) or 114 periods are allocated in the table.

However, depending on a teacher's district, municipal, metropolitan area, the subject coordinators will provide a scheme of learning for their schools to streamline the teaching and learning based on the curriculum.

The table gives the time allocation (in periods) per topic.

Module	Topic	Time allocation
1. Personal hygiene and food hygiene	1.1 Personal hygiene and food hygiene	4
	1.2 Personal, workshop and food laboratory safety	4
	1.3 Environmental health	6
2. Materials for production	2.1 Compliant materials	6
	2.2 Resistant materials	8
	2.3 Smart and modern materials	4
	2.4 Food commodities (animal and plant sources)	2
3. Tools, equipment and processes	3.1 Measuring and marking out	8
	3.2 Cutting and shaping	8
	3.3 Joining and assembling	8
	3.4 Kitchen essentials	8
	3.5 Finishes and finishing	8
4. Technology	4.1 Simple structures and mechanisms	6
5. Designing and making of artefacts and products	5.1 Communicating designs	10
	5.2 Designing	4
	5.3 Planning for making artefacts and products	4
	5.4 Making artefacts from compliant, resistant materials	10
6. Entrepreneurial skills	6.1 Career pathways and career opportunities	4
	6.2 Establishing and managing a small business enterprise	4
Total		116

This module has three topics.

Topic 1.1 Personal hygiene and food hygiene

Content standard

- B7.1.1.1: Demonstrate knowledge of basic concept of staying healthy.

Indicators

- B7.1.1.1.1: Discuss the need to stay healthy.
- B7.1.1.1.2: Describe ways of maintaining personal hygiene.
- B7.1.1.1.3: Discuss food hygiene.

Core competencies

- **Critical thinking and problem-solving (CP)**
 - CP5.1: Ability to combine information and ideas from several sources to reach a conclusion.
- **Communication and collaboration (CC)**
 - CC8.1: Speak clearly and explain ideas.
 - CC8.2: Explain ideas in a clear order with relevant details.
 - CC9.1: Demonstrate behaviour and skills of working towards group goals.
 - CC9.3: Understand roles during group activities.
- **Personal development and leadership (PL)**
 - PL5.6: Ability to set and maintain personal standards and values.
 - PL6.2: Division of tasks into solvable units and assign group members task units.

1. Introduction

This topic deals with two types of hygiene: personal hygiene and food hygiene. Practising both can help us to be healthy.

Practising good personal hygiene reduces the risk of disease and infection. The aim of practising personal hygiene is to keep our bodies clean and healthy. The Covid pandemic that began late in 2019 has helped us realise how important it is to wash and sanitise to limit infections and the transmission of diseases.

Besides personal hygiene, learners will also learn about other ways of staying healthy.

Practising good food hygiene helps to prevent the contamination of food. In this topic, the focus is on food hygiene practices such as storing food properly, preserving food in order to prolong its shelf life and ensuring that the food we prepare is clean and safe.

2. Learning expectations

Learners need to be able to:

- Explain what it means to stay healthy.
- Discuss the consequences of not taking good care of your body and work in groups to present your ideas.
- Working in groups, do research, discuss ideas and write about materials and strategies (ways) we can use to improve personal hygiene and discuss.

Duration

Teachers can teach this topic in four periods.

3. Resources

- Learner's Book
- Poster paper
- Personal protection equipment (PPE)
- Personal hygiene equipment such as nail brushes, toothbrush, soap, face cloths, sanitiser and face masks
- Pictures that illustrate food hygiene practices
- Videos that show how food can be contaminated
- Real objects such as basins, washing soap, water for washing hands, dish cloths, green leafy vegetables (*kantomire*) and fruits.

4. Using ICT

Teachers can use cell phones, laptops, projectors, portable speakers, flash drives, PowerPoint presentations, and MS WordPads to draw sketch when teaching this topic.

Activities that require ICT

Page	Activity	ICT required
3	1.1	Do research on the internet to find pictures and information learners can use to create posters.
4	1.2	Question 2: Research ways to improve personal hygiene.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Do research about personal and food hygiene and related hygiene practices.
- Collect and prepare teaching and learning resources that are relevant to lessons, for example, prepare charts or pictures and collect objects.
- Download videos that are suitable to support the lesson, such as www.safeconsume.eu; www.e-Bug.eu.
- Use games (such as hygiene charades) to reinforce what learners have learnt. Develop actions that promote good hygiene such as covering food and washing hands. Learners can work in groups or pairs and role play good hygiene habits without using words while others guess which action they are portraying. Discuss the proper way to carry out each action particularly if learners did not portray something correctly.

5.2 Teaching strategies

Brainstorming, discussion (groups and whole class), group work, demonstration, pair work, thought shower, games

5.3 Relevant background knowledge

Learners have fair knowledge about personal and food hygiene. Some learners always wash their hands before they eat food. All learners should brush their teeth in the morning and before going to bed, and wash their hands after they go to the toilet.

6. Suggested homework

List five hygienic practices or unhygienic practices that you have noticed at home or in your neighbourhood.

7. Assessment

7.1 Assessment questions

1. Define personal hygiene.
2. Give two benefits to wearing a face mask.
3. For more or less how many seconds should you wash your hands with soap and water?
4. Name and describe four things you can do to stay healthy.
5. State one way of staying healthy that is related to food.
6. **a)** List four types of germs that can contaminate food.
b) For each type of germ you mentioned for question a), give one example of food that can be affected by the germ.
7. What happens when you eat contaminated food?
8. Discuss five ways in which we can keep food clean.
9. **a)** State three items in which we can store food.
b) Describe how each item can be used to store any food item of your choice.
10. In which ways, besides those mentioned in question 9, can we keep food safe for longer periods?
11. List two agents we can use to preserve food.
12. What methods can we use at home to preserve food?
13. Describe drying as a method of preserving food.
14. Why is it important to preserve food?

Answers

1. Personal hygiene refers to washing our bodies and keeping our nails, hair, hands and feet clean.
2. Wearing a mask stops us from spreading germs and it also helps to prevent us from inhaling airborne diseases.
3. About 20 counts (seconds)
4. Refer to the list of actions on pages 2 and 3 of the Learner's Book.
5. Practise good food hygiene.
6. **a)** bacteria, fungi, viruses, parasites
b) Bacteria can affect raw or uncooked meat.
Viruses can contaminate undercooked shellfish.
Parasites can affect undercooked pork or lamb.
Fungi can cause mould on bread.
7. If you eat contaminated food, you can become very sick and even die.
8. Ways in which to keep food clean:
 - Always wash your hands with warm water and soap before you prepare food.
 - Wash fruit and vegetables well before you eat them.
 - Wash knives and other utensils you use when working with raw meat, poultry or fish well before you use them when working with other food.
 - To prevent spreading germs, do not wipe your hands on a dish towel after you have touched raw meat, poultry or fish.
 - Cook food thoroughly before you eat it.
9. **a)** Refrigerator, jute sack, basket
b) **Refrigerator:** You can store food such as milk, cheese, fish and vegetables for a few days in a fridge. If you want to store meat and fish for longer, you should place it in a freezer. When we store food in a refrigerator or a freezer, we prevent bacteria from growing in the food.
Jute sack: You can store foods such as maize, rice and beans in a jute sack. Air can circulate around food that is in a jute sack. You can place the sack on a raised platform or on a shelf to prevent rats and mice from destroying it and contaminating the food you have stored in it.

Basket: You can store tomatoes, cassava, cocoyam and sweet potatoes in baskets as air can circulate around the food. You should place a basket on a raised platform or on a shelf to prevent mice, rats, cockroaches from damaging food and allowing bacteria to get into the food.

10. We can keep food safe for longer periods by preserving it.
11. Sugar and salt
12. We can preserve food by drying, smoking and bottling it.
13. Drying is the oldest method of preserving food. Drying removes moisture from food. Examples of foods that can be dried include fish, okro and cassava.
14. Preserving food:
 - slows down the growth of germs
 - kills germs
 - prevents recontamination before and after you have prepared food.

7.2 Reflective practice or diagnostic assessment exercises

1. How well do learners understand the concept of personal hygiene?
2. How well do they understand why it is important to wear a mask during a pandemic?
3. How well do learners grasp the importance of washing hands properly?
4. How well were learners able to describe ways of staying healthy?
5. Were learners able to state a way of staying healthy that is related to food?
6. Were learners able to list four examples of germs that can contaminate food and give examples of food types that can be affected by these germs?
7. Do learners know what will happen to them if they eat contaminated food?
8. How well were learners able to discuss five ways of keeping food clean?
9. Were learners able to state three items that can be used to store food and describe how they can use each to store food items?
10. Do learners know that we can preserve food to make it safe for longer?
11. Did learners list two agents we can use to preserve food?
12. Were learners able to give the methods they and others use at home to preserve food?
13. How well do learners understand that drying preserves food because it removes moisture from food?
14. How well were learners able to discuss why it is important to preserve food?

8. Answers

ACTIVITY 1.1

LB page 3

Learners work in groups.

1. Each group brainstorms ideas about one topic. The group leader summarises their findings.
 - a) Examples of consequences if learners follow a poor diet: they can get sick, they may not grow properly, they will not be able to concentrate in class, their eyesight could fail, and they could develop deficiency diseases
 - b) Examples of consequences if learners use drugs: it will affect their minds, memory and concentration, their bodies will fail in certain ways, and they will not always be in control of the way they behave
 - c) Examples of consequences if learners don't get enough sleep: they may fall asleep in a place where it could be dangerous, they will not grow properly, they will lose focus, it will affect their mood, and they can get sick
 - d) Examples of consequences if learners allow a friend to be a bad influence on them: they will do things they do not necessarily want to do, they could commit crimes and be put in jail, they could get sick, or pick up a disease, they could get hurt, and they could be expelled from school or do badly at school
2. Use the rubric, *Creating a poster* on page 117 in this Facilitator's Guide.

ACTIVITY 1.2

LB page 4

Learners work in pairs.

1. Learners draw a picture of a balanced meal on a plate. They must include all the important food groups. Half the plate should be vegetables, a quarter carbohydrates and a quarter protein.
2. Learners research more ways of improving personal hygiene and discuss their findings before taking part in a class discussion. They can do online research or consult books or speak to family members or a clinic nurse.
3. Suggested answers:
 - A Playing sport can keep your body and your heart healthy.
 - B Getting a vaccine can protect you from serious illness and even death.
 - C Eating a balanced meal every day will help you grow and keep your body healthy.
 - D Wearing a face mask protects you and others from spreading disease.

ACTIVITY 1.3

LB page 6

Learners work in groups.

Learners should know the basics of personal hygiene, and why it is important to wash their hands, brush their teeth, wash their bodies regularly. Groups discuss their experiences of good hygiene and poor hygiene. The teacher can walk around the class, monitor group discussions and encourage all learners to take part.

ACTIVITY 1.4

LB page 7

Learners work in same groups as for Activity 1.3 (as the topic is the same).

Learners demonstrate certain actions and so it will be good to push the desks to one side to make space or for learners to go outside the classroom if possible.

For question 2, learners can add more activities based on their discussions for question 1. Teachers will need to ensure that learners bring the tools and materials they will need for each task from home.

Learners give feedback to each other and conduct informal peer assessment.

ACTIVITY 1.5

LB page 7

Learners work in pairs with a learner of the same gender.

Each learner draws up their own personal hygiene timetable, which they can decorate. They will use their planners for the whole year.

ACTIVITY 1.6

LB page 10

Learners work in groups.

In preparation for the lesson, find a video or a poster online that gives information about food hygiene. Learners then answer the questions based on the information the teacher provided. The teacher should lead a class discussion before asking the learners to answer question 3 in their exercise books.

Learners work on their own.

1. Wash your hands with soap and warm water, and wash the food if possible.
2. We cook meat to destroy the bacteria that is common in raw meat.
3. The rice could become contaminated by the bacteria that was left behind by the raw meat.
4. Answers will differ. Learners can include drawings.
5. Use the rubric, *Writing a paragraph/report* on page 119 in this Guide to assess learners.
6. A Chest freezer: store raw and cooked food for three to months.
 B Plastic container with lid: food that attracts flies or needs to be sealed for freshness.
 C Fridge: raw and cooked food to keep it out of heat and extend freshness.
 D Hessian sack: vegetables that need air, but not light, to prevent them turning green (potatoes).
 E Woven basket: store eggs, fruit or vegetables that will be eaten within the next few days.
 F Crate: transport fruit or vegetables in this sturdy container in which air circulates easily to prevent food from rotting quickly in the heat.

Linking Topics 1.1 and 1.2: Personal hygiene and workshop/food lab safety

Questions

1. Recall the reasons why maintaining personal hygiene is important.
2. How can poor personal hygiene contribute to food contamination?
3. Name two ways to ensure hygiene practices protect food from contamination in a hot kitchen.
4. Think about the safety measures discussed for workshops and food laboratories. Name one example of a safety measure that is also important for maintaining good personal hygiene.
5. Why do you think good ventilation is important in both workshops and food laboratories?
6. How do food hygiene practices help to prevent accidents in workshops and food laboratories?
7. Create a new safety rule for food laboratories that promotes personal hygiene and food safety. What would this rule be and why is it important?
8. List other ways personal hygiene practices contribute to a safe working environment in workshops and food laboratories.

Answers

1. Maintaining personal hygiene helps prevent the spread of germs and keeps us healthy.
2. Poor personal hygiene, such as not washing hands properly, can transfer bacteria and other pathogens to food, causing spoilage or illness.
3. Washing hands thoroughly before handling food; wearing clean clothes while preparing food.
4. Washing hands is a safety measure in both settings and is crucial for maintaining personal hygiene.
5. Good ventilation removes dust, fumes, and heat, which can be harmful in both workshops and food laboratories. It also helps prevent the spread of airborne bacteria in food preparation areas.
6. Proper food hygiene practices, such as storing food properly and avoiding cross-contamination, can reduce the risk of slips and falls caused by spilled food or grease.
7. Example: "Hair must be tied back or covered when working in the food laboratory to prevent hair from falling into food." This promotes both personal hygiene and prevents food contamination.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider the removal of dust, fumes, and heat for worker safety and to prevent the spread of airborne bacteria that could contaminate food in laboratories.
- Question 6: Encourage students to think about how proper food storage (avoiding spills) and hygiene practices (washing hands) can contribute to a safer working environment.

Topic 1.2 Personal, workshop and food laboratory safety

Content standard

- **B7.1.2.1** Demonstrate knowledge of preventing accidents in the workshop/site and laboratory.

Indicators

- **B7.1.2.1.1:** Describe accidents in the workshop/site/laboratory.
- **B7.1.2.1.2:** Explain the need for keeping the workshop/site and the laboratory safe.

Core competencies

- **Critical thinking and problem-solving (CP)**
 - CP5.2: Analyse and make judgement about viewpoints expressed in an argument.
 - CP6.3: Identify important and appropriate alternatives.
- **Communication and collaboration (CC)**
 - CC 8.1: Speak clearly and explain ideas.
 - CC 8.2: Explain ideas in a clear order with relevant details.

1. Introduction

Preventing accidents in a workshop or laboratory must be everybody's priority. While it is important to know how to treat accident or injury, it is even more important to prevent accidents from taking place.

Learners must be able to identify how and why accidents take place. They must also ensure that safety standards are maintained at all times.

2. Learning expectations

Learners need to be able to:

- Explain what is meant by accident.
- Discuss the types of accidents that occur in a workshop.
- Predict the causes of accidents that can occur in a workshop or food laboratory.
- Identify personal safety measures in a workshop or food laboratory.
- Discuss how to keep tools and equipment safe in order to prevent accidents in a workshop, building site, food laboratory and sewing laboratory.
- Demonstrate actions we can take to prevent accidents in a workshop or food laboratory.

Duration

Teachers can teach this topic in four periods.

3. Resources needed

- Learner's Book
- Safety posters
- PPE

4. Using ICT

When teaching this topic, teachers can use cell phones, laptops, projectors, audio portable speakers, flash drives, presentations in MS PowerPoint, and MS WordPads for sketches.

Activities that require ICT

Page	Activity	ICT required
17	1.10	Question 2: Use MS WordPad to draw and label PPE equipment.
19	1.11	Question 1: Research safety in the workplace.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Check the safety procedures for their school. Ensure there are safety procedures for the classroom.
- Collect posters that promote safety in workshops and laboratories; for example, research, 'safety in the kitchen poster' online, where there are different options.
- Ensure that they have enough PPE for learners to see and to handle.
- Download suitable videos that support the lesson. Examples are ones that show accidents and how to prevent accidents, for example, [cdc.gov/foodsafety/communication/food-safety-in-the-kitchen](https://www.cdc.gov/foodsafety/communication/food-safety-in-the-kitchen)

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, demonstration, pair work, games

5.3 Relevant background knowledge

Learners should have fair knowledge of knife safety, and care when handling boiling water and fire. They should also have basic knowledge of safety at home and school.

If this is the first time some learners work in the different workshops, teachers should insist that they start by observing safety processes before they allow them to take part in demonstrations or practical activities.

6. Suggested homework

Create a poster or draw up a checklist for you home, either for the kitchen, the workshop or another space. Your poster or checklist must include safety hazards and what to do to prevent different accidents. Learners can use sheets of A4 paper.

7. Assessment

7.1 Assessment questions

1. Briefly outline ways in which sharp items can injure people in a workshop.
2. How can dangers in a kitchen cause burn injuries?
3. Complete a copy of the table.

Protective gear	How it protects us
Non-slip footwear	
Strong, sturdy shoes	
Heat-resistant clothing	
	Protects against chemicals, flying splinters or open flames
	Prevent the spread of germs when coughing, sneezing or talking.
Hair nets	
Aprons	
	Protect our hands against injuries and from chemicals.

4. Explain the importance of practising an emergency drill regularly.
5. List and describe five ways to behave responsibly in a workshop or food laboratory.

Answers

1. Workshops and food laboratories contain sharp items that need careful handling. Sharp knives could slip and cut fingers. Falling knives could spear feet or legs. Sharp blades on equipment could cut arms, hands and fingers if handled incorrectly. Blades from mixers can cut or sever a finger if touched while the machine is on.
2. Hot grills, flames and cooking pots and pans can cause severe burns if someone touches them accidentally. People can bump into handles that face outwards and cause boiling contents to spill. Hot equipment such as kettles with boiling water, if placed on an uneven surface, can topple over and scald people. An unattended open flames or stovetop plates can cause something to ignite and result in burn injuries.

3. Protective gear	What it does
Non-slip footwear	The shoes help prevent a person from slipping and/or falling.
Strong, sturdy shoes	The shoes protect a person's feet from heavy or sharp objects that fall.
Heat-resistant clothing	Helps prevent burn injuries if a fire breaks out or boiling liquids spill.
Eye protection	Gives protection against chemicals, flying splinters or open flames.
Face mask	Prevents the spread of germs when coughing, sneezing or talking.
Hair nets	Prevents hair or dirt from dropping into the food or becoming snagged in equipment.
Aprons	Prevent spills on cloths or burns from hot foods and liquids.
Gloves	Protect our hands against injuries and from chemicals.

4. Every workshop or food laboratory should have a plan for emergencies such as fires and flooding. Workers should know the locations of all fire extinguishers and the safe exit routes. They should practise emergency drills, so that they know what to do in an emergency.
5. Learners list five points from the bulleted list on page 19 in the Learner's Book.

7.2 Diagnostic assessment exercises

1. Do learners understand how accidents happen in a laboratory or workshop? Can they identify possible risks?
2. Are learners' suggestions about preventing injury and accidents in a workshop and laboratory realistic?
3. Can learners identify each PPE item, and explain how, when and why to use it?
4. Can learners outline the safety measures to be followed in all workshops and laboratories?
5. Do the learners behave responsibly in workshops and laboratories?

8. Answers

ACTIVITY 1.8

LB page 15

Learners work in pairs.

1. **A:** Burn or scald from a hot pot or pan not handled carefully.
B: Back pain from lifting heavy objects in a workshop.
C: Cut sustained handling sharp objects in a workshop.
2. **a)** The gas bottle can explode and workers could be burnt.
b) Workers could slip and fall.
c) A worker could experience a strain in his wrist, back or ankle by twisting it.
d) A worker could be shocked or electrocuted.
3. Learners describe the incidents to one another. Their interpretations will differ, but ensure that learners correctly identify and describe the scenarios.

4.
 - a) **Tiredness or fatigue** can make it easy to be forgetful and someone could leave food on a fire unattended. The result could be that a fire ignites.
 - b) **Poor lighting:** If workers cannot see clearly because of poor lighting, they could use a cleaning agent or expired food when cooking because they could not read labels. The result could be food poisoning.
 - c) **Poor ventilation:** When ventilation is not good, stale air could suffocate workers.

ACTIVITY 1.9

LB page 16

Learners work in groups.

1. The teacher can lead the discussion by telling a story about an injury in a food laboratory. For example, a tired woman heated a pot of soup after working all day. She picked up the hot pot without using potholders. Her fingers burned and she dropped the pot. Some soup spilled onto her leg. She suffered burns on her fingers and scalding to her leg.

Examples of types of accidents that could occur in a food laboratory and likely causes:

- **Cuts** occur when people handle sharp tools (knives) carelessly in a kitchen. Instead of cutting on the cutting board, someone can cut their fingers.
- **Burns** are caused by dry heat, e.g., when skin touches a hot saucepan. **Scalds** are caused by moist heat, e.g., when water vapour from boiling water comes into contact with a person's body.
- **Sprains** and **muscle strain** occur when people lift heavy objects, e.g., mortar, a big bucket or sack of cassava dough.
- People can slip and **fall** when a kitchen floor is slippery or wet.
- **Explosions** can occur when gas equipment is not maintained well, e.g., gas bottle leaks or electric wires exposed to moisture or heat.

2. Answers will differ.

ACTIVITY 1.10

LB page 17

Learners work in pairs.

1. See the bulleted list on page 16 in the Learner's Book. Add any other items that learners suggest if they fit the description.
2. Learners draw any four types of protective gear, label each one and describe how to use it. If possible, they could use an MS WordPad to do the drawings or find examples on the internet.

ACTIVITY 1.11

LB page 19

Learners work on their own.

Teachers can use the rubric, *Writing a paragraph/report* on page 119 in this Facilitator's Guide to assess learners' paragraphs for both questions.

1. Learners research safety in the workplace and write a half page in which they outline the employer's role in preventing injury and employees role in keeping safe.
2. Learners write a one-page letter in which they report a workplace hazard to their employer. They explain the situation and try to convince the employer to take action.

Learners work in pairs.

1.
 - a)
 - i) If Kojo does not know how to use the saw, he could damage it, injure himself and damage or make mistakes with the materials he wants to cut.
 - ii) He started using the saw before learning how to use it properly.
 - iii) Kojo should ask for permission to use the saw, read the manufacturer's instructions and wear the correct PPE. If possible, he should also be trained about how to use the saw.
 - b)
 - i) They can be injured because they will not expect a sharp knife in a bowl of water.
 - ii) Leaving the sharp knife in a bowl of hot soapy water is a mistake because nobody will see the knife because of the soapy water.
 - iii) She should act responsibly and not leave work unfinished and expect others to finish it. For example, someone is likely to reach into the soapy water without realising that there is a sharp knife in the water and be injured.
 - c)
 - i) The gas could cause an explosion, either over the weekend or on Monday.
 - ii) It was a mistake to not report the smell of gas immediately.
 - iii) Dominic should have reported the smell of gas to his manager immediately. The problem should have been addressed immediately.
 - d)
 - i) Sophia's sandals can hook on something and heavy or sharp items can fall on her feet and injure her and she could also slip or trip.
 - ii) It is a mistake to wear shoes that offer little to no protection in a workshop.
 - iii) She should wear closed shoes with rubber soles. It is best to wear protective boots because carpenters work with equipment and machinery.
 - e)
 - i) He could cut himself because he was in a hurry. He could also fall the next day if he forgets about the dirty floor and does not walk carefully or someone else could run into the things that are on the floor and fall.
 - ii) It is a mistake to rush and to not clear the floor and the counters before leaving.
 - iii) Do not rush when working with sharp objects. Tidy up after working. Clean up and pack everything in its proper place before leaving the workplace.
2.
 - a) Responsible behaviour

Falls: Wipe spillages immediately after they occur.

Explosions: Do not put stones on leaking regulators and do not keep gas bottles in a kitchen.

Burns and scalds: Use potholders when you remove something from a hot plate. Remove lids from saucepans that are on a fire at an angle that will not cause scalds.

Sprains: Always ask for help when you need to lift a heavy item so that you do not, for example, injure yourself when you lift something heavy from the floor.

Cuts: Cut food on boards in the food laboratory.
 - b) Conditions in the workplace

Cuts: Cut away from you.

Explosions: A food laboratory should be well-ventilated.

Burns and scalds: Arrange objects sensibly and replace things once used.

Sprains: Arrange objects on shelves on a raised platform so that you do not have to lift heavy objects that are on the floor.

Cuts: Working surfaces should always be smooth. Cutting boards should be made available or within reach when somebody needs one.
 - c) Safety measures

Falls: Install warning signs to inform people who go to the food laboratory. Sharpen blunt knives regularly.

Explosions: Place gas bottles outside a food laboratory and not inside the room.

Burns and scalds: Be careful when you use heat in a food laboratory.

Use potholders and oven gloves when you remove food from a fire and from an oven.

Sprains: Do not work from the floor level.

Cuts: Cut away from you. Use a cutting board when and do not cut onto your fingers. Use the correct knife for a job. When carrying a knife, point the blade downwards. When passing a knife to someone, pass it handle first.

3. Each group writes a set of rules. Teachers can compile a full set of rules using groups' suggestions.
4. Guide learners in their discussions. First ask which situation they would prefer to be in. Then look at the PPE workers are using, the situation shown in each picture and so on. Encourage learners to find at least six points. Learners can share their suggestions during a class discussion.
5. Role-play is a fun way to focus on the importance of workshop and laboratory safety. Teachers can give pairs hints when necessary. For example, when cleaning up a spill, teachers can ask them how long they should wait before they clean it, what to use to clean it and how to clean it. Teachers can change this question into a game of charades and ask learners to each write scenario for three people. Then learners can work in groups of three, draw a scenario and act out the situation for the class. The other groups must guess what scenario they are enacting.

Linking Topics 1.2 and 1.3: workshop safety and environmental health

Questions

1. Recall some of the safety measures discussed for workshops and food laboratories
2. Name safety measures that prevent accidents and injuries in a metal workshop.
3. How can an oil spill in a metalworking accident impact the environment?
4. Why is the proper disposal of waste materials in workshops important for maintaining clean water?
5. Why is good ventilation important in workshops and how does it relate to environmental health?
6. Name responsible behaviour in the workshop to reduce waste generated in workshops.
7. Think of a new workshop safety rule that promotes worker safety and environmental health.
8. List other ways workshop safety practices contribute to a healthier environment.

Answers

1. Examples: wear appropriate safety gear, use tools correctly, maintain equipment, and clean up spills.
2. Safety measures (wearing gloves, using designated containers for waste oil) can help prevent cuts and spills.
3. Spilled oil can seep into the ground and contaminate water sources.
4. Improper disposal can pollute water sources or clog drainage systems.
5. Good ventilation removes dust and fumes, preventing respiratory problems. It also helps to prevent air pollution in the surrounding environment.
6. Use materials efficiently to minimise waste, reuse materials when possible, and properly segregate waste for recycling.
7. Example rule: "All used oil and paints must be stored in designated containers and disposed of according to regulations."

Teacher guidance for open-ended questions

- Question 5: Guide students to consider the removal of dust and fumes from the workshop to protect worker health and prevent air pollution. They might also discuss how good ventilation can help to reduce odours that could impact the surrounding environment.
- Question 6: Encourage students to research specific environmental challenges in their communities and how responsible waste management practices can contribute to solutions.

Topic 1.3 Environmental health

Content standard

- B7.1.3.1 Demonstrate knowledge of basic concept of environmental health.

Indicators

- B7.1.3.1.1: Discuss the factors of environmental health.
- B7.1.3.1.2: Demonstrate the preventive measures of environmental health.

Core competencies

- **Critical thinking and problem-solving (CP)**
 - CP5.1: Ability to combine information and analyse to make distinct judgement.
 - CP6.3: Identify important and appropriate alternatives.
 - CP6.7: Implement strategies with accuracy.
- **Creativity and innovation (CI)**
 - CI 5.1: Ability to look at alternatives when creating new things.
- **Communication and collaboration (CC)**
 - CC 8.2: Explain ideas in a clear order with relevant details.
 - CC 8.4: Anticipate different responses from the audience and plan for them.
 - CC 9.6: Ability to work with all group members to complete a task successfully.

1. Introduction

As humans, we need clean air, safe drinking water, and nutritious food and energy, which we obtain from the environment. Our environment is often polluted and it is dangerous to our health and to the health of other living creatures. This topic aims to explain what environmental health is, the factors, causes and consequences of poor environmental health as well as measures we can take to prevent the deterioration of the environment. This topic also stresses the need to safeguard the environment by planting trees.

2. Learning expectations

Learners need to be able to:

- Explain what is meant by environmental health.
- Identify the factors (constituents or pillars) of environmental health.
- Identify and discuss the causes of environmental health and other sources of environmental health.
- Research the consequences of poor environmental health.
- Identify preventive measures to prevent poor environmental health.
- Undertake a project to plant trees around the school or community.

Duration

Teachers can teach this topic in six periods.

3. Resources needed

- Learner's Book
- Charts and videos about environmental hazards
- Posters
- Cardboards, flip charts, colour markers

4. Using ICT

When teaching this topic, teachers can use cell phones, laptops, projectors, audio portable speakers, flash drives, presentations using MS PowerPoint, and MS WordPads to design posters.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read and research information about environmental health, factors, causes, consequences and preventive measures of environmental health as well as what to do when you plant trees.
- Prepare teaching and learning resources (charts and find suitable videos)
- Research the procedures for measuring and marking or setting out in each trade area.
- Look for additional information on the internet.

5.2 Teaching strategies

Brainstorming, discussion (groups and the whole class), group work, pair work, role play

5.3 Relevant background knowledge

Learners have experienced certain diseases as a result of environmental exposure.

6. Suggested homework

Below are suggestions for additional activities for homework.

- Using MS WordPad, make a signpost or poster that you can display in an area where people defecate indiscriminately. On your sign post or poster, give reasons why people need to stop this practice.
- Write a project with title 'Avoid galamsey in our mining communities'.
- Write a project with title 'Reasons to avoid open defecation in our communities'.

7. Assessment

7.1 Assessment questions

1. Explain the term *environmental health*.
2. Give two reasons why we should study environmental health.
3. Write down five factors that are related to environmental health.
4. List four causes of environmental health.
5. Give two consequences of poor environmental health.
6. Give two measures to take to help avoid poor environmental health.
7. Why should people not do the following?
 - a) Pollute water bodies
 - b) Litter
 - c) Defecate indiscriminately
 - d) Pollute the air
8. State **two** ways in which people can avoid doing the following.
 - a) Polluting water bodies
 - b) Littering
 - c) Defecating indiscriminately
 - d) Polluting the air

Answers

1. Environmental health is a way to protect our quality of life by preventing and treating disease in the natural and built environment. Poor environmental health may affect human health while good environmental health fosters healthy and safe communities.
2. Reasons we need to study environmental health (any two):
 - We need to maintaining the safety of food and drinking water.
 - Reducing air, water and noise pollution.
 - Discover how diseases that are caused by environmental exposures work.
 - Treat and dispose of solid and toxic waste.
 - Prevent and control workplace hazards.
 - Investigate the effects of climate change and environmental inequalities on health and safety.
3. Disease control, clean water, sanitation and hygiene, waste management, clean air
4. Air, water pollution, and soil pollution, chemical exposure
5. Consequences of poor environmental health (any two): transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid, polio, Novel Coronavirus (COVID-19), exacerbates stunting.
6. Preventative measures (any two): avoid polluting water bodies, avoid littering, do not defecate indiscriminately, reduce waste, reduce air pollution
7.
 - a) Avoid polluting water bodies so that people will have water that is safe to use and that will be safe for future generations to use.
 - b) Avoid littering because litter creates a breeding ground for bacteria and viruses, which are a health hazard for people. Litter also creates safety problems.
 - c) Defecating indiscriminately pollutes the environment and causes health problems and diseases such as cholera, diarrhoea and malaria.
 - d) Polluted air is harmful for people. It is particularly bad for our respiratory and cardiovascular systems.
8. Ways in which people can avoid doing the following (any two):
 - a) Polluting water bodies:
 - Do not dump waste into our rivers and into the ocean.
 - Create laws in countries and in the world to stop big companies from damaging our environmental health.
 - Get rid of waste at home and at school in the correct ways. Use proper bins, so that waste is not dumped into our water bodies.
 - Workers in hospitals and factories should dispose of waste in responsible ways, and not dump it into rivers or the ocean.
 - Farmers should use fewer fertilisers and pesticides.
 - b) Littering:
 - Enforce strict rules and regulations that ban littering.
 - Provide litter bins in public spaces.
 - Allow community waste pickers to collect litter.
 - Start special programmes that give incentives for recycling.
 - Avoid single-use plastics.
 - c) Defecating indiscriminately:
 - Put up public toilets.
 - Every household should have sanitary toilets.
 - Every household should have a proper sewage system.
 - d) Polluting the air:
 - Use filters for chimneys.
 - Use of fans instead of air conditioners.
 - Reduce the numbers of forest fires and smoke.
 - Do not use plastic bags.
 - Recycle and reuse paper.
 - Use public transport.

7.2 Diagnostic assessment exercises

1. How well did learners explain environmental health?
2. How well did learners identify the factors (constituents or pillars) of environmental health?
3. How well did learners identify and discuss the causes of environmental health and other sources?
4. How successfully did learners research the consequences of poor environmental health?
5. How successfully did learners identify preventive measures to take to avoid poor environmental health?
6. What problems did learners face when they planted trees?

8. Answers

ACTIVITY 1.13

LB page 23

Learners work in pairs.

1. Answers will differ. Learners look at different water bodies in their area and particularly at contaminated water sources. They should also look at sources of drinking water. Learners' reports should answer the following questions:
 - Which water is safe to drink?
 - How do you know when water is not safe to drink?
 - How do you think some bodies of water became contaminated?
 - What are the effects of contaminated water bodies on the surrounding areas?
 - How can we prevent water sources from becoming contaminated?
2. Learners describe where they get clean and drinkable water at home and the processes that are used to process water to make it clean and drinkable. Their answers should include boiling, filtration and distillation.

ACTIVITY 1.14

LB page 23

Learners work on their own.

1. Learners can ask personnel at a health post and Environmental Protection Agency for information and do research on the internet.

Large-scale infections in the last 10 years in Ghana include cholera and malaria. Causes of infections include poor sanitation and indiscriminately throwing away rubbish and garbage, indiscriminately defecating, stagnant waters in containers in the many homes and market places, in villages, towns and cities around water bodies, drainage areas, bushy areas, market places, homes and beaches.

Cholera has been linked to vomiting, which results in rapid dehydration and electrolyte imbalance, which can be the cause of a person's death.

People who have malaria suffer from anaemia and jaundice because of loss of red blood cells. They also suffer from headaches, muscle aches and tiredness. Nausea, vomiting and diarrhoea may also occur.
2. We can prevent large-scale infections of diseases such as cholera by providing people with safe drinking water, good sanitation and enhanced personal hygiene.

To combat the spread of malaria, we need to dispose of garbage and waste properly, spray mosquito breeding grounds and, most importantly, educate the public about keeping the environment clean
3. Learners then prepare a short speech of four to five minutes.

Use the rubric, *PowerPoint presentation/oral* on page 118 of this Facilitator's Guide to assess learners' presentations.

ACTIVITY 1.15

LB page 26

Learners work in groups of five. Each group chooses a group leader and a scribe.

1. Learners identify a polluted water body they can visit.
 - a) Pollution is the introduction of harmful or poisonous substances into an environment. Causes of water pollution include domestic animals and people, beverages and foods industries. Agriculture is the leading cause of water degradation because of fertiliser run-off. Other causes include rapid urban development, improper sewage disposal and chemical waste dumping,
 - b) The effect of pollution includes the destruction of biodiversity, depletion of aquatic ecosystems or death of aquatic life, contamination in the food chain, lack of potable water, diseases, flooding and infant mortality.
 - c) The Community Health and Sanitation Department under the Districts, Municipal or Metropolitan Assembly as well as Environment Protection Agency are in charge.
2. Learners' plans to reduce pollution can include:
 - Dispose of waste properly.
 - Do not throw waste into drains and rivers.
 - Do not use excess fertilisers or pesticides.
 - Clear clogged drains to prevent flooding and creating areas for mosquitoes to breed.

Learners present their plan to the class.

If possible, the class can adopt or adapt the best plans for a class environmental project.

ACTIVITY 1.16

LB page 27

Learners work in pairs.

1. Learners can role-play the discussion between friends Kwaku and Kwadwo after they went to a restaurant and ate gari and beans with fried plantain. On the way home, they walked next to a river. Kwadwo felt the case to defecate, but there was no public toilet in the area. They were in an enclosed area that people hardly use.

Kwadwo: Kwaku, I am having issue with my stomach.

Kwaku: Oh Kwadwo, is it really serious?

Kwadwo: Yes, ooo my brother, I need to defecate. Please cover for me so that I can defecate in that bush.

Kwaku: Oh Kwadwo, please wait till we get home. We don't have far to go.

Kwadwo: Oh, Brother, I cannot wait any longer. I have to defecate now.

Kwaku: This is not the right thing to do at all. It can cause problems to our health and the health of everybody in the community. Please wait just a little longer until we get home.

Kwadwo: Kwaku, nobody will be affected, stop talking rubbish, you do not know what I am going through.

Kwaku was angry and walked away and Kwadwo defecated nearby.

Teachers can discuss the following questions with the class:

- a) What do you think about Kwadwo's behaviour?
 - b) Is it acceptable to defecate in the open? If not, why not?
2. Learners make signs or posters. They can use the heading, Stop open defecation!
Use the rubric, *Creating a poster* on page 117 of this Facilitator's Guide to assess learners' work.

ACTIVITY 1.17

LB page 28

Learners work on their own.

1.
 - a) Waste
 - b) Litter
2. Four ways in which families can reduce waste include:
 - Reuse containers, such as glass jars and plastic bags, and take bags with you when you go shopping.
 - Reduce our waste by, for example, flattening tins and boxes.
 - Turn food waste, such as egg shells and vegetable peels, into compost.
 - Separate waste that can be recycled from waste that cannot be recycled.
3. Three ways in which to convince a community to reduce waste include:
 - Factories can find ways in which to work that create less waste.
 - Shops can use less packaging, and ask customers to provide their own bags.
 - Companies should find ways to process waste into fuel.
4. Learners do research about a dump site including finding out if there are rules that govern the sites. They write a one-page report and present their reports for discussion.
Learners' presentation are not for assessment purposes, but they should keep them in their workbooks.

ACTIVITY 1.18 Practical: Plant a tree

LB page 29

Learners work as a class and in groups.

1. Learners take part in a class discussion about the best place to plant a tree.
Learners should consult their textbooks and create a checklist of what they have to do.
2. If possible, teachers and/or learners can try to find someone who will sponsor one or more trees that learners will plant.
Learners do research about the tree(s) they will plant.
3. Learners take part in a class discussion about the tree(s) they will plant.
4. Learners find out what they need to do when they plant the tree(s).
5. Learners plant the tree(s). Perhaps some learners can create a plaque in the woodwork class to dedicate the tree(s). The learners should take ownership of the tree(s) and nurture them to full growth over the years.

Learners work on their own.

1. C Avoid eating raw chicken. (1)
2. B Covering food prevents flies from spreading germs to the food. (1)
3. B Clear it up immediately and make sure the floor is dry. (1)
4. Rules for preventing the spread of bacteria:
 - Clean your hands and food thoroughly before you touch and cook food.
 - Separate raw foods, particularly raw meat, from cooked foods.
 - Cook food thoroughly before you eat it. (3)
5. Handling equipment incorrectly can cause accidents that range from cutting a finger to causing a permanent and life-changing injury.
 Ways in which equipment can be handled incorrectly include failure to read and use the equipment according to the manufacturer's instructions, failure to observe safety rules and regulations about specific jobs and failure to use the correct equipment for a job, for example, using a knife to open a tin of milk instead of opener and using a blade instead of stitch ripper. (4)
6. Proper storage includes correct labelling, packaging and storing food at heights that are easy to access. Storing something properly means placing it in a clean and safe environment. Storing goods properly saves time and energy as it can improve workflow and shorten production times, help preserve the quality and nutritional value of food and, most importantly, prevent food-borne illness from spoiling food and spreading. (4)
7. Examples of protective clothing that keep workers safe at work:
 - Protective goggles protect the eyes.
 - Fabric gloves protect people's hands when they remove food from an oven.
 - Overalls and aprons protect the body against acids and excessive heat. (6)
8. Two reasons why workers must tie hair back:
 - Prevent the hair from catching fire.
 - Prevent hair particles from getting into food. (1)
9. a) drying
 b) bottling
 c) smoking
 d) freezing (4)
10. a) False. Some water in Ghana is not safe for humans to drink.
 b) True.
 c) False. People can also use pit latrines and portable toilets.
 d) True.
 e) False. Waste disposal is the responsibility of all citizens. (5)

Total: 30 marks

This module has four topics.

Topic 2.1 Complaint materials

Content standard

- B7.2.1.1 Demonstrate knowledge of basic concept of compliant materials.

Indicators

- B7.2.1.1.1: Describe compliant materials.
- B7.2.1.1.2: Distinguish between types of compliant materials.
- B7.2.1.1.3: Explain how compliant materials are manufactured or produced.

Core competencies

- **Communication and collaboration (CC)**
 - CC8.1: Speak clearly and explain ideas.
 - CC8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP5.1: Ability to combine information and ideas from several sources to reach a conclusion.
 - CP5.2: Analyse and make distinct judgement about viewpoints expressed in an argument.
 - CP6.3: Ability to identify important and appropriate criteria to evaluate each alternative.

1. Introduction

This focus of topic is the materials that are used in production and specifically compliant materials and how they are made. Learners will learn about the properties of compliant materials and learn to tell the difference between compliant and resistant materials (Topic 2.2). It is important for learners to be familiar with each type of material and what it are made of, so that they can choose the right material for every task.

Learners will also discover how paper and fabric are made and find out more about Ghana's traditional Kente cloth. This cloth is symbolic and special in our country. Kente cloth is gifted and passed down through generations and it is a treasured material in any house. When discussing Kente cloth, if time permits, teachers can ask learners to share stories about the history of the Kente cloth in their homes.

2. Learning expectations

Learners need to be able to:

- Explain what is meant by compliant materials.
- Pick compliant materials out from available materials and classify compliant materials as paper, card, fabric or textile.
- Give examples of each class of compliant materials: paper, card, fabric or textile.
- Search for information about how paper or card is made.
- Find information from books and other sources about how fabric or textile is made.

Duration

Teachers can teach this topic in six periods.

3. Resources needed

- Learner's Book
- Different types of compliant materials such as paper, cardboard, card, fabric (such as linen) and textiles (woven, knitted, knotted materials)
- Different types of non-compliant materials such as items made from wood, glass, stone, steel, metal or iron

4. Using ICT

Teachers can use cell phones, laptops, projectors, portable speakers, flash drives, PowerPoint presentations, and MS WordPads to draw sketches when teaching this topic.

Activities that require ICT

Page	Activity	ICT required
35	2.4	Find pictures online of compliant materials.
36	2.5	Find information online about how paper and card are manufactured.
36	2.6	Find information online about paper and pulp mills in Ghana
37	2.7	Research the history of Kente cloth and how it is made.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read and research information about compliant materials.
- Prepare teaching and learning resources (charts, objects and videos).
- Do research to find how compliant materials are manufactured.
- Search for further information online.

5.2 Teaching strategies

Brainstorming, discussion (groups and whole class), group work, pair work, research

5.3 Relevant background knowledge

Learners wear clothes and they write and use paper and cardboard every day. Fabric, paper and cardboard are compliant materials.

6. Suggested homework

Below are suggestions for additional activities for homework.

1. Learners make a poster that shows different examples of compliant materials, with labels and include lists of the properties of each item. (See Activity 2.4 question 4 on page 35 in the Learner's Book.)
2. Learners can design a game, or copy a game such as snakes and ladders, using compliant materials. Learners will need to be creative when they make the counters! For example, they can use glue to stick material onto card.

7. Assessment

7.1 Assessment questions

1. List the four main properties of compliant materials.
2. Name the two main types of compliant materials.
3. List the five main steps in the paper-making process.
4. List the four main steps in the fabric-making process.

Answers

1. Compliant materials are easy to shape, we can crumple or flattened them by hand, they are lightweight and they are flexible.
2. Main types of compliant materials: paper and fabric
3. See the steps on page 36 in the Learner's Book.
4. See the steps on page 37 in the Learner's Book.

7.2 Reflective practice or diagnostic assessment exercises

1. How well do learners recognise compliant materials based on an object's properties?
2. Do learners know the two main types of compliant materials?
3. Can learners list the steps to follow to make paper?
4. Can learners list the steps to follow to make fabric?

8. Answers

ACTIVITY 2.1 Practical: Sort compliant materials

LB page 33

Learners work in groups.

1. Learners discuss the properties of compliant materials as outlined on page 32 in the Learner's Book. Encourage all group members to take part in the discussion and contribute towards the list the group leaders compiles.
2. Groups work with a set of random objects that are made from compliant or non-compliant materials. Examples include sponges, bricks, sticks, woollen socks, plastic wrap, soft clay, glasses, metal sharpeners and fabric.
3. Learners sort objects into two groups depending on what they are made from: compliant or non-compliant materials.
4. Groups compare their answers during a class discussion.

ACTIVITY 2.2

LB page 33

Learners work on their own.

1. Learners write a summary using full sentences about how they worked in groups in Activity 2.1 to identify objects made of compliant materials.
2. Learners' paragraphs should include these properties: easy to shape, can be crumpled up or flattened by hand, usually light in weight, flexible, can be bent easily, and can change their shape.

ACTIVITY 2.3 Practical: Classify compliant materials

LB page 34

Learners work in groups.

1. Learners investigate objects to see if they can fold them into squares, stretch them, crumple the object into a smaller shape and they feel the texture of the object. They group the objects that are not made from compliant materials.
Teachers can refer to pages 34 to 37 in the Learner's Book for possible compliant objects and to Topic 2.2 for non-compliant objects.
2. Learners sort compliant objects into groups according to the materials from which they are made: paper, stiff card, cardboard and fabric or textiles.
3. Learners discuss the criteria they used to sort objects.

ACTIVITY 2.4

LB page 35

Learners work in pairs.

1. Learners discuss how they can use paper, cardboard and card.
2. Cotton is used to produce towels because it has a high absorbency rate. Other fabrics that are made from cotton include woven fabrics such as canvas and denim, clothing, bed linen, underwear, and home décor such as curtains, furniture fabric and carpets.
3. Learner's answers will differ.
Partners can swap books and check each other's answers to questions 2 and 3.
4. Learners make album of objects. They group objects according to the type of compliant material from which they are made. Pictures must be labelled and captioned. Learners can also create posters. Teachers can use the rubric, *Creating a poster* on page 117 of this Facilitator's Guide, to assess posters.

ACTIVITY 2.5

LB page 36

Learners work in groups.

1. If possible, learners research online how paper and card are manufactured.
2. Teachers can show the class a video about how paper is made. There are many videos on YouTube. Examples include [xhttps://www.youtube.com/watch?v=OXQDsSctP1M](https://www.youtube.com/watch?v=OXQDsSctP1M) and the animation [xhttps://www.youtube.com/watch?v=DjfCpBKZCd4](https://www.youtube.com/watch?v=DjfCpBKZCd4).
- 3, 4. Learners look for more information and discuss what they have found in their groups.
5. Learners write logical steps to follow to make paper. The class can discuss these steps.

ACTIVITY 2.6

LB page 36

Learners work on their own.

1. They use the information from Activity 2.5 when they answer the questions.
 - a) wood
 - b) Wood chips are softened and a pulp is formed.
 - c) Answers will differ. An example is because the quality of the wood can be controlled and specific trees can be grown and used to make paper.
 - d) Examples of chemicals include: chlorine for bleaching and a combination of sodium hydroxide and sodium sulphide to remove the lignin (binding substance).
2. Learners do research to find information about paper mills in Ghana. They can refer to the following link: https://www.dnb.com/business-directory/company-information.pulp_paper_and_paperboard_mills.gh.html

ACTIVITY 2.7

LB page 37

Learners work in groups.

1. There are many interesting websites such as <https://www.khanacademy.org/humanities/art-africa/west-africa/ghana/a/kente-cloth>, <https://www.bbc.com/news/world-africa-56484264> and <https://kitengestore.com/everything-need-know-kente>.
2. Learners share information about Kente cloth. They may have heard stories they can share. If possible, teachers can show the following video. It explains the history and also how the cloth is made: <https://www.youtube.com/watch?v=vUvBoYzRghQ>
3. Learners write notes about their findings and take part in a class discussion.

Linking Topics 2.1 and 2.2: Compliant and resistant materials

Questions

1. What are some properties of materials used to make clothing?
2. How does the flexibility of a material affect its suitability for building a bridge?
3. What properties are important when creating a comfortable cushion?
4. Why might a metal spoon be a better choice than a cloth spoon for stirring hot soup?
5. Name an object that uses both a compliant and a resistant material.
6. Explain the difference between how paper and a wooden desk are manufactured.
7. Suggest other uses for compliant materials besides clothing.
8. Why might some materials be better suited for certain applications than others?
9. Identify everyday objects that combine compliant and resistant materials. Provide examples.
10. When designing a new shoe, what properties would the materials need to have, and why?

Answers

1. Compliant materials used in clothing are typically flexible, soft, and breathable.
2. A bridge needs a material that is strong and rigid to support heavy loads. Flexibility would be a disadvantage in this case.
3. A comfortable cushion material should be soft, breathable, and have good shock absorption.
4. Metal is a resistant material, meaning it can withstand high temperatures without melting or deforming. Cloth is a compliant material and would not be suitable for hot liquids.
5. An example could be a chair with a fabric seat (compliant) and a wooden frame (resistant).
6. Paper is manufactured from wood pulp, which is a processed and broken-down form of wood. Wooden desks are made from solid timber, which involves cutting and shaping wood.
7. Compliant materials can be used for upholstery, packaging, insulation, and medical applications.
8. The suitability of a material depends on the specific application. For example, a toy car needs a strong and rigid material (resistant) for its frame, whereas the wheels might benefit from a more flexible material (compliant) for better grip.
9. Examples: a backpack with a fabric exterior (compliant) and a plastic frame (resistant) for support, or headphones with soft ear cups (compliant) and a metal headband (resistant) for durability.
10. A shoe might need a compliant material for the upper part (flexibility for movement) and a more resistant material for the sole (durability and support).

Teacher guidance for open-ended questions

- Question 6: Guide students to consider the different processes involved in turning wood pulp into paper and shaping solid wood for a desk (the machinery and techniques used).
- Question 7: Provide examples of different applications and ask students to explain why certain materials are chosen.

Topic 2.2 Resistant materials

Content standard

- B7.2.2.1 Demonstrate knowledge of basic concept of resistant materials.

Indicators

- B7.2.2.1.1: Describe resistant materials.
- B7.2.2.1.2: Distinguish between the types of resistant materials.
- B7.2.2.1.3: Explain how each of the resistant materials is manufactured or produced.

Core competencies

- **Communication and collaboration (CC)**
 - CC8.1: Speak clearly and explain ideas.
 - CC8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP5.1: Ability to combine information and ideas from several sources to reach a conclusion.
 - CP5.2: Analyse and make a distinct judgement about viewpoints expressed in an argument.
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.

1. Introduction

Many objects we use in our everyday lives are made from resistant materials, such as plastic, wood, metal, ceramics and glass. This topic includes descriptions and types of resistant materials and gives information about how they are manufactured.

2. Learning expectations

Learners need to be able to:

- Explain what is meant by resistant materials.
- Identify resistant materials from the variety of available materials.
- Sort resistant materials into categories, for example, plastics, wood and metals.
- Identify and give the names of the different types of resistant materials in each category.
- Discuss the two main sources (natural and synthetic) from which plastics are made.
- Find information from different sources, including online, about the two types of plastics and give examples.
- Match products with the types of plastics from which they are made.
- Explain briefly where wood comes from.
- Distinguish between solid timber and man-made boards and give examples.
- Compare the weight of products that are made from solid timber and from man-made boards.
- Explain briefly how metals are made.
- Identify products that are made from different categories of metals: ferrous metals, non-ferrous metals, alloys, smart metals.
- Identify and classify materials that are used for building as natural or man-made.
- Discuss sources of natural building materials.

Duration

Teachers can teach this topic in four double periods.

3. Resources needed

- Learner's Book
- Specimen pieces of mild steel, copper, lead, aluminium, wawa, odum, mahogany, clay, cement, lime, stones, sand, urea formaldehyde, polyester resin, epoxy resin, polythene, polymerising vinyl chloride (PVC), nylon, perspex
- Artefacts made from types of resistant materials
- Videos that show how different resistant materials are manufactured or produced
- PowerPoint specimen charts about all types of resistant materials

4. Using ICT

Teachers can use cell phones, laptops, projectors, portable speakers, flash drives, PowerPoint presentations, and MS WordPads to draw sketches when teaching this topic.

Activities that require ICT

Page	Activity	ICT required
51	2.18	Do research about a certain type of plastic. Make an MS PowerPoint presentation about your findings.
54	2.21	Research tree felling procedures that include drawings with MS WordPad, if possible. Research the types of wood that are used for different objects.
58	2.24	Question 4: Do research to find out how bricks are made

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read and research information about resistant materials.
- Prepare teaching and learning resources (prepare charts and find objects and videos).
- Do research to find out how resistant materials are manufactured.
- Search for additional information on the internet.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work

5.3 Relevant background knowledge

Learners have been using objects such as tables, chairs, plastic bowls, nails, cooking utensils and statues, which are made from resistant materials.

6. Suggested homework

Below are suggestions for additional activities for homework.

1. Design and make each artefact using PVC, acrylic or nylon.
 - a) playing game
 - b) soap dish
 - c) picture frame

- Make a chart by completing a copy of the table.

	Plastic	Type of plastic	Two properties	Two uses
a)	Nylon			
b)	Urea formaldehyde			
c)	PVC			
d)	Polyester resin			
e)	Acrylic pr perspex			
f)	Epoxy resin			

7. Assessment

7.1 Assessment questions

- Explain what is meant by resistant materials.
- Give three reasons why people select resistant materials over other materials for certain objects.
- Give two groups of each type of resistant material.
 - Plastics
 - Wood
 - Metals
- Complete a copy of the table.

Two main sources from which plastics are made	Two examples	Two by-products

- Explain briefly where wood comes from.
- What is the difference between solid timber and man-made boards? Give two examples of each.
- Explain briefly how metals are made.
- Give the constituent of each metal.
 - soft solder
 - brass
 - bronze
- Give two products that are made from each category of metals.
 - ferrous metals
 - non-ferrous metals
 - alloys
 - shape memory alloys (SMAs)
- Give the names of two shape memory alloys (SMAs).
- Give two examples and one source of each main class of building materials.
 - Natural materials
 - Man-made materials
- Which of the plastics below are a) thermoplastics and b) thermosetting plastics?
urea formaldehyde, PVC, polyester resin, nylon, epoxy resin, polythene

Answers

- Resistant materials are not pliable or flexible, they cannot be easily compressed with bare hands. Examples include plastic, wood, metal, ceramics, and glass.
- Resistant materials:
 - cannot be crumpled up or flattened by hand
 - cannot easily be compressed with bare hands without using force or tools
 - are inflexible; they are stiff and hard
 - cannot easily bend or change their shape without using tools.
- Plastics:** thermoplastics and thermosetting plastics
 - Wood:** hardwood, softwood and manufactured (man-made) board
 - Metals:** ferrous, non-ferrous, alloys and shape memory alloys (SMAs)

4.	Two main sources from which plastics are made	Two examples	Two byproducts
	Natural resources	Plants (cellulose), trees, animals, insects	table tennis balls, acetate films, cellophane wrapping, rubber, paint, decoration, glues, polish
	Synthetic sources	Crude oil, coal and natural gas	chemically produced plastics, polymerising vinyl chloride (PVC), polystyrene, polyethylene, acrylic

5. A mature living tree is felled, the branches are cut off the tree trunk. The tree trunk is sawn into standard sizes and the wood is seasoned.
6. Solid timber is made from harvested trees or similar natural sources, it is heavier than board and less flexible. Examples: wawa (obeche), odum (iroko), mahogany, cedar, sapele
Man-made boards are often produced from small pieces of wood or waste wood, they are lighter than solid timber and more flexible. Examples: plywood, blockboard, chipboard, hardboards and fibreboard
7. The raw material for metals is mined from the earth. It undergoes processes such as crushing, washing and grading, and then it is refined.
8.
 - a) **Soft solder:** lead and tin
 - b) **Brass:** copper and zinc
 - c) **Bronze:** copper and tin
9.
 - a) **Ferrous metals:** machine parts, nails, hand tools
 - b) **Non-ferrous metals:** kitchen cooking utensils, window frames, electrical wires
 - c) **Alloys:** sculptures, statues, ornaments
 - d) **Shape memory alloys (SMAs):** mending broken bones, wires used for dental braces, toys, gas water heaters, water regular valves, fire dampers, pipe seams
10. SMAs (any two): nitinol, a nickel-titanium based alloy, copper-aluminium-nickel
11.
 - a) **Natural materials:** sand, stones and clay source: pits, river banks, the ocean
 - b) **Man-made materials:** cement and lime
Source: quarries
12.
 - a) **Thermoplastics:** polythene, PVC, nylon
 - b) **Thermosetting plastics:** urea formaldehyde, polyester resin, epoxy resin

7.2 Diagnostic assessment exercises

1. How well could learners explain what resistant materials are and give their properties?
2. How well did learners learn to identify and classify resistant materials into various categories?
3. How easy was it to find samples of resistant materials to take to class?
4. Did you show the learners how resistant materials are manufactured?
5. How well did learners prepare charts with information about different categories of resistant materials?
6. Were learners able to identify the two main types of plastics, give their characteristics and examples of products?
7. Were you able to demonstrate the difference between thermosetting plastics and thermoplastics by heating them?
8. Were you able to show learners artefacts made from ferrous, non-ferrous, alloys and shape memory alloys (SMAs)?
9. Did you discuss the composition and products of alloys with learners?
10. How well did learners explain how wood is produced?
11. How well do learners understand the weight difference between solid timber and man-made boards?
12. Were learners able to identify and classify building materials?
13. Were learners able to give the sources of natural building materials?
14. How involved were learners in the work of this topic? What can you do to improve how you teach this topic in future?

8. Answers

ACTIVITY 2.8

Practical: Sort out resistant materials

LB page 39

Learners work in groups. This activity is mainly a group and class discussion where learners discuss the differences between resistant and non-resistant materials.

1. Learners discuss the properties of resistant materials and make a list of these materials.
2. Groups answer questions about a set of objects made from compliant or resistant materials.
3. Learners sort the objects into groups depending on the material from which they are made: resistant or non-resistant materials.
4. Groups compare their findings with other groups.
5. Groups brainstorm ideas for objects that can be made from resistant materials.
6. Groups discuss and describe objects that cannot be made from resistant materials.

ACTIVITY 2.9

LB page 39

Learners work on their own.

1. Learners' summaries will differ. Check for brevity and full sentences.
2. Learners describe the properties of resistant materials in a paragraph. See the content on page 38 in the Learner's Book. Learners can also include other information.

ACTIVITY 2.10

LB page 40

Learners work in pairs.

The answers relate to learners' experiences. During a class discussion, encourage all learners to participate. This activity is not for assessment purposes.

ACTIVITY 2.11

LB page 41

Learners work in pairs.

1. **Thermosetting plastics:** A and B; **Thermoplastics:** C and D
2. Thermoplastics are easier to recycle because they can be melted and used to make other items. Accept all other reasons that can be supported.

ACTIVITY 2.12

LB page 42

Learners work on their own. Their answers will differ.

Learners' lists should contain at least five items. They must give reasons why each object was made of wood. For example, when we use a wooden spoon to stir hot food, it will not become hot. It is safer to use a wooden spoon than a metal spoon.

ACTIVITY 2.13

LB page 44

Learners work in pairs.

1. Trees take years to grow. If we do not replace cut down trees, there will be no more wood for making products. Besides being a source of wood, trees produce oxygen, provide shade, and homes to animals. Replacing trees as we use them is called a sustainable practice, and it will ensure we have trees in the future.
2. Learners find information about a planted forest that is close to the school. If possible, teachers should arrange an outing to the forest so that learners can see the different types of trees.

ACTIVITY 2.14

LB page 46

Learners work on their own.

- The items on page 45 in the Learner's Book are non-ferrous. All items except for the coins are made of metal. The locks and the tools on page 45 are ferrous. The gold, copper and aluminium items on page 45 are non-ferrous.
 - Answers may differ. Groups compare their answers.
- Answers will differ. Learners must motivate their answers.
- Non-ferrous metals are more expensive. Products made from these metals are of a higher quality than those made from ferrous metals. They will not rust and so they will last longer.
- The car and the bolt have rusted.
 - When ferrous metals came into contact with water and air, the iron in the metals reacts and the objects corrode (rust).

ACTIVITY 2.15 Practical: Classify resistant materials

LB page 46

Learners work in groups.

Groups discuss the properties of different resistant materials. They complete a copy of the table using the objects the teacher gave them. This activity is not for assessment purposes.

ACTIVITY 2.16

LB page 48

Learners work on their own.

- Chemicals are taken from petroleum (oil), natural gas or coal.
The chemicals are then heated to break them down into molecules.
The molecules are joined together in chains or polymers that form the plastics.
- synthetic
 - Accept any reasonable answers, such as that plastics only appear in small quantities in nature. Natural plastics are hard to extract and they take longer to form.

ACTIVITY 2.17

LB page 49

Learners work on their own.

- | Thermosetting plastics | Thermoplastics |
|--|--|
| Become permanently 'set' when heat is applied. | Can be reshaped. |
| Cannot be reshaped. | Do not become permanently hard when heat is applied. |
| Popular for disposable cutlery. | Do not undergo chemical change. |
| Undergo chemical change. | Cannot withstand high temperatures. |
| Can withstand high temperatures. | Easier to recycle. |
| Popular in car parts. | Melts very easily. |
| More difficult to recycle. | |
| Do not melt. | |
- Thermosetting plastics: urea formaldehyde, polyester resin, epoxy resin; Thermoplastics: polymerising vinyl chloride (PVC), nylon (polyamide), perspex (acrylic), polyethylene

ACTIVITY 2.18

LB page 51

Learners work in groups. Their answers will differ.

1. Teachers allocate one type of plastic to each group. Learners use the information in the Learner's Book and additional research to find out more about the plastic.
2. Learners present their findings to the class as an MS PowerPoint presentation or an oral with a written report as a back-up. Presentations must include the information listed in the activity. Use the rubric, *PowerPoint presentation/oral* on page 118 of this Guide to assess presentations.

ACTIVITY 2.19

LB page 51

Learners work on their own.

1. Answers will depend on the objects teachers display. Learners must be able to see the display and take notes. Teachers must complete the table and discuss it with learners so they can check their answers.
2. Learners look for more products they can add to the list.

ACTIVITY 2.20**Practical: Compare the weight of wooden products** LB page 54

Learners work in groups.

Answers will depend on the objects teachers give to groups.

ACTIVITY 2.21

LB page 54

Learners work on their own.

1. The tree is identified and marked. The direction the tree is going to fall is decided and the tree is felled. Smaller branches are sawn off. Tree trunks are moved to a central collection point (yarded). Logs are transported to a sawmill. At the sawmill, logs are cleaned and debarked. Logs are sawn into boards or planks. Boards are graded and sorted per species. Boards are either air-dried, dried in a heated oven (kiln), or seasoned.
2. Solid timber is made from harvested trees and man-made boards are produced from smaller pieces of wood or waste wood.
See table on page 53 in the Learner's Book for examples and differences.

3.	Products	Wood choice	Reason
	Window and door frame	solid	Highly resistant to rot and decay, strong
	Staircase	solid	Strong, can take weight
	Kitchen rolling pin	solid	Heavy enough to roll pastries flat
	Book shelf	man-made	Lighter so will stay up on the wall easier.
	School notice board	man-made	Light and easy to pin notices on it
	Kitchen stool	solid	Needs to carry weight
	Kitchen table	solid	Needs to be resistant to moisture rot, and carry weight
	Ladle	solid	Resistant to heat and moisture
	Bed	solid	Must carry weights
	Ceiling	man-made	Must be light enough to stay up; it is mostly decorative

ACTIVITY 2.22

LB page 56

Learners work on their own.

1. Extract the ore from the earth, break the ore into smaller pieces (crushing), use smelting, water or magnetic fields to separate metals from rock.

2.

Category metal	Two examples	Two products
Ferrous	cast iron tool steel	manhole cover screwdrivers
Non-ferrous	copper silver	electrical wires jewellery
Alloys	brass stainless steel	bells cutlery
Shape memory alloy (SMA)	nickel titanium	dental braces wires joint implants and orthopaedic wire

ACTIVITY 2.23

LB page 58

Learners work on their own.

1. Natural building materials are directly extracted or harvested from nature with minimal processing. Natural: sand, clay, stones. Human-made building materials are created through industrial processes, often involving chemical reactions or transformations of natural materials. Human-made: concrete, lime, cement
2. To make cement, we crush large blocks of limestone into smaller stones, together with other raw materials such as clay, sand, iron ore and gypsum. The mixture is heated to extremely high temperatures, at which it forms a hard, rocky material called “clinker”. The clinker is cooled and ground into a fine powder. That powder is cement.
3.
 - a) We get sand from three sources: sand pits, river banks, and sea shores.
 - b) Clay deposits are found in most communities in Ghana. We can dig clay from a quarry or a pit.
 - c) We get stones from quarries.

Linking Topics 2.2 and 2.3: Resistant and smart materials

Questions

1. List three properties of resistant materials.
2. Name an example of a common object in Ghana that uses a resistant material.
3. Imagine you have a metal spoon that gets too hot to hold after stirring soup. What kind of property might a smart material spoon have to solve this problem?
4. Can a smart material be strong and rigid, or does it need different properties? Explain your answer.
5. Name an application in Ghana where thermochromic materials could be beneficial.
6. Are smart materials obtained from natural resources, or are they created differently?
7. Imagine a new type of building material that is both resistant to harsh weather and can adjust to changes in temperature. How might this benefit construction projects in Ghana?
8. List other ways resistant materials could be combined with smart materials to create innovative products. Provide examples.

Answers

1. Examples of resistant material properties: strong, rigid, durable, heat resistant.
2. Examples include a metal cooking pot, a wooden stool, or a corrugated iron roof.
3. A smart material spoon might have thermochromic properties, changing colour to indicate when it is too hot to touch.
4. Smart materials can have a variety of properties, including being strong and rigid. The specific properties needed will depend on the intended application.
5. Examples include thermochromic paint used on cooking utensils to indicate safe handling temperatures, or temperature-sensitive clothing that changes colour to regulate body heat.
6. While some smart materials may incorporate natural elements, they are often complex and involve scientific processes beyond simply obtaining them from nature.
7. It could improve energy efficiency and occupant comfort.
8. Examples include self-healing paints for cars (combining scratch resistance with a repair mechanism), or impact-absorbing sports equipment that becomes more rigid upon impact.

Teacher guidance for open-ended questions

- Question 4: Guide students to consider the different functions of resistant materials and smart materials. Discuss whether rigidity is always necessary for a smart material to be effective.
- Question 5: Facilitate discussion about the science behind smart materials and how they differ from simply obtaining a material from nature.

Topic 2.3 Smart and modern materials

Content standard

- B7.2.3.1 Demonstrate understanding of the properties of smart and modern materials.

Indicators

- B7.2.3.1.1: Explore the general properties of smart and modern materials.

Core competencies

- **Communication and collaboration (CC)**
 - CC8.1: Speak clearly and explain ideas.
 - CC8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.

1. Introduction

Technology has advanced significantly and nowadays we have materials that appear to be smart because they respond to conditions in the environment around them. These smart materials have improved the quality, durability and safety of everyday products, and they have become essential for modern lifestyles.

2. Learning expectations

Learners need to be able to:

- Describe smart and modern materials.
- Identify the main factors that affect the properties of smart and modern materials.
- Describe the effects of light on smart and modern materials and products.
- Explain the effects of temperature on smart and modern materials and products.
- Discuss how moisture affects products that are made from smart and modern materials and products.

Duration

Teachers can teach this topic in four periods.

3. Resources needed

- Learner's Book
- Examples of smart materials such as a reflective vest, heat-reactive mug or temperature patch and nappies that change colour when they are wet.

4. Using ICT

Teachers can use cell phones, laptops, projectors, portable speakers, flash drives, PowerPoint presentations, and MS WordPads to draw sketches when teaching this topic.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Do research to find information in books and on the internet about smart materials including to find out how smart materials are manufactured.
- Prepare teaching and learning resources (videos about smart materials will help learners visualise how they work, or examples if the teacher cannot find suitable objects to take to class).

5.2 Teaching strategies

Brainstorming, discussion (groups and whole class), group work

5.3 Relevant background knowledge

Learners may not have been in contact with smart materials before. Teachers can ask the class if any of them have prior knowledge rather than assuming that they know what smart materials are.

6. Suggested homework

Learners can look for examples of smart materials in shops, at home, at clinics and at school. Learners can take photographs of these materials or draw them and give their names and uses.

7. Assessment

7.1 Assessment questions

1. Define smart materials.
2. Give four examples of modern materials and their uses.
3. How do the properties of smart and modern materials differ?
4. Discuss the effect of moisture on smart materials.

Answers

1. Smart materials respond to the environment.
2. Refer to the examples on pages 59 and 60 in the Learner's Book.
3. Modern materials are developed for specific purposes. They do not change. Smart materials change in certain ways and then change back to the way they were before they changes (which is described as reversible), in response to the environment.
4. See page 63 in the Learner's Book.

7.2 Reflective practice or diagnostic assessment exercises

1. How well can learners define smart materials and modern materials, and explain the difference between the two?
2. Can learners give examples of modern materials and explain how we use them to improve our lives?
3. Do learners understand the properties that make smart and modern materials different?
4. Can learners describe the effects of temperature, light and moisture on smart materials?

8. Answers

ACTIVITY 2.24

LB page 63

Learners work in groups.

1. Modern materials are developed. This means that the production of objects is improved and they are more useful. Each smart material is designed with a specific purpose in mind.
After the class discussion, refer learners to pages 59 and 60 in the Learner's Book.
2. Smart materials can change in response to conditions in the environment and later, they can change back to the way they were earlier. This is described as reversible.
3. Learners' answers will differ. Below are example answers.
 - a) People will not get as sick, medical expenses will be lower and hospitals will not be full.
 - b) Young children and babies will not be burnt by hot water.
 - c) Buildings will weather storms better and the people who work in these buildings will not be affected by extreme weather conditions.

- d) It will save a lot of money if cell phone screens can repair themselves after they are damaged.
 - e) Moisture-sensing patches will be useful when they are used with nappies for babies or where moisture could cause damage, rot or injury.
 - f) Such textiles suit activities where someone works in water some of the time.
4. Groups take part in a class discussion where learners explain their points of view.

Linking Topics 2.3 and 2.4: Smart materials and food commodities

Questions

1. Recall the properties discussed for smart materials. Name one example of a smart material.
2. We learned that some materials change colour based on temperature. Think about food storage in Ghana. How could a thermochromic material be helpful in this context?
3. Imagine a special container that uses light to keep food fresh for longer. What type of smart material might be used in this container, and how might it work with light?
4. Consider the different sources of food commodities (animal and plant). List challenges related to food spoilage in Ghana.
5. We saw that some smart materials respond to moisture. How might this property be useful for packaging food items commonly found in Ghana, such as fruits or vegetables?
6. Think about the reasons we eat food. Besides providing nutrients, are there any other reasons why food packaging is important?
7. Imagine a new type of food packaging that combines smart materials with traditional materials like plastic. What benefits might this have for food preservation and safety in Ghana?
8. Brainstorm other applications of smart materials in the food industry, beyond packaging. Consider how they might improve food preparation, transportation, or even consumption.
9. Research a specific smart material used in food packaging and its benefits. Present your findings to the class, explaining how it addresses a challenge related to food spoilage or safety.

Answers

1. Examples of smart materials: thermochromic materials, shape-memory materials, and photochromic materials.
2. A thermochromic container could change colour to indicate when food is no longer safe to consume due to temperature changes.
3. The container might use a photochromic material that activates with sunlight to kill bacteria or slow down spoilage.
4. Challenges could include high temperatures, humidity, or limited access to refrigeration.
5. Moisture-sensitive materials could indicate spoilage by changing colour or texture, alerting consumers to potential food safety risks.
6. Food packaging protects food from contamination and damage and helps to maintain quality and freshness.
7. Combining smart materials with plastic could provide the strength and durability of plastic with the added benefits of smart functionalities for monitoring food spoilage.

Teacher guidance for open-ended questions

- Question 3: Encourage students to think creatively about how light interacts with materials. They might consider materials that absorb specific wavelengths of light or emit light to achieve a desired effect.
- Question 4: Guide students to consider factors like climate, storage methods, and transportation challenges specific to Ghana.

Topic 2.4 Food commodities (animal and plant sources)

Content standard

- B7.2.4.1 Demonstrate knowledge of basic food commodities.

Indicators

- B7.2.4.1.1: Discuss food commodities.

Core competencies

- **Communication and collaboration (CC)**
 - CC8.1: Speak clearly and explain ideas.
 - CC8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.

1. Introduction

Food is a basic need for all people. In order to get the nutrients we need, we need to eat a variety of foods. Some of these foods will be available in learners' environment and some will be more difficult to find. In this topic, learners will learn more about food and food commodities that are from plant and animal sources. They will also look at reasons for eating food.

2. Learning expectations

Learners need to be able to:

- Explain what is meant by food.
- Explain what is meant by food commodities.
- Give examples of common food commodities in the community.
- Discuss and classify the two main sources of food commodities: plant and animal.
- Discuss reasons for eating food.
- Make a chart about the two main sources of food commodities and examples of each one.

Duration

Teachers can teach this topic in two periods.

3. Resources needed

- Learner's Book
- Charts with information about food commodities
- A variety of food items
- Videos that show procedures that are used when working with food commodities

4. Using ICT

Teachers can use cell phones, laptops, projectors, portable speakers and flash drives when teaching this topic.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read and do research about food commodities.
- Prepare and collect teaching and learning resources that are relevant to lessons about food hygiene (charts with pictures and real objects).
- Download videos that are suitable to support and illustrate lessons, for example: https://youtu.be/bTES_33CbHE ; <https://youtu.be/i7cEFK6G2No>

Learners can work in pairs to create and play a food board game using dice and counters.

Guidelines to help learners decide what type of board game to make:

- Decide what type of game you want to make. Remember, it must be a food game board for two players.
- Draw a rough sketch of the shape of the board. Include the number of blocks you want and write numbers, questions or draw pictures in the blocks.
- Where will players start to play and where will the game end?
- Will players have to go backwards if they land on certain blocks as they do when they land on a snake's head in snakes and ladders?
- How will players know who wins the game? Will they get points if they land on certain blocks?
- What will players need to play? (Will they need a game board and one or two dice, one counter for each player?)
- Write simple and clear instructions.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, demonstration, pair work. concept map, role play, games

5.3 Relevant background knowledge

Learners have fair knowledge about food commodities. Some learners prepare food at home and they use food items or ingredients when they prepare food. Other learners watch and help their parents use ingredients to prepare food. Learners can identify food items or ingredients that are used to prepare foods such as rice and stew, beans stew and plantain.

6. Suggested homework

1. Draw two favourite food commodities that you like. One must be from a plant source and the other from an animal source. Give reasons for your choices.
2. Ask one man and one woman why they eat food. One person should be a family member and the other one should be a neighbour.

7. Assessment

7.1 Assessment questions

1. Explain each term.
a) food **b)** food commodity
2. How many sources of food commodities do we have?
3. List the main sources of food commodities.
4. **a)** Give 20 examples of food commodities.
b) Classify the food commodities under the two main food sources.
5. Give three reasons why you eat food.
6. Discuss the reasons why people eat food.

Answers

1. **a)** Food is anything solid or liquid, cooked or uncooked that, when eaten and digested will give us energy, make us grow and protect us against diseases.
b) Food commodities are the food items and ingredients we use to prepare our food.
2. Two
3. Plant source and animal source
4. **a)** Examples of food commodities include: cassava, okro, orange, beans, kontomire, ayoyo, spinach, yam, eggs, cheese, milk, snails, crab, beef, pork, mutton, rabbit, grasscutter, guinea fowl, chicken, dandelions, garden eggs, onions, wheat, sausage, shrimps, oysters, yoghurt, herrings, anchovy, tuna, mud fish, tilapia, mango, banana, apple, cabbage, tomatoes, maize, millet, sorghum, rice
b) **Plant source:** kontomire, cassava, oranges, okro, beans, ayoyo, spinach, yam, dandelions, garden eggs, onions, wheat, rice, sorghum, millet, maize, tomatoes, cabbage, apples, bananas, mangoes
Animal source: eggs, cheese, milk, snails, crab, beef, pork, mutton, rabbit, grasscutter, guinea fowl, chicken, sausage, shrimps, oysters, yoghurt, herrings, anchovy, tuna, mud fish, tilapia
5. Reasons we eat food (any three): satisfy hunger, get energy, be healthy, protect the body against diseases and promote growth.
6. **Energy:** The food we eat gives us enough ability to work, walk, run, learn, play, exercise and do the activities we enjoy. Examples of foods that give us energy are cassava, millet, rice and oil. They provide heat and energy for our physical well-being.
Growth: We eat to ensure proper development and that the body functions well. Foods such as meat, fish, beans and melon seeds (agushie) contain substances that regulate and maintain our bodily functions. They help us grow and repair cells.
Protection against diseases: Nutrients are the substances in food that provide growth and strength, and protect our bodies against diseases. Foods such as oranges, pineapples, kontomire, crab, liver, milk and beans will keep our bodies healthy and strong to help fight disease.
Food satisfies hunger: Hunger makes us want food. It might drive us to eat anything we find, which may not necessarily provide the body with the nutrients it needs.

7.2 Reflective practice or diagnostic assessment exercises

1. How well were learners able to explain the food and food commodities?
2. Were learners able to identify the two main sources of food commodities?
3. Did learners list the main sources of food commodities?
4. Were learners able to give 20 examples of food commodities?
Did learners classify food commodities under the two main food sources?
5. Were learners able to give three reasons why they eat food?
6. How well did the learners discuss the reasons why we eat food?

8. Answers

ACTIVITY 2.25

LB page 64

Learners work in groups.

1. Accept lists of ingredients as long as they could be used to make the two dishes.
- 2, 3. Learners' answers will differ as they discuss the commodities that are available in their neighbourhood. Most learners' final tables should be similar, and should help them plan meals learners will cook in modules that follow.

Learners work in pairs.

1. Example answers include: food satisfies our hunger, keeps us healthy, gives us energy and nutrients and we enjoy the taste of food.
2. Answers will differ. Be sensitive as some learners may struggle with food security at home.

REVISION ANSWERS

(Learner's Book page 66)

1. A They can be folded. (1)
2. C They can change shape when we apply force or heat. (1)
3. A Hardwood trees always produce wood that is hard to shape. (1)
4. Reasons why plastic is popular (any three):
 - Plastic can be formed into almost any shape.
 - Plastic lasts for a long time because it can resist damage by water, moderate heat and chemicals and it does not rust.
 - Plastic is light and easy to carry.
 - Plastic objects can be made in many colours.
 - Plastic resists electricity; this helps make cars and appliances safer. (3)
5. Thermoplastics do not undergo chemical change whereas thermosetting plastics undergo chemical change. Thermoplastics can be reshaped because the molecules are always free to move when heated whereas thermosetting plastics cannot be reshaped because of the arrangement of the molecules (in other words, the molecules are fixed). Thermoplastics are permanently hard with the application of heat and pressure whereas thermosetting plastics become permanently set when heat is applied.
Thermoplastics: polythene, PVC, nylon
Thermosetting plastics: urea formaldehyde, polyester resin, epoxy resin (4)
6. To make paper, cellulose fibres are extracted from different sources and converted into pulp. Pulp is combined with water and placed on a paper-making machine where it is flattened, dried and cut into sheets and rolls. (4)
7. Ferrous metals contain iron and non-ferrous metals do not contain iron.
Ferrous metals: mild steel, medium carbon steel, cast iron, wrought iron
Non-Ferrous metals: lead, copper, aluminium (4)
8. a) A malleable material can take on a new shape. So, non-ferrous metals can be hammered, pressed or rolled into thin sheets without breaking. These metals can be used when making jewellery, for small parts inside tools and equipment, and when statues and ornaments are made. (3)
 b) High resistance to rust and corrosion makes a metal ideal for use in pipes, roofing, gutters and outdoor signs, as well as in cabling and wires. (3)
9. a) False. Shape memory alloys change shape reversibly in response to heat.
 b) True.
 c) True. (3)
10. Examples of photochromatic smart materials (any one):
 - Photochromatic fashion clothing changes colour and patterns in altering light conditions.
 - Photochromatic clothes or cream change colour as a warning against sunburn. Usually, they are colourless in a dark place, but when exposed to sunlight or ultraviolet light, the material changes and shows colour. When the light source is removed, the colour disappears.

- Photochromic lenses darken when exposed to ultraviolet light. These glasses act as sunglasses on sunny days, but quickly change back to normal glasses when the lenses are no longer in sunlight.
- Reactive glass changes from transparent to dark in bright light, and changes back again in the dark. An example is auto-dimming rear-view mirrors in a car that helps prevent a driver from being dazzled by bright light. (1)

11. Wood is a popular resistant material (any one reason):

- Wooden objects last for a long time if they are treated correctly.
- Wood comes from nature (trees). It does not require a complicated process to produce.
- We can plant new trees to ensure there will be an ongoing supply of wood.
- Wood is easy to handle.
- Wooden products are safe to use.
- Wooden tools do not conduct heat and so a pot's wooden handle will not become hot on a stove. (1)

12. concrete (1)

Total: 30 marks

Module 3 Tools, equipment and processes

This module has five topics.

Topic 3.1 Measuring and marking out

Content standard

- B7.3.1.1: Demonstrate understanding of measuring and marking-out tools and equipment for production.

Indicators

- B7.3.1.1.1: Classify and use measuring and marking-out tools and equipment for production.
- B7.3.1.1.2: Demonstrate how to care for and maintain measuring and marking-out tools and equipment used for production.

Core competencies

- **Communication and collaboration (CC)**
 - CC8.1: Speak clearly and explain ideas.
 - CC8.2: Explain ideas in a clear order with relevant details.
- **Creativity and innovation (CI)**
 - CI6.1: Exhibit strong memory, intuitive thinking and respond appropriately.
 - CI6.10: Reflect on work and explore thinking behind thoughts and processes.
- **Critical thinking and problem-solving (CP)**
 - CP5.6: Demonstrate a thorough a generalised concept and facts specific to task or situation.
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.
 - CP6.7: Implement strategies with accuracy.

1. Introduction

Making artefacts

In order to make artefacts accurately, learners must learn how to use basic measuring and marking-out and setting-out tools accurately. They must learn how to maintain artefacts in order to prolong their life span.

The focus of this topic is on identifying and classifying the types of measuring and marking-out tools and equipment that are used in different trades, the uses, care and maintenance of tools and why it is necessary to measure and mark out or set out.

Sewing

Good sewing tools make it easy to sew and complete a sewing project or task.

The focus of this topic is on identifying and classifying measuring and marking-out tools and caring for and maintaining these tools.

Food production

Measuring tools help us measure the correct amounts of ingredients for recipes and marking-out tools and equipment help us achieve balance and proportion in size.

2. Learning expectations

Learners need to be able to:

- Identify and classify different measuring and marking-out tools and equipment.
- Think-write-pair and share at a plenary session, the uses of different tools and equipment that are used in kitchens, sewing workshops, building sites, wood workshops and in metal or plastic workshops.
- Discuss the importance of measuring and marking-out tools including accuracy, avoiding wastage and achieving desired results.
- Identify from displayed realia (real-life objects) or pictures, tools and equipment that are used for measuring and marking out in kitchens, sewing workshops, building sites, wood workshops and in metal or plastic workshops.
- Sketch and label parts of measuring and marking-out tools and display sketches for appraisal.
- Demonstrate how to use the measuring and marking-out tools and equipment.
- Share experiences from home about how to care for tools and equipment that are used for production.
- Discuss the cleaning agents or materials that are used to clean and maintain tools and equipment based on the materials that were used to make a tool.
- Demonstrate how to care for measuring and marking-out tools and equipment according to the material that was used to make them.

Duration

Making artefacts: Teachers can teach this topic in four double periods.

3. Resources

- Learner's Book
- Charts of artefacts with dimensions and marking out
- Charts of measuring and marking or setting out tools and equipment
- Real-life objects (measuring and marking or setting out tools and equipment)
- A4 sheets of paper, flip charts and cardboard
- Specimen workpieces or artefacts and materials
- Videos about procedures for measuring and marking out in all trade areas
- Measuring tools and equipment (measuring scale, calabash, olonka, measuring cup, measuring spoon, knife, flour or margarine or sugar and so on)

4. Using ICT (where relevant)

Teachers can use laptops, projectors, pen drives, PowerPoint presentations, and MS WordPads to sketch measuring and marking-out tools and equipment when teaching this topic.

Activities that require ICT

Page	Activity	ICT required
71	3.3	Question 2: Sketch using MS WordPad
73	3.4	Question 4: Sketch using MS WordPad
75	3.5	Question 3: Sketch using MS WordPad
76	3.6	Presentation using MS PowerPoint
83	3.9	Question 1: Sketch using MS WordPad

5. Teaching methodology

Making artefacts

5.1 Preparation

The teacher should:

- Read and research information about measuring and marking or setting out tools and equipment.
- Research methods for measuring and marking or setting out on workpieces.
- Prepare teaching and learning resources (charts, PowerPoint presentations, artefacts or workpieces and materials, and videos).
- Look for additional information on the internet.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, pair work

5.3 Relevant background knowledge

Learners have experience comparing the sizes of articles including books and lines. They have used rulers to take measurement and to mark lines on paper and on the ground.

Sewing

5.1 Preparation

The teacher should:

- Read and research information on measuring and marking-out tools and equipment and how they are used.
- Prepare teaching and learning resources (charts and teaching materials).
- Do research to find out how to care for and maintain measuring and marking-out tools in a sewing workshop.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, demonstration, pair work

5.3 Relevant background knowledge

Learners have fair knowledge about measurements and marking out. They have seen tailors use measuring and marking-out tools to take measurements

Food production

5.1 Preparation

The teacher should:

- Do research about measuring and marking-out tools and equipment.
- Prepare and collect teaching and learning resources that are relevant to lesson about measuring and marking-out tools and equipment.
- Download videos that to support the lesson; an example is https://youtu.be/cxK5Xd_NUok ; <https://youtu.be/m-Lebr8JBXo>.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, demonstration, pair work, games

5.3 Relevant background knowledge

Learners have fair knowledge about measuring tools and equipment. Some of the learners consciously or unconsciously measure sugar when they make tea or coffee. Others also watch their parents and guardians and help them use measuring tools when they bake bread and cakes. Learners can also identify measuring tools that are used in kitchens.

6. Suggested homework

Below are suggestions for additional activities for homework.

A Making artefacts

1. Imagine that you need to drill a hole with a diameter of 20 mm in a metal workpiece. Write down six steps to follow when measuring and marking out the hole.
2. Make a freehand sketch of each measuring and marking or setting out tool or piece of equipment.

Label two parts on each tool.

- | | |
|---------------------------------|---------------------------------|
| a) scribe with angle point | b) dividers |
| c) builder's square | d) try square |
| e) steel rule with calibrations | f) marking gauge |
| g) marking knife | h) tape measure (wood or metal) |
| i) surveyor's tape | j) weighing scale |

B Sewing

3. Using an MS WordPad, sketch and label one measuring tool and one marking-out tool that are used in a sewing centre.

C Food production

4. Explain the difference between a liquid measuring cup and a dry measuring cup.

7. Assessment

Making artefacts

7.1 Assessment questions

1. List **two** measuring and marking or setting-out tools and pieces of equipment by completing a copy of the table.

Workplace	One measuring tool or piece of equipment	One marking or setting-out tool or piece of equipment
Food laboratory (kitchen)		
Sewing workshop or laboratory		
Building site		
Wood workshop		
Metal or plastic workshop		

2. Give **one** use of each tool and or piece of equipment.

a) measuring cup	b) compass
c) marking gauge	d) surveyor's tape
e) tailor's chalk	f) yard or metre rule
g) kitchen knife	h) scribe
i) profile board	j) steel rule
3. Give two major reasons for using measuring and marking or setting-out tools and pieces of equipment.
4. Select the measuring and marking or setting-out tools and pieces of equipment that are used in each workshop.

tape measure, olonka, steel rule, compass, folding rule, calabash, try square, measuring cup, marking knife, builder's square, head pan, measuring spoon, straight edge, yard rule, weighing scale

- | | |
|------------------------------|----------------------------------|
| a) Food laboratory (kitchen) | b) Sewing workshop or laboratory |
| c) Building site | d) Wood workshop |
| e) Metal or plastic workshop | |

5. List **two** cleaning agents and give examples of materials you can use the agents to clean.
6. List **three** ways in which you can clean measuring and marking or setting-out tools and pieces of equipment that are made of each material.
 - a) wood
 - b) metal
 - c) plastic
7. Write down **five** general rules for taking care of measuring and marking-out tools and pieces of equipment depending on the materials from which the tools are made.

Answers

1.	Workplace	One measuring tool or piece of equipment	One marking or setting-out tool or piece of equipment
	Food laboratory (kitchen)	measuring cup, olonka	kitchen knife
	Sewing workshop or laboratory	tape measure, yard or metre rule	pencil, tailor's chalk
	Building site	surveyor's tape	profile board, peg, chalk
	Wood workshop	tape measure, folding rule	pencil, marking gauge, marking knife
	Metal or plastic workshop	steel rule	compass, scribe, dividers

2.
 - a) Measuring cups are used to measure liquid ingredients such as water, oil, and milk.
 - b) A compass is used to inscribe circles or arcs.
 - c) A marking gauge is used to mark out lines for cutting or other purposes.
 - d) Surveyor's tape is used to measure horizontal, vertical or slope distances.
 - e) Tailor's chalk is used to draw lines on fabric before you cut it.
 - f) A yard or metre rule is used to check hems and draw long lines.
 - g) A kitchen knife is used to cut meat, dice vegetables, disjoint certain cuts, slice herbs and chop nuts.
 - h) A scribe is used to scratch (mark) lines on metal and plastic.
 - i) A profile board is used to control trench positioning, width and depth.
 - j) We use a steel rule to measure pieces of plastic and metal.
3. We use measuring and marking or setting-out tools and pieces of equipment to measure accurately, avoid wasting material and achieve the results we desire.
4.
 - a) **Food laboratory (kitchen):** weighing scale, measuring cups, spoons, calabash, olonka
 - b) **Sewing workshop or laboratory:** tape measure, yard rule
 - c) **Building site:** tape measure, builder's square, head pan, straight edge
 - d) **Wood workshop:** tape measure, folding rule, try-square, marking knife
 - e) **Metal or plastic workshop:** tape measure, steel rule, compass
5. Silvo: silver
Brasso: brass
Oil: mild steel, medium carbon steel, stainless steel
6.
 - a) Wood (any three):
 - Clean wooden tools such as calabashes and wooden spoons with warm, soapy water and a sponge or brush.
 - Do not leave wooden tools in water as they will crack.
 - Use cooking oil to oil wooden tools regularly.
 - Treat the wooden handles of metal tools in the same way you treat wooden tools.
 - At least once a year, oil wooden tools and knife handles thoroughly. Use a cloth to rub the oil along wooden handles and then leave the tools to dry.
 - b) Metal (any three):
 - Metals such as stainless steel and copper can scratch easily. Do not use cleaning tools such as steel wool that can scratch these materials. Use a soft sponge or cloth to clean metal tools.
 - Wipe metal tools with a clean cloth in the direction of the grain to avoid making streaks.

- Wash very dirty metal tools in soapy water and then dry the tools thoroughly to prevent rust. Dry metal tools immediately after you have washed them to prevent stains from dirty water and leftover cleaning agents forming.
 - You can remove special metal polishes such as Brasso and Silvo to remove stains, dirt, tarnish and grease build-up. Brasso is a little more scratchy and harsher than Silvo. Do not use it to clean soft metals such as gold and silver. You can use both metal polishes to clean brass, copper, chrome and steel.
 - Oil the metal parts of tools regularly to prevent rust and ensure that the moving parts work smoothly. A light film on oil will prevent rust from forming. Apply a light coat of oil to tools and use a clean rag to wipe the oil off. You can use cooking oils and machine oils to oil tools in all workshops.
- c) Plastic:
- Use a sponge or a brush and hot soapy water to wash remaining food particles and greasy substances off plastic tools. Wash plastic tools immediately after you have used them so that food remainders will not harden and stain the plastic.
 - Also use a sponge and warm soapy water to get rid of greasy substances on plastic rules or handles in workshops.
 - Use baking soda and a soft cloth to polish plastic tools.
7. • Store tools after you have used them to help keep tools free of dust and grime. Never store tools without cleaning them.
- Store tools in a dry place. Dampness causes metals to rust and it weakens the wooden part of tools, such as handles, which will cause them to rot or split.
 - If you wash the tools in water, dry them thoroughly before you store them to prevent damage that is caused by moisture.
 - Do not leave tools, including kitchen utensils, in dirty water for a long time as doing so will cause rust and allow stains to form. The wood in the tools will crack and the metal parts will stain and rust.
 - Keep tools free from dust. Dust tools regularly with a soft cloth.
 - Use soft cloths, brushes and sponges to clean tools and not materials that can damage the tools.
 - Ensure that cloths, brushes and sponges are clean before you use them to clean tools.
 - Choose the correct cleaning agents (soaps or polish) to clean tools. Check the labels on cleaning agents and make sure you use the correct product to clean each tool. Do not use soap or polish that could scratch or stain a tool.

7.2 Diagnostic assessment exercises

1. How well are learners able to identify and classify measuring and marking or setting out tools and equipment?
2. How well did learners demonstrate how to use measuring and marking or setting out tools and equipment?
3. How well are learners able to state the uses of different measuring and marking or setting out tools and equipment that are used in a food laboratory (kitchen), sewing workshop or laboratory, building site, wood workshop and metal or plastic workshop?
4. How well do learners understand the importance of measuring and marking or setting out?
5. How well are learners able to identify real-life objects or pictures of tools and equipment used for measuring and marking or setting out in each workplace:
 - **Food laboratory (kitchen for liquids/dry ingredients):** weighing scale, measuring cups, spoons, calabash, *olonka*
 - **Sewing workshop or laboratory:** tape measure, yard rule
 - **Building site:** tape measure, builder's square, head pan, straight edge
 - **Wood workshop:** tape measure, folding rule, try square, marking knife
 - **Metal workshop:** tape measure, steel rule, compass
6. How well are learners able to sketch and label the parts of measuring and marking-out tools and equipment?

7. How well did learners understand the teacher's demonstration of how to use the measuring and marking-out tools and equipment?
8. How much help did learners need to demonstrate how to use measuring and marking and setting out tools and equipment?
9. How many learners took part in a class discussion about how to care for tools and equipment that are used at home?
10. How well do learners understand the cleaning agents or materials we use to clean and maintain tools and equipment based on the materials from which tools are made?
11. How well did learners understand the teacher's demonstration about how to care for measuring and marking-out tools and equipment depending on the material from which they are made?
12. How much help did learners need when they demonstrated caring for measuring and marking-out tools and equipment depending on the materials from which they are made?

Sewing

7.1 Assessment questions

1. Name the tool you should use to measure a full piece of fabric.
2. Give two reasons why it is necessary to measure lengths when sewing.
3. Give two reasons why it is important to measure lengths accurately.
4. Name two marking-out tools you can use in a sewing workshop.
5. Why do we use marking-out tools in a sewing workshop?

Answers

1. A yard stick or a metre rule
2. Measuring lengths helps ensure that a garment will fit as intended, which could mean tightly or loosely. Measuring lengths prevents wasting fabric.
3. When tailors take accurate measurements, they will know exactly how much material to use. Accurate measurements will ensure that fabric pieces that must be sewn together are the correct lengths.
4. Pencil
Tailor's chalk
5. We use marking-out tools to draw lines on fabric before we cut it.

7.2 Diagnostic assessment

1. How well were learners able to classify measuring tools and equipment for production?
2. How efficiently were learners able to use marking-out tools and equipment?
3. How well were learners able to demonstrate how to care for and maintain measuring and marking-out tools and equipment?

Food production

7.1 Assessment questions

1. Identify and classify the types of measuring and marking-out tools and equipment.
2. State the uses of each measuring and marking-out tool and piece equipment in a food laboratory.
3. Discuss the importance of measuring and using marking-out tools.
4. Using an MS WordPad, sketch and label the parts of measuring and marking-out tools. Display your sketches for appraisal.
5. Demonstrate how to use measuring and marking-out tools and equipment in a food laboratory.
6. Take part in a discussion about experiences from home about how to care for tools and equipment that are used for production.
7. Discuss cleaning agents or materials we use to clean and maintain tools and equipment based on the material that was used to make a tool.
8. Demonstrate how to care for a glass measuring cup and a stainless steel knife.

Answers

1. **Measuring tools and equipment:** scale, spoon, olonka, calabash, measuring cup
Marking-out tools and equipment: knife
2. **Measuring scale:** measure dry ingredients such as flour
Measuring spoon and cup: measure dry and liquid ingredients such as flour, sugar, water and milk
Olonka: measure dry ingredients such as sugar, beans and rice, and also liquids such as water and oil
Calabash: measure liquid and dry ingredients
Knife: use as a marking tool to make marks on food items such as fish
3. Measuring and marking tools are important because they make it possible to measure the quantities of food ingredients such as fish and margarine, and to locate the position of a cut or make a visible pattern, for example, on fish.
4. Learners sketch and label tools.
5. Learners demonstrate how to use measuring and marking tools and equipment.
They can include the following:
 - Tell the class what their objective is, for example, how to use a measuring scale.
 - Revise the parts of the measuring tools such as the tray (bowl), needle (hand), rotation dial and reading on a kitchen scale.
 - Put a measuring bowl on a kitchen scale.
 - Check if the needle points to zero. If it does not, use the rotation dial to set it to point to zero.
 - Use a spoon to scoop flour into the measuring pan until the needle points to the desired weight.
 - Remove the tray from the scale and pour the flour into a bowl.
6. Learners discuss experiences from home about how to care for tools and equipment that is used in food production.
7. Learners discuss cleaning agents or materials:
Plastic: sponge and detergent
Stainless steel: sponge, detergent, Brasso, vinegar
Wood: sponge, detergent, lemon or baking soda (remove odour)
Silver: sponge, detergent, vinegar, baking soda
Porcelain: sponge, soap, detergent, vinegar(white), baking soda
Aluminium: sponge, detergent, Brasso or cream of tartar, vinegar
Glass: sponge, detergent, baking soda
8. **Glass measuring cup:**
Learners organise the items they will use for the demonstration.
They inform the class of the objective of the demonstration, for example, to clean the glass measuring cup in a certain way because it is made of glass.
Steps to follow to clean the glass cup:
 - Wash the glass measuring cup in warm detergent soap, paying attention to the brim, spout, inside glass and handle.
 - Rinse the cup in clean warm water that contains baking soda. (This will remove odours.)
 - Place the cup on a rack to dry or wipe with a clean dish cloth with the dish cloth spread in both palms so that no finger prints will be left on the cup.**Stainless steel knife:**
Learners organise the items they will use for the demonstration, for example, detergent, Brasso or vinegar, sponge, lemon or baking soda.
They inform the class of the objective of the demonstration, for example, to care for a stainless steel knife in a certain way because it is made from stainless steel.
Steps to follow to clean a stainless steel knife:
 - Wash the knife in warm detergent water with the blade facing away from you.
 - Add lemon or baking soda to the rinsing water if the handle is wooden.
 - Polish the stainless part of the knife using Brasso or vinegar.
 - Place the knife to dry on a rack particularly if the handle is wooden.

7.2 Reflective practice or diagnostic assessment exercises

Questions teachers can ask themselves:

1. Can learners identify and classify the types of measuring and marking-out tools and equipment?
2. How well were learners able to state the uses of each measuring and marking-out tool and piece of equipment in the food laboratory?
3. Did learners take part in a discussion of the importance of measuring and marking-out tools?
4. How well were learners able to sketch and label parts of measuring and marking-out tools. Did they display their sketches for appraisal?
5. Could learners demonstrate using measuring and marking-out tools and equipment in the food laboratory?
6. Did learners share experiences from home about caring for food production equipment?
7. How many learners took part in the discussion about cleaning agents or materials we use to clean and maintain tools and equipment based on the materials that were used to make different tools?
8. Did a few learners demonstrate how to care for measuring and marking-out tools and equipment depending on the materials that were used to make the tools?

8. Answers

ACTIVITY 3.1

LB page 68

Learners work in pairs.

1. Learners identify the tools shown on page 69 in the Learner's Book.
2. **a) Measuring tools:** measuring cup, steel rule, tape measures (soft and metal), folding rule
Marking-out tools: kitchen knife, pencil, scribe, tailor's chalk, profile board and peg, marking gauge, dividers
3. Learners discuss and complete the table as far as possible. See the table in Activity 3.2.

ACTIVITY 3.2

LB page 70

Learners work on their own (question 1), in pairs (questions 2 and 3) and as a class (question 4).

1. Learners write a sentence about each tool on page 69.
2. Learners compare their sentences about the tools.

3.	Place of work	Measuring tool	Marking-out tool
	Food laboratory (kitchen)	measuring cup	kitchen knife
	Sewing workshop or laboratory	tape measure (soft)	pencil, tailor's chalk
	Building site	tape measure (metal)	profile board, peg, chalk
	Wood workshop	tape measure (metal), folding rule	pencil, marking gauge
	Metal or plastic workshop	tape measure (metal), steel rule	scriber, dividers

4. Learners take part in a class discussion about the tools.

ACTIVITY 3.3

LB page 71

Learners work on their own.

1. **Dry measuring:** A kitchen scale, E olonka
Liquid measuring: B measuring cups
Liquid and dry measuring: B measuring cups, C measuring spoons, D measuring jug, F measuring tins
2. Learners sketch two tools and label their drawings using pencil/paper or an MS WordPad.

ACTIVITY 3.4

LB page 73

Learners work in pairs.

1. A **Tape measure:** take body measurements and measure fabric
B **Yard rule:** check hems and draw long lines (The tool is also called a yardstick or metre rule.)
C **Tailors chalk:** draw lines on fabric before you cut it
D **Pencil:** record and draw lines and on fabrics

2. Measuring tools for sewing	Marking-out tools for sewing
Tape measure	Tailors chalk
Yard rule or metre rule	Pencil
Clear ruler	

3. Learners demonstrate how to use tools:
Tape measure: Spread fabric on a flat surface. Make sure tape measure is flat with the metal end exactly at the edge from where you will take the measurement.
Yard rule: Measure from the floor to the hem length of a garment and draw straight lines.
Tailor's chalk: Measure and plot measurements on fabric. Draw lines on fabric before you cut it.
Pencil: Record measurements and draw lines on fabrics.
4. Learners' drawings should match those in the Learner's Book. They use pencil/paper or an MS WordPad.

ACTIVITY 3.5

LB page 75

Learners work in pairs.

1. A a) The contractor is measuring the length of a wall.
b) He is using a measuring tape.
B a) The contractor is building a wall that is at right angles to the ground.
b) He is using a try square.
C a) The person is mixing the correct quantities of dry ingredients.
b) The person is using a mixing bowl.
D a) The photo shows the ingredients for dough: flour in a measuring jug, eggs and milk.
b) The person has used a measuring jug and measuring cups.
2. Learners demonstrate how to use a tape measure and a straight edge.
3. Learners sketch a head pan and describe in a paragraph how it is used for measuring.

ACTIVITY 3.6

LB page 76

Learners work in groups of five.

Each group works with a tool or piece of equipment. Learners may use MS PowerPoint for presentations. Use the rubric, *Demonstration: artefacts/tools* on page 116 of this Guide to assess presentations.

ACTIVITY 3.7

LB page 79

Learners work on their own.

1. a) marking gauge
c) try square
e) tape measure
b) folding rule or tape measure
d) marking knife

Accept all valid reasons based on, but not limited to, the content on pages 77 to 79.

2. Teachers can use the rubric, *Writing a paragraph/report* on page 119 of this Facilitator's Guide.
3. Teachers check learners' labelled sketches if a try square for accuracy and correct labelling.

ACTIVITY 3.8

LB page 83

Learners work in small groups.

1. **A Plastic pipes:** tape measure and callipers **B Soap dish:** tape measure
C Paper plate: steel rule and dividers **D Plastic pieces:** dividers and steel rule
2. Accept all valid reasons based but not limited to the content on pages 81 to 82.
a) tape measure **b)** tape measure or steel rule **c)** callipers and dividers

ACTIVITY 3.9

LB page 83

Learners work on their own.

1. Learners may use pencils and paper or an MS WordPad to complete their sketches. Each sketch must include the correct labels.
2. The outcome could include a combination of problems, such as the pieces not fitting together, some pieces that are not the correct size, pieces that are out of proportion.
Teachers can accept any reasonable answer as long as the learner has justified it. Answers should not be longer than three or four sentences.

ACTIVITY 3.10

LB page 84

Learners work in groups.

Groups discuss their experiences of measuring and using marking-out tools at home. The aim is for learners to relate what they have learnt to their lives. Learners do not have to take notes. Teachers should walk around the class and listen to the conversations. Encourage all learners to participate. If time allows, learners can broaden their discussions to include other ingredients or measuring tools.

ACTIVITY 3.11

LB page 86

Learners work in pairs.

1. **a)** Learners must motivate their suggestions for a good storage space for a steel rule. Teachers can establish such a storage space if one does not exist.
b) Answers can include closing cupboard doors, using storage boxes and wrapping the steel rule in cloth. Encourage learners to be practical and make cost-effective suggestions.
c) If the gradations on a steel rule are damaged, you cannot use it to make measurements. If the edges of a steel rule are damaged, the rule will not provide a straight smooth line.
d) Learners demonstrate how to wash a steel rule.
2. **a)** A plastic, B metal, C steel
b) Learners discuss how to clean plastic and metal (see page 85 in the Learner's Book).
3. Refer learners to the cleaning processes on page 85 of the Learner's Book.
a) A marking knife is made of steel.
b) A try square can be made of wood, plastic or steel.
4. Dividers should be oiled as they have metal parts that move. Oiling them will ensure that they work smoothly and accurately. It is important to apply only a little oil; too much can stain metal.

Learners work in groups to clean a measuring or marking-out tool.

Use the rubric, Demonstration: artefacts/tools on page 116 of this Guide to assess learners' skills.

Linking Topics 3.1 and 3.2: Measuring and marking out to cutting and shaping

Questions

1. Why is it important to measure and mark out materials in food laboratories and sewing workshops?
2. Imagine you are preparing a cake in the food laboratory. How does measuring and marking out the cake batter ensure a good final product?
3. How can inaccurate measuring and marking out affect cutting and shaping in a wood workshop?
4. Why is it important to secure a workpiece before sawing wood? Relate it to measuring and marking out.
5. Why is proper care and maintenance of rulers important?
6. Describe the steps involved in creating a shirt, and explain how measuring and marking out, as well as cutting and shaping, are crucial in this process.

Answers

1. Measuring and marking out ensures precise cuts, and proportions, and avoids wasting materials.
2. Measuring ingredients and marking the cake pan ensures the cake bakes evenly and has the desired size and shape.
3. Inaccurate measuring and marking out leads to uneven cuts, wasted materials, and difficulty during assembly.
4. Securing a workpiece prevents movement and ensures the saw cuts in the intended location, which relates to the accuracy of measuring and marking out.
5. Proper care of rulers prevents wear and tear that could affect their accuracy, leading to mistakes in measuring and ultimately cutting or shaping materials.
6. The tailor would first measure the customer, then mark out the pattern on the fabric based on those measurements. Accurate cutting and shaping of the fabric pieces create a well-fitting shirt.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider the importance of accurate readings on measuring tools for precise cutting and shaping. Discuss how damaged or worn-out tools could lead to inaccurate measurements.
- Question 6: Encourage students to break down the process into steps, highlighting how measurements are taken for different parts of the shirt (e.g., sleeves, collar) and then marked on the fabric before cutting. Marked lines guide the cutting process to achieve the desired shape.

Topic 3.2 Cutting and shaping

Content standard

- B7.3.2.1: Demonstrate understanding of cutting and shaping tools and equipment used for production.

Indicators

- B7.3.2.1.1: Identify cutting and shaping tools and equipment used for production.
- B7.3.2.1.2: Use appropriate skills when cutting, chopping, slicing, dicing and shaping products.
- B7.3.2.1.3: Demonstrate how to care for and maintain cutting and shaping tools used for production.

Core competencies

- **Communication and collaboration (CC)**
 - CC 8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.
 - CP6.7: Implement strategies with accuracy.

1. Introduction

Artefacts

After marking out measurements for an artefact, workers can prepare for production in the cutting and shaping stage. In this topic, learners will learn to identify cutting and shaping tools, use appropriate skills and learn how to care for and maintain the tools.

Sewing

In this topic, the focus is on identifying cutting and shaping tools and equipment people use for sewing. Good sewing tools makes it easy to sew and they help people complete sewing projects or tasks.

When working with cutting and shaping tools, the focus is on:

- identifying the types of tools and equipment needed for cutting and shaping in a sewing centre
- demonstrating how to care for and maintain cutting and shaping tools that are used for production.

Food production

In food production, cutting and shaping tools and equipment are very important. Cutting tools help us to achieve different food textures, which create variety and get rid of monotony. Shaping tools and equipment help people to shape food into desired shapes. In this topic, the focus is on using real objects to identify and classify types of cutting and shaping tools and equipment. Learners will discuss the uses of different tools and pieces of equipment, discuss the importance of each one, sketch and label the parts of cutting and shaping tools and display sketches for appraisal, demonstrate how to use the cutting and shaping tools and equipment, share experiences from home about how to care for tools and equipment used for food production, and discuss cleaning agents or materials we use to clean and maintain tools and equipment based on the materials that are used to make the tools. Finally, the focus is on demonstrating how to care for cutting and shaping tools and equipment according to the material that were used to make them.

2. Learning expectations

Learners need to be able to:

- Identify cutting tools in a kitchen, sewing workshop, building site, wood workshop and metal or plastic workshop.
- Demonstrate the appropriate techniques for cutting, chopping, slicing and dicing food.

- Demonstrate the appropriate techniques for cutting, paring, and moulding wood, metal and building materials.
- Share experiences about how to care for, and maintain cutting and shaping tools and equipment for production.
- Identify cleaning agents we use to clean tools and equipment according to the material that is used to make cutting and shaping tools.
- Demonstrate how to care for and maintain cutting and shaping tools and equipment according to the material that is used to make them and take part in a class discussion.

Duration

Artefacts: Teachers can teach this topic in eight periods.

3. Resources needed

- Learner's Book
- Charts about artefacts
- Charts with information about cutting and shaping tools and equipment
- Real objects (cutting and shaping tools and equipment)
- A4 sheets of paper, flip charts and pieces of cardboard
- Specimen workpieces or artefacts and materials
- Charts with information about cutting and shaping tools and equipment
- Videos about procedures for cutting and shaping food
- Cutting and shaping tools (knives, biscuit cutters, cake tins, loaf tins, chopping boards and so on)

4. Using ICT

When teaching this topic, teachers can use laptops, projectors, pen drives, PowerPoint presentations, and MS WordPads to sketch the cutting and shaping tools and equipment.

Activities that require ICT

Page	Activity	ICT required
–	Homework	Draw and label different tools.
–	Homework	Draw and label one cutting and one shaping tool that are used in sewing.
90	3.15	Question 3: Draw a scoop and a mould.

Artefacts

5.1 Preparation

The teacher should:

- Read and research information about cutting and shaping tools and equipment.
- Prepare teaching and learning resources (preparing charts, Power Points presentations and find real-life objects, artefacts or workpieces and materials, videos)
- Do research about how to cut or shape workpieces.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, pair work

5.3 Relevant background knowledge

Learners have seen seamstresses and tailors, food vendors, woodworkers, metalworkers and block or brick layers cutting before they join and assemble parts in their workplaces.

Sewing

5.1 Preparation

The teacher should:

- Find information about cutting and shaping tools and equipment and how to use these tools.
- Prepare teaching and learning resources (prepare charts and find real-life objects).
- Research methods for caring and maintaining cutting and shaping tools in a sewing workshop.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, demonstration, pair work

5.3 Relevant background knowledge

Learners have fair knowledge about cutting and shaping. They have seen dressmakers cut and shape articles using cutting and shaping tools.

Food production

5.1 Preparation

The teacher should:

- Find information about measuring and marking-out tools and equipment.
- Prepare teaching and learning resources that are relevant to lessons about measuring and marking-out tools and equipment.
- Find videos on the internet that support lesson.
(An example is <https://youtu.be/coxVzC4tcYw>)

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, demonstration, pair work, games

5.3 Relevant background knowledge

Learners have fair knowledge of cutting and shaping tools and equipment. Many learners will cut oranges before they eat them. Others will have watched and helped their parents and guardians use loaf tins when baking bread. Learners can also identify a few cutting and shaping tools in the kitchen.

6. Suggested homework

Below are suggestions for additional activities for homework.

1. Make a freehand pictorial sketch of each tool and label its parts. If possible, use an MS WordPad.

a) rip saw	b) crosscut saw	c) firmer chisel
d) spoke shave	e) rasp file	f) bolster
g) brick hammer	h) mould box	i) coping saw
j) hand file	k) junior hacksaw	l) hacksaw
m) backsaw	n) flat chisel	o) hand drill
2. Use pencil and paper or an MS WordPad to sketch and label one cutting and one shaping tool that are used in a sewing centre.
3. Prepare a cleaning agent using a local material such as egg shell.

7. Assessment

Artefacts

7.1 Assessment questions

1. a) Explain why we cut fabric before we sew or join pieces of fabric.
b) Why do we saw wood into pieces before we join or assemble an artefact?

2. We all use wooden tables and chairs. List five tools we can use to cut or shape wooden tables and chairs.
3. State the use of each tool we use to cut and shape material.

a) hand saw	b) hacksaw	c) backsaw
d) coping saw	e) junior hacksaw	f) biscuit cutters
g) bolster	h) brick hammer	i) cake tin
j) chisel	k) cold chisel	l) drill
m) file	n) French curve	o) paring knife
p) bread knife	q) mould box	r) mould
s) scissors	t) pinking shears	u) rasp file
v) scoop	w) seam ripper	x) spoke shave
4. Group all the tools in question 3 into the following groups.
 - a) Tools used in food production
 - b) Tools used in wood work
 - c) Tools used in metal work
 - d) Tools used in building work
 - e) Tools used in sewing production
5. Explain the following.
 - a) slicing
 - b) dicing
 - c) chopping
6.
 - a) Name three types of saws that are used in woodwork.
 - b) Distinguish between a rip saw and a cross-cut saw.
 - c) Which three pieces of equipment or tools can be used to secure a workpiece?
7. Give the steps to follow to use a backsaw to cut or shape a piece of wood.
8.
 - a) Which two types of saws can we use when sawing metal or plastic?
 - b) Explain how we use the two types of saw to which question (a) refers.
 - c) Explain how to use a hacksaw to saw a piece of metal or plastic.
9.
 - a) Define the term pairing as it is used in woodwork.
 - b) Which techniques are used in pairing?
 - c) Explain how to use a hand file.
10.
 - a) Define the terms mould and moulding.
 - b) List all the equipment you will need to mould a metal.
 - c) How do contractors use a mould box in building work?
11. Explain how to care and maintain cutting and shaping tools using each method.
 - a) cleaning
 - b) sharpening
12. Explain how to care for and maintain the tip on each tool.

a) plane	b) hand saw	c) chisel
d) file	e) rasp file	f) scissors
g) kitchen knife	h) biscuit cutter and pan	

Answers

1.
 - a) We cut fabric into pieces that will fit together to form a garment.
 - b) We saw wood into parts that it will fit together to form a piece of furniture.
2. Tools we use to cut or shape wood: hand saw, backsaw, chisel, drill and file
3.
 - a) **hand saw**: Cut long lengths of wood
 - b) **hacksaw**: Make straight cuts in metal and plastic.
 - c) **backsaw**: Cut short lengths of wood.
 - d) **coping saw**: Cut circles and curves in wood.
 - e) **junior hacksaw**: Make precise, small cuts in metal and plastic.
 - f) **biscuit cutters**: Cut biscuit dough in different shapes.
 - g) **bolster**: Split open or bricks and blocks.

- h) **brick hammer:** Break off pieces of rocks and cut stone.
 - i) **cake tin:** Pour cake mixtures into tins before baking.
 - j) **chisel:** Cut and shape wood (large chunks or shavings).
 - k) **cold chisel:** Cut, shear and chip metal and stone.
 - l) **drill:** Make round holes in wood, metal and plastic.
 - m) **file:** Shape and smooth surfaces of metal, plastic and wood.
 - n) **French curve:** Draw curves in, for example, dress patterns.
 - o) **paring knife:** Cut, chop and slice fruits and vegetables.
 - p) **bread knife:** Slice bread.
 - q) **mould box:** Shape and form bricks or blocks.
 - r) **mould:** Give a food dish or artefact a specific shape.
 - s) **scissors:** Cut fabric, paper and other thin materials.
 - t) **pinking shears:** Cut fabric and prevent edges from fraying.
 - u) **rasp file:** Shape wood coarsely.
 - v) **scoop:** Form ice cream and soft fruit into ball shapes.
 - w) **seam ripper:** Remove stitches, open seams and cut threads.
 - x) **spoke shave:** Shape curves in wood.
4.
 - a) Tools used in food production: scoop, mould, bread knife, paring knife, cake tin, biscuit cutters
 - b) Tools used in woodwork: spoke shave, rasp file, drill, chisel, backsaw, hand saw, coping saw
 - c) Tools used in metalwork: file, drill, cold chisel, junior hacksaw, hacksaw
 - d) Tools used in building work: mould box, cold chisel, brick hammer, bolster
 - e) Tools used in sewing production: seam ripper, pinking shears, pair of scissors, French curve
 5.
 - a) Slicing means cutting something into even pieces, keeping the outer shape intact. Examples include loaves of bread, vegetables, fruit and cheese.
 - b) Dicing is cutting ingredients into small cubes that are all the same size.
 - c) Chopping is cutting ingredients without a definite shape such as a cube or a slice. For example, we chop vegetables such as onions and peppers into small chunks for recipes and we chop herbs finely.
 6.
 - a) Rip saw, crosscut saw, backsaws (tenon saw and dovetail saw)
 - b) We use a rip saw to cut along the grain of wood and a crosscut saw to cut across the grain of wood.
 - c) Bench hook, G-clamp, bench stop, woodworker's vice or engineer's vice
 7. Steps to follow to use a backsaw to cut or shape a piece of wood:
 - Secure the wood on a workbench.
 - Measure and mark a cut line along the grain of the wood.
 - Hold the handle of the backsaw in your right hand with your index finger pointing forward in the direction in which you will saw so that you support and guide the blade.
 - Hold the saw at a right angle to the wood and draw the saw back a few times to make a small groove.
 - Use the full length of the blade and long, steady push strokes when sawing. Do not push too hard on the saw. If you push too hard, the saw will stick.
 - At the end of a stroke, lift the saw up and start again.
 - When you have almost cut through the wood, saw more gently and support the wood to stop it from tearing or splintering.
 8.
 - a) Hacksaw and junior hacksaw
 - b) Use a hacksaw to make straight cuts in metal.
Use a junior hacksaw to make precise cuts in metal and on smaller workpieces that are difficult to handle.
 - c) Steps to following when using a hacksaw to saw metal or plastic:
 - Clamp the work firmly in an engineer's vice.
 - Stand with your left leg forward, and start to saw using a light stroke. Use your left thumb as a guide. The saw should move backwards on the first mark.

- Make sure at least three teeth are in contact with the workpiece to prevent the blade from breaking.
 - Using the full length of the blade, gradually increasing pressure on the forward stroke and releasing it on the backward stroke.
 - Saw with steady even strokes. Keep the blade straight.
 - Finish the cut with light strokes, moving the left hand to support the waste section.
9. a) Paring is the process of using a chisel to remove fine shavings from a workpiece.
- b) Techniques used in paring:
- Pare across the grain to produce a clean cut. The fibres will separate and curl away easily.
 - Paring with the grain causes splintering and it is difficult to control the size of the piece of wood that is cut off.
 - To pare horizontally, hold the chisel loosely in the palm of your left hand (if you are right-handed). Hold the handle of the chisel in your right hand and rest it on the work bench. Guide the blade through your clenched left hand.
 - Always work on a chiselling board when paring vertically. Hold the chisel like a dagger in your dominant hand. Hold the blade in your other hand and guide it with a finger and your thumb.
- c) How to use a hand file:
- Secure the piece of work in a vice.
 - Use cross-filing to remove material. To cross-file, hold the file with both hands and move it across the workpiece in one direction.
 - Use draw-filing for a smooth finish. To draw-file, hold the blade in both hands, with one hand on each side of the work. Move the file back and forth over the surface.
10. a) A mould (noun) is a hollow form that is shaped according to a design or pattern.
Moulding (verb) is the process of shaping a material by pouring or pressing the material into a mould.
- b) Equipment needed to mould a metal:
- mould frame
 - parting dust (to prevent the material from sticking to the mould)
 - moulding sand (also called foundry sand)
 - leather gloves, boots and protective eyewear.
- c) Contractors use a mould box to shape mortar or concrete into blocks or bricks.
11. a) Never store tools without cleaning them. The material that was used to make a tool determines how you must clean the tool:
- Use a clean cloth to wipe metal and wooden parts. Keep the wooden parts dry. Do not leave them in water. If necessary, wash metal tools in warm water, but then dry the tools thoroughly.
 - Use Silvo to clean the metal parts of a tool and remove stains, dirt, tarnish and grease build-up. You can also use sifted egg shells as a mild abrasive, or wood ash with lemon or pawpaw leaves to clean aluminium and galvanised tools.
 - Oil keeps the metal parts of cutting and shaping tools in working order. To oil a tool, soak a piece of cloth in oil and rub over the metal parts. Do not use oil on files and rasps.
 - Take special care when cleaning a file. Do not use oil on its teeth. Waste material often clogs a file's teeth. This is called pinning. To minimise pinning, rub chalk into a file's teeth. Use a file card to clean a file's teeth. (A file card is a brush that has wire bristles.) Use a file pick (brass needle) to remove pins you cannot remove with a file card.
- b) In order to work properly, the sharp parts on cutting and shaping tools must be sharp. Guidelines to ensure that they will be sharp:
- Store each sharp tool in a separate place, so that it will not become blunted by rubbing against another sharp tool. Store cutting tools on racks rather than in drawers. Always hang up chisels and saws.
 - Avoid throwing tools down after you have used them or allowing them to touch other tools as doing so may damage cutting blades and edges.
 - Sharpen cutting tools regularly.

- Store each tool in a dry place. Dampness cause metals to rust, which will reduce their effectiveness as cutting tools. Dampness will also weaken the wooden parts of tools such as handles. Over time, this can cause the wood to rot or to split. If you wash tools in water, dry them thoroughly before you store them to prevent damage by moisture.

12. a) Plane: Lay a plane on its side and not on its sole to avoid damaging the blade.

Rub the sole with steel wool to get rid of rust.

Regularly oil the sole and the knobs lightly.

b) Hand saw: When not in use, place a plastic guard over the saw teeth to protect them.

Use a file to trim and sharpen a saw's teeth.

c) Chisel: Hang chisels on a rack after use.

Only store a chisel in a drawer or tray if it is in a storage roll or wrapped in a cloth or plastic bag that has a slot for each chisel.

d) File: Hand files are brittle and damaged easily and so they should be stored separately on a tool rack. Do not allow files to rub against other files.

Do not use a file on hardened steel.

To prevent rust, keep files away from acids.

Never oil a file as oil will clog its teeth and reduce friction.

Never use a file without a handle, even if its handle is fitted separately.

e) Rasp file: Do not rub a rasp file.

Use a file wire to clean a file's teeth.

f) Scissors: Do not let scissors get wet or damp.

Only cut fabric or thread with sewing scissors.

When sewing, do not insert pins along cutting lines as the edge of the scissors can be damaged when you cut the fabric.

g) Kitchen knife: Sharpen a knife regularly.

Use a honing rod to straighten the edge of a kitchen knife blade and make the blade straight and sharp again.

Never cut on a marble countertop, glass plate, ceramic baking tray, steel tray and on a similar surface that is not designed for cutting.

Use the spine of a knife to scrape vegetables off a cutting board.

Do not store knives in a drawer. A knife's delicate blade will be damaged when it moves around and rubs against other utensils in a drawer.

h) Biscuit cutter and pan: Keep the metal cutting tools clean and remove food particles, particularly from the corners. Wash the tools in warm detergent water, rinse them thoroughly and dry them thoroughly.

Use fine steel wool to remove rust.

7.2 Diagnostic assessment exercises

1. How well were learners able to describe how to cut fabric and saw wood before assembling the parts?
2. Could learners list five tools that can be used to cut or shape wooden furniture?
3. How well could learners explain how to use tools for cutting and shaping?
4. Could learners group all the tools according to their uses?
5. How well did learners explain different cutting techniques?
6. Did learners name the three types of saws that are used in woodworking correctly?
7. Could they explain how to use a back saw?
8. Could they define various terms used in woodworking and building work?
9. Did learners know which tools to use for which functions?
10. How well did learners explain how to clean and care for the different tools?

Sewing

7.1 Assessment questions

1. What tool do we use to cut fabric?
2. Give two reasons why it is necessary to cut fabric in a sewing centre.
3. Which two tools are used to cut fabric in a sewing workshop?
4. How are shaping tools used in a sewing workshop?

Answers

1. scissors
2. Reasons why we cut fabric (any two):
 - We cut fabric to create the shapes we need.
 - We cut fabric to remove unwanted stitches or seams.
 - Cutting fabric helps neaten the raw edges of fabric or items.
3. Scissors and pinking shears
4. We use shaping tools to form the shapes we need.

7.2 Diagnostic assessment exercises

1. How well were learners able to identify cutting tools and equipment that are used in production?
2. Were learners able to identify shaping tools and equipment for production?
3. How well were learners able to demonstrate how to care for and maintain cutting and shaping tools that are used for production?

Food production

7.1 Assessment questions

1. Identify and classify cutting and shaping tools and equipment.
2. Discuss how we use cutting and shaping tools.
3. Demonstrate appropriate techniques people use in food production when cutting, chopping, slicing and dicing.
4. Explain each technique after the demonstration (question 3).
a) cutting **b)** chopping **c)** slicing **d)** dicing
5. Take part in a discussion about caring for and maintaining cutting and shaping tools and equipment that are used in food production.
6. Identify cleaning agents you can use to clean tools and equipment according to the materials from which cutting and shaping tools are made.
7. Demonstrate how to care for and maintain cutting and shaping tools and equipment according to the materials from which these items are made, and take part in a class discussion.

Answers

1. **Cutting tools and equipment:** bread knife, paring knife, peeler
Shaping tools and equipment: mould, cake tin, scoop
2. Ways in which we use cutting and shaping tools:
 - Use knives for cutting.
 - Use biscuit cutters to cut biscuit mixtures or dough into different shapes.
 - Use a mould to give a food dish or artefact a specific shape.
 - Use a bread knife to slice bread.
 - Use a cake tin when baking cake so that the cake will have the desired shape.
 - Use a paring knife to cut, chop and slice fruits and vegetables.
 - Use a scoop to form ice cream and reform soft fruit into ball shapes.
 - Use a peeler to remove the peel from fruits and vegetables.

3. Demonstrate slicing an onion:
 - Cut the onion in half and place the cut side on the cutting board.
 - Cut off the root end of the onion so that you will be able to peel the onion to remove the outer skin.
 - Use a V-cut to remove the core.
 - Hold the onion firmly under your fingertips. Using your fingers as a guide, cut the onion into even sizes.
4.
 - a) Cutting is the process of dividing food items such as vegetables and meat into portions.
 - b) Chopping is the process of cutting vegetables such as onions and peppers into small chunks for recipes. You can also chop herbs finely.
 - c) Slicing is the process of cutting vegetables into pieces that are the same width and keeping the outer shape whole.
 - d) Dicing is the process of cutting fruit and vegetables into small cubes that are the same size.
5. Encourage learners to share experiences about how to care for and maintain cutting and shaping tools for production.
6. Materials you can use to take care of tools and equipment:
 - **Plastic:** sponge and detergent
 - **Stainless steel:** sponge, detergent, Brasso, grounded and sifted egg shell, vinegar
 - **Wood:** sponge, detergent, lemon or baking soda (to remove odours)
 - **Aluminium:** sponge, detergent, Brasso or cream of tartar, vinegar
 - **Glass:** sponge, detergent, baking soda
 - **Silicon:** sponge, detergent
7. Demonstrate how to biscuit cutter:
 - Organise the items you will use for the demonstration.
 - Tell learners what the objective is of the demonstration: take care of a biscuit cutter.
 - Remove particles of pastry dough from corners of the cutter.
 - Wash the biscuit cutter in warm soapy water.
 - Rinse the biscuit cutter thorough and dry it.
 - Oil a metal biscuit cutter.

Demonstrate how to clean a baking tray or a cake tin:

- Organise the items you will use for the demonstration (for example, detergent, Brasso or vinegar, sponge, lemon or baking soda).
- Tell learners what the objective is of the demonstration: take care of an aluminium baking tray or a cake tin
- Use a tooth pick or a pointed stick to remove particles of cake from corners of cake tin.
- Wash the baking tray or cake tin in warm soapy water.
- Rinse the baking tray or cake tin thoroughly.
- Leave the tray or the tin to dry or dry it with a clean cloth.
- Wrap the tray or the tin in rubber and store it in a cupboard to prevent dust settling on it.

7.2 Reflective practice or diagnostic assessment exercises

1. How well were the learners able to identify and classify cutting or shaping tools and equipment?
2. How many learners took part in the discussion about the uses of cutting and shaping tools?
3. How effective were the demonstrations of appropriate techniques for cutting, chopping, slicing and dicing food? How many learners were involved in the demonstrations?
4. How well were learners able to explain cutting, chopping, slicing and dicing?
5. How well did learners share experiences about how to care for and maintain cutting and shaping tools and equipment for food production?
6. How well were learners able to identify the cleaning agents to use to clean tools and equipment according to the material from which tools and equipment were made?

7. How good were the demonstrations about how to care for and maintain cutting and shaping tools and equipment according to the materials from which the tools and equipment were made? How many learners took part in the class discussion?

8. Answers

ACTIVITY 3.13

LB page 87

Learners work in groups.

This is a preparation activity and the answers are given in the Learner's Book. Teachers should walk around the class and monitor discussions.

ACTIVITY 3.14

LB page 89

Learners work in pairs.

1. The cold chisel is made only of steel and has a thick, wide chisel. It is used to remove waste metal. The firmer chisel has a thinner rectangular chisel with a wooden handle. It is used to cut and shape wood.
2. We use a metal file to shape and smooth metal and plastic surfaces.
We use a rasp file to shape wood coarsely.
3. Learners identify three types of file: a) a flat file, b) a square file and c) a rectangular file.
Teachers can label the tools (A, B, C, and so on) and ask learners to write the correct letter for each type of file.

ACTIVITY 3.15

LB page 90

Learners work on their own.

1.	Wood workshop	Building site	Metal and plastic workshop	Kitchen	Sewing workshop
	file card drill and bit rasp file cold chisel spoke shave firmer chisel tenon saw hand saw	mortise chisel bolster brick hammer mould box	metal file file card drill and bit cold chisel hacksaw junior hacksaw coping saw	biscuit cutters cake tin paring knife bread knife scoop mould	French curve seam ripper scissors pinking shears needles and thread

2. **a)** Cut through a plastic pipe before installing it: hacksaw
b) Cut a hole in a wooden board: drill and bit
c) Cut the joints to make a small wooden tray: chisel
d) Cut timber into long floor boards: handsaw
e) Make a clean trough a thin metal tube: junior hacksaw
3. Learners should identify the scoop and the mould. They can use a pencil and paper or an MS WordPad to draw and label their food artefacts or dishes.

ACTIVITY 3.16

LB page 93

Learners work in pairs.

Teachers can use the rubric, *Food preparation/demonstration* on page 116 of this Facilitator's Guide. If learners are doing peer assessment, teachers should give them copies of the rubric.

ACTIVITY 3.17

LB page 96

Learners work in pairs.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide. If learners are doing peer assessment, teachers should give them copies of the rubric.

ACTIVITY 3.18

LB page 99

Learners work on their own.

1. Learners do research using books or the internet to find information about metal moulding. If there is a foundry in your community, teachers can find information about the process to share with the class.
2. Teachers can use the rubric, *PowerPoint presentation/oral* on page 118 of this Facilitator's Guide.

ACTIVITY 3.19**Practical: Demonstrate a cutting or shaping technique**

LB page 100

Learners work in groups of six.

Learners follow the instructions in the Learner's Book. If necessary, teachers can make copies of the pages in the Learner's Book for groups to refer to as they work.

1. Each group member is allocated a cutting or shaping technique.
2. Each group member reads the text about their technique.
3. Learners who are working with the same technique from all groups work together.
4. Learners prepare a demonstration about how to carry out the technique.
5. Once they are ready with their demonstrations, they return to their original groups.
6. Learners take turns to demonstrate the technique to their original group.
7. Groups discuss demonstrations.

ACTIVITY 3.20

LB page 101

Learners work in pairs.

Learners discuss the methods they use at home to clean rust from cutting tools. Example answers:

Method 1

- Mix water and baking soda to form a thick paste.
- Spread the paste over the metal, making sure that rusty spots are covered well.
- Leave the paste on the rusty areas for an hour.
- Use steel wool or a wire brush to scour the object and remove the rust.
- Rinse the paste off with water and dry the cutting tool thoroughly.

Method 2

- Soak the rusty metal object in white vinegar for a couple of hours.
- Wipe the tool to remove the rust.
- If the object is too large to soak in white vinegar, pour white vinegar evenly over the surface of the object and allow it to settle before rinsing it off the tool.

Learners work in groups.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

Linking Topics 3.2 and 3.3: Cutting and shaping to joining and assembling

Questions

1. Recall the different cutting and shaping skills we learned about, such as sawing wood. What is the purpose of these skills in various workshops?
2. Imagine you are building a wooden stool in the workshop. How does accurate cutting and shaping of the wooden pieces affect the final assembly process?
3. We learned about different joining and assembling techniques like soldering. List everyday objects where soldering is used, and how it connects to cutting and shaping.
4. Consider the materials used for joining in food production, such as egg white. How do these joining materials help create a final product, and how might they be related to cutting and shaping techniques?
5. Why do you think proper care and maintenance of cutting and shaping tools, such as saws, is important for successful joining and assembly in workshops?
6. Imagine you are working in a sewing workshop. Describe the steps involved in creating a simple bag, and explain how both cutting and shaping, as well as joining and assembling, are crucial in this process.
7. List other examples in everyday life where successful joining and assembling relies on accurate cutting and shaping beforehand.
8. Research a specific joining or assembling technique used in a particular workshop (e.g., dovetail joint in carpentry). Present your findings to the class, explaining how this technique connects to the accurate cutting and shaping of materials.

Answers

1. Cutting and shaping skills prepare materials for proper joining and assembly, ensuring a strong and functional final product.
2. Accurate cuts and shapes ensure the wooden pieces fit together seamlessly during assembly, creating a stable and visually appealing stool.
3. Examples: electrical wires in electronics, jewellery pieces. Soldering requires precise cutting and shaping of the metal components to ensure a good surface area for a strong and secure join.
4. Joining materials in food (like egg white in meringues) help bind ingredients together and create the desired structure of the final product. The way ingredients are cut and shaped (e.g., whisking egg whites) can also influence how well the joining materials function.
5. Dull or damaged cutting and shaping tools can lead to uneven cuts, which can make it difficult to join pieces together properly during assembly.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider how improper cuts can create gaps or misalignments that hinder a secure join. Properly maintained tools ensure precise cuts, leading to easier and more successful joining and assembly.
- Question 6: Encourage students to break down the process into steps. They might mention cutting the fabric pieces based on a pattern (shaping), followed by joining the pieces using sewing techniques (assembling) to create the final bag.
- Question 7: Examples could include assembling furniture (requiring pre-cut pieces for proper fit), building models (precise cuts for accurate connections), or even putting together a jigsaw puzzle (cutting the image into pieces requires a specific shape for successful assembly).

Topic 3.3 Joining and assembling

Content standard

- B7.3.3.1: Demonstrate understanding of joining and assembling materials, tools and equipment used for production.

Indicators

- B7.3.3.1.1: Describe joining and assembling materials, tools and equipment used for making artefacts or products.
- B7.3.3.1.2: Use appropriate skills for joining and assembling artefacts using the materials, tools and equipment.

Core competencies

- **Communication and collaboration (CC)**
 - CI 6.10: Reflect on work and explore thinking behind thoughts and processes.
- **Critical thinking and problem-solving (CP)**
 - CP5.1: Ability to combine information and analyse to make distinct judgement appropriately.
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.
 - CP6.7: Implement strategies with accuracy.

1. Introduction

Artefacts

Joining and assembling materials is an important technology in many manufacturing industries. Different parts are used in most products. These parts are assembled and fastened using rivets, seaming, clamping, soldering, brazing, welding and by using adhesives.

Choosing the correct method to join parts can ensure that a product is structurally and economically sound. The many factors that influence these choices include production economics and mechanical properties such as strength, vibration damping and durability, corrosion or erosion resistance, as well as the ability to correct defects.

The focus of this topic is to equip learners with the knowledge they need to be able to detect, describe, and use the appropriate skills to join and assemble materials using the correct tools and equipment.

Sewing

Good sewing tools make it easy to sew. This topic identifies joining and assembling tools and equipment people need for sewing production.

Food production

Substances such as corn starch, gluten, tapioca, gelatine, egg white and milk are used to join ingredients. These substances are called food binders because they thicken, help keep the shape of food items, and give food a smoother and more appealing texture. In this topic, learners will gather information, discuss topics, make and display albums, and demonstrate the appropriate techniques to use when joining and assembling materials in food production.

2. Learning expectations

Learners need to be able to:

- Identify joining and assembling materials, tools and equipment used for sewing and crocheting, food production, woodwork, metal work or plastic work, building or paper work.
- Do research about joining and assembling materials, tools and equipment using ICT tools and other sources and take part in group discussions.
- Sketch or make an album about joining and assembling materials, tools and equipment.
- Display their sketches or albums for appraisal.
- Demonstrate the appropriate techniques to use when using joining and assembling materials and tools in sewing and crocheting, food production, wood products, metal or plastic products, building or paper work.

Duration

Artefacts: Teachers can teach this topic in four double periods.

3. Resources needed

- Learner's Book
- Charts that show artefacts that have been joined and assembled
- Charts with information about joining and assembling materials, tools and equipment
- Joining and assembling materials, tools and equipment
- A4 sheets of paper, flip charts and cardboards
- Specimen workpieces or artefacts and materials
- Charts with information about cutting or shaping tools
- Cutting or shaping tools
- Pictures that show joining and assembling materials
- Videos about procedures that are used when using binders to join and assemble food
- Joining ingredients (such as corn starch, gluten, tapioca, gelatine, egg white and milk)

4. Using ICT

Teachers can use laptops, projectors, pen drives, PowerPoint presentations, and MS WordPads to sketch the cutting or shaping tools and equipment when teaching this topic.

Activities that require ICT

Page	Activity	ICT required
–	Homework	Artefacts: question 5: Draw and label different tools.
–	Assessment	Food preparation questions 4 to 6: Use ICT tools for research about binding materials
105	3.23	Do research about materials that can be used to join and assemble clothing and the differences between knitting and crocheting.
107	3.25	Do research about why certain ingredients are used as binders.
112	3.27	For question 1, research types of fasteners: rivets, screws and bolts. For question 2, research different types of glue. For question 3, find information about the difference between welding and soldering.

5. Teaching methodology

Artefacts

5.1 Preparation

The teacher should:

- Read and research information about joining and assembling materials, tools and equipment.
- Prepare teaching and learning resources (charts, Power Point presentations, artefacts or workpieces and materials, videos)
- Do research about how to join and assemble workpieces.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, pair work

5.3 Relevant background knowledge

Learners use tables and chairs that have been joined and assembled using nails, glues, screws, rivets. The girls wear dresses that have been assembled using thread and needle. When preparing food, learners have used corn starch, tapioca, gelatine, egg white and milk.

Sewing

5.1 Preparation

The teacher should:

- Read and research information about joining and assembling materials, tools and equipment and how they are used.
- Prepare teaching and learning resources (charts and real-life objects)
- Practise techniques we use for stitches for sewing and crocheting.

5.2 Teaching strategies

Brainstorming, discussion, group work, demonstration, pair work, individual practice

5.3 Relevant background knowledge

Learners have fair knowledge about cutting and shaping. They have seen dressmakers cut and shape articles using cutting and shaping tools.

Food production

5.1 Preparation

The teacher should:

- Do research about measuring and marking-out tools and equipment.
- Prepare and collect teaching and learning resources that are relevant to the lesson about measuring and marking-out tools and equipment.
- Download pictures that support the lessons.

5.2 Teaching strategies

Brainstorming, discussion (group and class), group work, demonstration, pair work, games

5.3 Relevant background knowledge

Learners have fair knowledge about joining and assembling materials. Some use corn flour and egg at home to prepare food. Other learners have watched and helped their parents and guardians use wheat flour when baking bread.

6. Suggested homework

Below are suggestions for additional activities for homework.

Artefacts

1. State three reasons why we practise food bonding.
2. Imagine that your father arrives home with a metallic table and chair that need to be assembled. Describe how you will assemble each piece of furniture.
 - a) metallic table
 - b) metallic chair
3. Imagine that you have been given all the pieces you need to assemble a wooden ladder. Demonstrate how to assemble the ladder.
4. Imagine that you are the senior contractor at a building site. Demonstrate to your masons and labourers how you will bond blocks.
5. Make a freehand sketch of each tool and label the parts. If possible, use an MS WordPad to complete your drawings.
 - a) wooden mallet
 - b) claw hammer
 - c) ball pein hammer
 - d) G-clamp
 - e) soldering iron bit
 - f) trowel
 - g) screwdriver
 - h) hand sewing machine

Sewing

Make sewing and crocheting artefacts by joining and assembling materials.

Food production

Prepare a dish using joining and assembling ingredients you can find easily in your environment. Present the recipe for appraisal.

7. Assessment

Artefacts

7.1 Assessment questions

1. Complete a copy of the table.

Place of work	Two examples of joining and assembling materials	Two examples of joining and assembling tools
Food laboratory (kitchen)		
Sewing workshop or laboratory		
Building site		
Wood workshop		
Metal workshop		
Plastic workshop		
Paper		

2.
 - a) Explain what it means to assemble sewing materials.
 - b) Explain how to use the following.
 - i) sewing thread
 - ii) sewing needle
 - iii) crotch hook
 - iv) sewing machine

3. a) What are food binders?
b) Give four examples of food binders.
4. Explain how to use each fastener or tool.
a) bolts b) screws c) screwdriver d) rivets
e) nails f) hammers g) mallets h) clamps
i) glues j) soldering bit
5. List three binders that are used in blockwork.

Answers

1.

Place of work	Examples of joining and assembling materials	Examples of joining and assembling tools
Food laboratory (kitchen)	corn starch, gluten, tapioca, gelatine, egg white, milk	–
Sewing workshop or Laboratory	thread	needle, crocheting hooks or pins, sewing machine
Building site	cement, mortar, bricks	float, trowel
Wood workshop	glues	mallet, clamps, screws
Metal workshop	bolts and nuts	mallet, hammer
Plastic workshop	epoxy resin, rivets	mallet, screwdriver
Paper	glue	–
2. a) When you assemble sewing materials, you use a needle and thread to join pieces of fabric.
b) i) Sewing thread is the yarn we use to form the stitches that join fabric.
ii) We use a sewing needle with the thread when sewing.
iii) We use a crotch hook to make loops with thread or yarn, and then lock them together to form an artefact.
iv) We use a sewing machine to speed up the process of assembling and joining fabric.
3. a) Food binders are substances we use to join ingredients in food. These binders give food dishes and products a smoother, more appealing texture and help them keep their shape. We also use binders to thicken food.
b) Examples of food binders (any four): corn starch, gluten, tapioca, gelatine, egg white and milk
4. a) Bolts are used to join pieces temporarily or permanently. A bolt has to be connected with a nut to work as a fastener.
b) Screws are used to pull workpiece parts together permanently or temporarily. A screw has a head at one end, into which a screwdriver fits so that you can turn the screw.
c) Screwdrivers are used to drive in, tighten and undo screws.
d) Rivets are used as fasteners to make permanent joints in metal and plastic materials.
e) Nails are common fasteners for wood. They are difficult to remove without causing damage, which makes a join semi-permanent.
f) Hammers are used to drive in nails into wood.
g) Mallets are used to nudge parts of a workpieces together, for example to knock joints into place.
h) Clamps are used to secure a workpiece while working on it. We also use clamps to bind or press two or more objects together to keep them firmly in place. It is useful to use clamps when gluing materials such as wood, paper, plastic and certain metals.
i) Glues are liquid or semi-liquid substances we use to join or stick materials.
j) We use a soldering bit with soft solder to join two or more pieces of metals.
5. cement, clay and lime

7.2 Diagnostic assessment exercises

1. How well were learners able to identify joining and assembling materials, tools and equipment used for sewing and crocheting, food production, woodwork, metal work, plastic, building and paper?
2. How useful was information learners found using ICT about joining and assembling materials, tools and equipment?
3. Were learners able to sketch or make an album of joining and assembling materials, tools and equipment?
4. Were learners able to display their sketches or albums for appraisal?
5. How effective was your demonstration of the appropriate techniques to use when joining and assembling materials and tools for sewing and crocheting, food production, wood products, metal products, plastic products and building?
6. How well were learners able to demonstrate the appropriate techniques for joining and assembling materials and tools for sewing and crocheting, food production, wood products, metal products, plastic products and building?

Sewing

7.1 Assessment questions

1. Which tools and other equipment do people use to join and assemble artefacts in sewing centre?
2. Name two joining and assembling materials and tools that are used when crocheting.
3. Mention two techniques we can use when joining and assembling sewing and crocheting at sewing workshop.

Answers

1. Thread, needle, sewing machine
2. People use a crocheting hook or pins with crochet thread, acrylic thread, wool or twine.
3. Techniques people use when joining or assembling sewing and crocheting (any two): stitching, knotting or looping.

7.2 Diagnostic assessment exercises

1. How well were learners able to identify joining and assembling materials, tools and equipment used for sewing?
2. Were learners able to identify joining and assembling materials, tools and equipment used for crocheting?
3. How well were the learners able to demonstrate appropriate techniques to use when joining and assembling materials, tools and equipment in sewing?

Food preparation

7.1 Assessment questions

1. Identify joining and assembling materials such as binders in food production.
2. Explain and discuss the uses of the food binders as joining and assembling materials in food production.

a) corn starch	b) gluten	c) tapioca starch
d) gelatine	e) egg white	f) milk
3. Demonstrate appropriate techniques to use when using binders when joining and assembling food ingredients in food production.
4. Using ICT tools and other sources, do research about joining and assembling materials. Discuss information you find in groups.
5. Make an album with information about joining and assembling materials that are used in food production.
6. Display the album for appraisal.

Answers

1. Corn starch, gluten, tapioca starch, gelatine, egg white and milk
2.
 - a) Corn starch is a smooth powder that is made from dried corn kernels. It is used as thickener in puddings, sauces, stews or soups.
 - b) Gluten is a protein that is found in grains, particularly in wheat, maize, barley and rye. If water is added to flour made from the grains, the flour swells and act as a binding or thickening agent in food. An example is *kaklo*, which can be used for stew and soup.
 - c) Tapioca starch is extracted from cassava and used in the form of a fine white powder.
 - d) Gelatine is a powder that makes liquids become firm as particles in a liquid mix and stick together.
 - e) Egg white is a protein in eggs, which acts as a binding agent. When egg whites are heated, they coagulate (change from a liquid to a solid) and function as an adhesive (which holds the ingredients together). For example, when making an omelette, the vegetables are held in place by the egg. Egg white also functions as a thickener in egg stew and in puddings such as custard pudding.
 - f) Milk can be used as a binder as the proteins in it coagulate during cooking. Milk adds moisture and helps activate the binding effect of starch-based ingredients.
3. Examples of binders to use when joining and assembling an egg white omelette:
Objective: Bind vegetables using egg white as a binder.
Ingredients: egg white, vegetables (onion, green pepper, cabbage), white pepper, salt, oil
Procedure: Separate the egg white from the yolk.
Add chopped vegetables to the egg white.
Add a pinch of salt and white pepper to the mixture.
Pour one tablespoon oil into a frying pan to cover the base of the pan.
Pour the mixture into the frying pan and allow it to cook for one minute. Turn or toss the mixture to allow the side that was at the top to cook.
4. Examples of information learners can find:
Edible glue is used to make sugar paste flowers and attach edible decorations to cake.
Oatmeal can be used as a binder in meat and vegetable products.
Psyllium husk is a fibre that is made from the husks of a plant. It can be produced in a powder form.
Xanthan gum is added to toothpaste keep it uniformly thick.
5. Learners can collect pictures of joining and assembling materials used in food production to display. Examples include oatmeal gluten (which is a protein in wheat gelatine powder, *kokonte* powder, barley and rye flour), evaporated milk, xanthan gum, egg white and edible glue.
6. Learners finalise their albums so that they can display them.

7.2 Reflective practice or diagnostic assessment exercises

1. How well were learners able to identify joining and assembling materials such as binders in food production?
2. Did learners explain and discuss the uses of each food binder as a joining and assembling material in food production?
 - a) corn starch
 - b) gluten
 - c) tapioca starch
 - d) gelatine
 - e) egg white
 - f) milk
3. How well did learners demonstrate appropriate techniques when using binders when joining and assembling food ingredients?
4. Did learners find useful information when using ICT tools to research joining and assembling materials? How many learners took part in group discussions?
5. Did the teacher give learners guidance when they made albums with information about joining and assembling materials used in food production?
6. Did learners display their albums for appraisal under the teacher's guidance?

8. Answers

ACTIVITY 3.22

LB page 103

Learners work in groups.

1. Learners sort fasteners into categories: nails, screws, nuts, bolts and rivets.
2. Example answers include:
 - a) Join pieces of wood to make furniture.
 - b) Join sheets of metal to make a covering.
 - c) Join plastic parts to make objects.
 - d) Join pieces of fabric to make clothing or curtains.
3. Examples of artefacts are given for each material.
 - a) Tables, cabinets, chairs and beds
 - b) Roofs, sheds, containers and aeroplanes
 - c) Toys, tools and jewellery
 - d) Curtains, stage drapes, jackets and dresses

ACTIVITY 3.23

LB page 105

Learners work on their own.

1. Learners do research on the internet. They can also speak to a local tailor. This research is for learners' own benefit and not for examination purposes. Learners can briefly discuss their findings in class.
2. Learners write a paragraph in which they describe the differences between knitting and crocheting. They may use the internet or other sources. Teachers can use the rubric, *Writing a paragraph/report* on page 119 of this Facilitator's Guide.

ACTIVITY 3.24 Project

LB page 105

Learners work in pairs.

Learners will make an album with six sections: sewing, food production, woodwork, metalwork, plastics and building.

Learners prepare a folder or book, start with sewing, sketch materials, tools and equipment, insert labels and captions.

Learners can keep working on their sketches as they compile their albums. This activity is continued in Activity 3.26, Activity 3.28 and Activity 3.29.

ACTIVITY 3.25

LB page 107

Learners work on their own.

1. Learners read labels to find out if what food binders were used in packaged food.
 - a) They check if binders mentioned in the Learner's Book appear on the labels.
 - b) Learners research (on the internet, if possible) why certain ingredients are used and how they improve or change a food product.
2. Learners describe a dish from home in which a binder is used in a paragraph. Teachers can use the rubric, *Writing a paragraph/report* on page 119 of this Facilitator's Guide.

ACTIVITY 3.26 Project

LB page 107

Learners work in the same pairs as in Activity 3.24.

Learners continue working on their albums.

In this activity, learners compile the second section (food production), sketch a few sources of the joining ingredients, sketch finished products that are shaped because of binders and write captions.

Learners continue to work their sketches as they continue to compile their albums. This activity is continued in Activity 3.28 and Activity 3.29.

ACTIVITY 3.27

LB page 112

Learners work on their own.

1. Learners do research to find examples of fasteners: a) rivets, b) screws and c) bolts.
2. Learners research different types of glue.
3. Learners research the difference between welding and soldering.

ACTIVITY 3.28 Project

LB page 112

Learners work in the same pairs as in Activity 3.24 and Activity 3.26.

Learners continue to work on their albums about joining and assembling materials, tools and equipment by compiling the next three sections (woodwork, metal work and plastics). They sketch joining and assembling tools and materials that used when making artefacts and include examples that they researched. They label the sketches and write captions.

Learners continue working on their sketches. This activity continues in Activity 3.29.

ACTIVITY 3.29 Project

LB page 113

Learners work in the same pairs as in Activity 3.24, Activity 3.26 and Activity 3.28.

Learners finalise their albums by compiling the last section of their album (building), sketching examples of finished products in which cement was used for joining and assembling. They label their sketches. Learners should finalise all their sketches in the album for display and appraisal.

Teachers can use the rubric, *Project* on page 119 of this Facilitator's Guide

ACTIVITY 3.30 Practical: Make a sewing stitch

LB page 113

Learners work on their own.

Teachers can use the rubric, *Sewing preparation/demonstration* on page 117 of this Facilitator's Guide to assess learners' work.

ACTIVITY 3.31 Practical: Make a crochet slip knot

LB page 114

Learners work on their own.

Teachers can use the rubric, *Sewing preparation/demonstration* on page 117 of this Facilitator's Guide to assess learners' work.

ACTIVITY 3.32 Practical: Make a beef stew

LB page 114

Learners work in groups.

Teachers can adapt the rubric, *Food preparation/demonstration* on page 116 of this Facilitator's Guide to assess learners' work. How teachers adapt the rubric depends on whether learners make a beef stew or role-play making a beef stew.

ACTIVITY 3.33 Practical: Boil puna yam

LB page 115

Learners work in groups.

Teachers can adapt the rubric, *Food preparation/demonstration* on page 116 of this Facilitator's Guide.
How teachers adapt the rubric depends on whether learners make puna yam or role-play making it.

ACTIVITY 3.34 Practical: Glue paper or card together

LB page 115

Learners work on their own.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

ACTIVITY 3.35 Practical: Drive a nail into wood

LB page 115

Learners work on their own.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

ACTIVITY 3.36 Practical: Screw wooden boards together

LB page 116

Learners work in groups.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

ACTIVITY 3.37 Practical: Glue wooden boards together

LB page 116

Learners work in groups.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

ACTIVITY 3.38 Practical: Bolt metal, plastic or wood together

LB page 117

Learners work in groups.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

ACTIVITY 3.39 Practical: Insert a screw in plastic

LB page 117

Learners work in groups.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

ACTIVITY 3.40 Practical: Glue plastic together

LB page 118

Learners work in pairs.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

ACTIVITY 3.41 Practical: Solder metal together

LB page 118

Learners work in pairs.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

Learners work in pairs.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide.

Linking Topics 3.3 and 3.4: Joining and assembling kitchen essentials

Questions

1. Recall the different joining and assembling techniques we learned about, such as soldering. List examples of kitchen essentials that might use joining techniques.
2. Imagine you are examining a whisk in the classroom. How do you think the different metal wires are joined together to create this essential tool?
3. We learned about different materials used for joining, like egg white in food production. Are there any kitchen essentials where joining materials might be used, and why are strong joins important?
4. Consider the tools used for assembling wood, plastic, and metal. List kitchen essentials made from these materials, and how joining techniques might be important for their functionality.
5. Why do you think proper care and maintenance of tools used for joining and assembling, like glue or rivets, is important for the safety and functionality of kitchen essentials?
6. Imagine you are working in a metal workshop to create a simple kitchen colander. Describe the steps involved, explaining how both joining techniques and the properties of the materials are important for its creation.
7. List other examples in everyday life where strong joins are important for the functionality and safety of an object.
8. Research a specific kitchen essential and the joining techniques used in its manufacture (e.g., riveted handles on a pot). Present your findings to the class, explaining how the joining method contributes to the strength and durability of the kitchen tool.

Answers

1. Examples of kitchen essentials that might use joining techniques: whisks (metal wires), pots and pans (handles attached to the body), and cutlery (handles attached to blades).
2. The metal wires in a whisk are likely joined using a technique like welding or brazing, creating a strong and permanent connection.
3. Examples: cake layers joined with frosting; dumplings sealed with dough. Strong joins are important to ensure the tool or food item maintains its shape and function during use.
4. Examples: wooden spoons with handles glued or riveted to the body, plastic cutting boards with glued seams, and metal spatulas with welded handles. Joining techniques ensure the different utensil parts are secure and can withstand pressure during use.
5. Improperly applied glue or weak rivets could lead to parts of the kitchen essentials coming loose, creating a safety hazard or rendering the tool unusable.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider how weak glue bonds could cause handles to detach from pots and pans, creating a burn risk. Similarly, loose rivets could cause parts of kitchen tools to break or malfunction during use.
- Question 6: Encourage students to break down the process into steps. They might mention shaping metal sheets for the colander body, using rivets or welding to join the pieces, and considering factors like the material's resistance to rust and heat for functionality.

Topic 3.4 Kitchen essentials

Content standard

- B7.3.4.1: Demonstrate knowledge and understanding of the kitchen essentials.

Indicators

- B7.3.4.1.1: Describe kitchen essentials.
- B7.3.4.1.2: Demonstrate skills in the classification of kitchen essentials.

Core competencies

- **Communication and collaboration (CC)**
 - CC8.1: Speak clearly and explain ideas.
- **Critical thinking and problem-solving (CP)**
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.

1. Introduction

Kitchen essentials are important tools and equipment that people use in the kitchen. It would be very difficult or impossible to prepare food without tools and equipment such as saucepans, spoons and ladles. This topic explains basic kitchen essentials, identifies and classifies kitchen essentials according to sizes and whether they are mechanical.

2. Learning expectations

Learners need to be able to:

- Explain what is meant by basic kitchen essentials.
- Identify and classify kitchen essentials according to sizes.
- Present responses to questions about the classified kitchen essentials for appraisal.

Duration

Teachers can teach this topic in eight periods.

3. Resources needed

- Learner's Book
- Charts with kitchen essentials
- Pictures of kitchen essentials

4. Using ICT

To teach this topic, teachers can use laptops, projectors, pen drives and PowerPoint presentations.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read information about food commodities.
- Prepare and collect teaching and learning resources that are relevant to the lesson about food hygiene. For example, the teacher can prepare charts or pictures and collect real objects.
- Download pictures that support the lessons in the textbook.

5.2 Teaching strategies

Brainstorming, discussions (group and class), group work, pair work, jigsaw technique, games

5.3 Relevant background knowledge

Learners have fair knowledge about certain essentials in the kitchen. Some learners will have used these essentials to prepare, cook and serve food at home. Other learners will have watched and helped their parents use kitchen essentials. Most learners can readily identify many kitchen essentials.

Teachers can use games (such as Bingo) to reinforce lesson content.

Instructions for playing Bingo

- Each player needs a score card and pencil.
- The teacher or a learner who is not playing the game can be the caller.
- The caller calls a word.
- If one of the players has a word that corresponds with the word the caller calls, he or she crosses out the word on the score card.
- Players continue to play until one player has five answers in a row (horizontal, vertical or diagonal) on the score card. This player calls out "Bingo" and wins the game.
- Teachers can generate the game online and print copies. See the sample Bingo card for kitchen essentials: https://www.bonus.com/bingo/?bingo_card_id=119389&bingo_card_action=view.

6. Suggested homework

Below are suggestions for additional tasks for homework.

1. Make a list of all the kitchen essentials you have at home and classify the items under the headings, small, large and mechanical kitchen essentials. Present your answer in table form.

7. Assessment

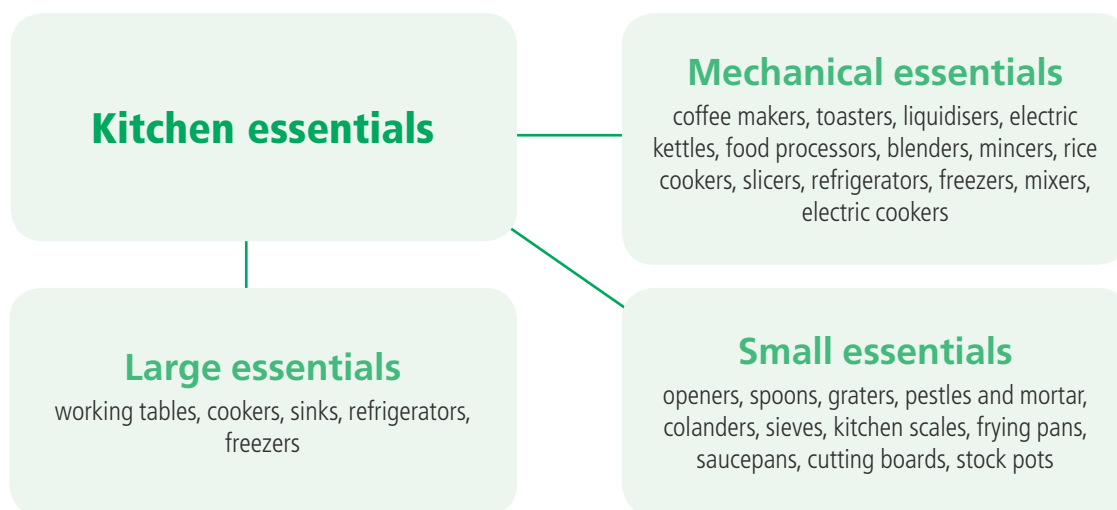
7.1 Assessment questions

Teachers need to provide pictures for question 1.

1. Identify the kitchen essentials in the pictures.
2. Use a chart to classify kitchen essentials according to their sizes and also according to whether they are mechanical.
3. Discuss the importance of kitchen essentials.

Answers

1. Pictures will probably show: frying pans, coffee makers, saucepans, toasters, stock pot, liquidisers, colanders, cutting boards, electric kettles, food processors, knives, graters, mortar and pestles, kitchen scales, blenders, sieves, mincers, spoons, openers, rice cookers, ladles, working tables, slicers, cookers, sinks, refrigerators, freezers and mixers
2. Kitchen essentials can be small or large:
 - Small essentials are easy to carry; they are sometimes called tools.
 - Large essentials are generally not easy to carry and they are sometimes fixed in place.
 - c) Mechanical essentials can be small or large tools and pieces of equipment that are generally operated by electricity. Even though some essentials are small, they are very efficient. These devices are also called appliances.Teachers can make copies of the example of a chart with just the headings. They can then ask learners to supply the examples.



- Kitchen essentials are important because they help us prepare, cook and serve food. They save energy and time and ensure that we can work efficiency in food production.

7.2 Reflective practice or diagnostic assessment exercises

- How well were learners able to identify the kitchen essentials in the pictures?
- How well did learners interpret a chart and classify kitchen essentials according to sizes and whether they are mechanical?
- How many learners took part in the discussion about the importance of kitchen essentials?

8. Answers

ACTIVITY 3.43

LB page 122

Learners work in pairs.

- Learners' answers will differ. Ask pairs to compile a final table in their exercise books.
- Below are suggested answers. Accept all reasonable answers.
 - A fridge is essential because we need to keep food cold so that it will not spoil.
 - Knives are essential as we need them to prepare food.
 - Plates are essential although we can also eat out of bowls.
 - Measuring spoons are essential if you need to measure ingredients. However, many experienced cooks and chefs can guess quantities accurately. We can replace measuring spoons with teaspoons and tablespoons.
- Below are example answers of essential tools and appliances. If learners think that an item is not essential, give them the opportunity during a class discussion to express their view and find out if others agree with them. Encourage learners to express their views – they might have an interesting perspectives.

Large electrical appliances	Small hand-held tools	Serving equipment	Stovetop cookware
fridge stove smaller appliances: kettle toaster	knives forks spoons egg whisk can opener	bowls plates dishes baskets	pots pans saucepans frying pans

Linking Topics 3.4 and 3.5: Kitchen essentials to finishes

Questions

1. Recall the different kitchen essentials we learned about, such as pots and pans. Why do you think these tools often have a smooth, finished surface?
2. Imagine you are examining a wooden spoon in the classroom. How does the finish on the handle affect how you use the tool?
3. We learned about different finishes, including those used on food products. List examples of food garnishes, and how they enhance the final product.
4. Consider the processes involved in joining and assembling kitchen essentials. How might the application of a finish be related to these processes?
5. Why do you think proper care and maintenance of finishes on kitchen essentials is important?
6. Imagine you are decorating a cake in the food laboratory. Describe the steps involved, explaining how both joining techniques (e.g., frosting layers) and different finishing techniques (e.g., icing decorations) are used.
7. List examples in everyday life where finishes are applied to objects to improve their functionality or aesthetics.
8. Research a specific type of finish used on kitchenware (e.g., non-stick coating on pans). Present your findings to the class, explaining how this finish enhances the functionality and safety of the cookware.

Answers

1. A smooth finish on pots and pans makes them easier to clean, prevents food from sticking, and improves their overall appearance.
2. A smooth finish on the handle of a wooden spoon makes it more comfortable to hold and prevents splinters.
3. Examples of food garnishes: chopped herbs, sliced fruits, and edible flowers. Garnishes add visual appeal, enhance flavour, and complement the texture of the dish.
4. A finish might be applied after joining and assembling to protect the joined surfaces, improve aesthetics, or enhance the functionality of the utensil (e.g., non-stick coating).
5. Proper care of finishes helps to maintain their protective qualities, prevents them from flaking or chipping, and ensures the kitchen essentials remain visually appealing and safe to use.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider how damaged finishes on pots and pans could expose the metal underneath, potentially leading to rust or affecting food safety. Worn finishes on wooden utensils might become rough or splinter, creating a safety hazard.
- Question 6: Encourage students to break down the process into steps. They might mention joining cake layers with frosting (assembly), applying a smooth icing finish (initial finishing), and then adding decorative elements with icing or other toppings (final finishing touches).

Topic 3.5 Finishes and finishing

Content standard

- B7.3.5.1 Demonstrate knowledge of finishes and finishing.

Indicators

- B7.3.5.1.1: Identify finishes and finishing applied to products or artefacts.

Core competencies

- **Communication and collaboration (CC)**
 - CC 8.1: Speak clearly and explain ideas.
 - CC 8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP 6.5: Ability to select alternatives that adequately meet selected criteria.

1. Introduction

Finishes and finishing provide neat and tidy raw edges for garments and articles that are made using woven fabrics. In this topic, learners will learn to identify finishes and finishing that have been applied to products and artefacts.

2. Learning expectations

Learners need to be able to:

- Explain what is meant by finishes and finishing.
- Identify types of finishes.
- Identify solvents that are used to create thin finishes.
- Explain what is meant by garnishes.
- Discuss ways of applying finishing to food products.
- Choose garnishes with colours and flavours that complement the food.
- Identify types of garnishes for savoury and sweet dishes.
- Explain what is meant by edge finishes.
- Identify edge finishes on articles.

Duration

Teachers can teach this topic in eight periods.

3. Resources needed

- Learner's Book
- Charts about finishes and finishing used on articles and garments.
- Real-life objects (examples of finishes and finishing)
- Pieces of fabric, sewing thread, needles, and so on

4. Using ICT

To teach this topic, teachers can use laptops, projectors, pen drives and PowerPoint presentations. They can also show videos that give more information about articles.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read and research information about finishes and finishing that is applied to products.
- Prepare teaching and learning resources (prepare charts and collect real-life objects).

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, pair work

5.3 Relevant background knowledge

Learners have fair knowledge about edge finishes. Girls wear dresses on which raw edges are finished.

6. Suggested homework

Below are suggestions for additional tasks for homework.

Identify other finishes that can be used to finish necklines, armholes and hems.

7. Assessment

7.1 Assessment questions

1. Which areas of a girl's garment need to be finished?
2. Give two reasons why the edges of garments are finished.

Answers

1. Necklines, armholes and hems
2. The edges of garments are finished (any two):
 - to prevent the fabric from fraying
 - to strengthen the edges of articles
 - as a decoration or as a style feature.

7.2 Diagnostic assessment exercises

How well are learners able to identify finishes and finishing that have been applied to products and artefacts?

8. Answers

ACTIVITY 3.44

LB page 126

Learners work on their own.

1.	Wallpaper	Hung vertically on a wall, using a paste to glue it on
	Varnish	Hard, transparent substance applied to wood to make it glossy
	Lacquer	A hard substance that is applied to wood to make it glossy and resistant to damage; can include colour
	Plaster of Paris	A stiff paste that is used to make moulding
	Epoxy	Use in modern techniques for sealing concrete floors, for example, 3D-floors
	Acrylic paint	Water-based paint that is used for interior walls
	Ceramic	Used to produce tiles for finishing off wall and floors
	Slate	Type of stone used in bathrooms for its anti-slip properties

2. True statements:
 - A. Water can be used to thin some paints.
 - D. In a 3D-floor, a picture is embedded in epoxy.

ACTIVITY 3.45

LB page 127

Learners work in groups.

Teachers can use the rubric, *Food preparation/demonstration* on page 116 of this Facilitator's Guide. If work is being peer-assessed, give learners copies of the rubric and allow them to make comments.

ACTIVITY 3.46

LB page 128

Learners work in pairs. If time allows, pairs of learners can swap garments.

1. Each learner can bring one garment to school. The finished garments must have necklines, armholes and hemlines.
2. Learners discuss the finishes on the garments and make notes in their exercise books.

REVISION ANSWERS

(Learner's Book page 129)

1. B Measure and mark out the material. (1)
2. C We measure and mark out materials once in the production process. (1)
3. A Secure the workpiece, for example, by using a bench stop or G-clamp. (1)
4. B joining and assembling (1)
5. a) tape measure b) builder's square
c) *olonka* d) dividers (4)
6. A b) slicing
B a) dicing
C c) chopping (3)
7. a) cross-cut saw b) coping saw
c) tenon saw d) hacksaw (4)
8. a) True.
b) True.
c) False. Sewing needles differ in size and shape.
d) True. (4)
9. a) bolt b) screw
c) nail d) rivet (4)
10. Use a soft sponge or cloth. (1)
Wipe metal tools with a clean cloth.
Wipe in the direction of the grain to avoid leaving streaks.
Wash very dirty metal tools in soapy water, but dry them thoroughly to avoid rust and to avoid stains from dirty water and leftover cleaning agents.
Special metal polishes such as Brasso and Silvo can remove stains, dirt, tarnish and grease build-up.
11. a) **Colander:** We use a colander to drain boiled food such as spaghetti.
b) **Spatula:** We use a spatula to scrape food off the sides of the mixing bowl when creaming fat and sugar.
c) **Blender:** We use a blender to blend or crush ingredients so that a liquid is formed. (3)
12. Cross-filing is the initial filing we use to remove rough or surplus edges quickly.
Draw-filing final done to smoothen the edges or surfaces of workpieces. (2)

13. Measuring tools in sewing workshop:

- **Tape measure:** We use a tape measure to take measurements of people's bodies and to measure fabric.
- **Yard or metre rule:** We use a yard or metre rule to check hems and draw long lines. (1)

Marking-out tools in sewing workshop:

- **Pencil:** We use a pencil to draw lines on fabric before we cut it.
- **Tailor's chalk:** We use chalk to draw lines on fabric before we cut it. (1)

14. We use dry measuring tools to measure dry ingredients such as flour and sugar. These tools are generally not see through and do not have spouts.

Examples of dry measuring tools: weighing scales, measuring cups, *olonka*

We use liquid measuring tools to measure liquids such as water, juice and milk. These tools are generally see through so that it is easy to see the level of the liquid in them. They usually have spouts.

Examples of liquid measuring tools: measuring cups and jugs (2)

15. Do not place the ruler flat on the surface of the workpiece. The reading will be more accurate if you hold the steel ruler at a 90°-degree angle to the flat surface.

Place 0 on the ruler at the one edge of the length you want to measure.

Read the length off at the line on the ruler that is at the other edge of the length you want to measure. (1)

16. Food binders are substances we use to join ingredients. They give food dishes and products a smoother, more appealing texture, help them keep their shape and they thicken food.

Examples of binders (any two): corn starch, gluten, tapioca, gelatine, egg white and milk (2)

17. Examples of adhesives and their uses (any two):

- PVA glue is not waterproof. We use it to join paper, cardboard and wood indoors. These glues are not waterproof.
- Contact adhesives are used to join wood and cardboard.
- Epoxy resin is used to join metals, wood and plastic that has a smooth surface. (2)

18. Soldering is a joining process we use to join different types of metals by using a soldering iron to heat solder (which is metal alloy made of tin and lead). (2)

19. a) Apply varnish to wood to give it a hard, clear, shiny surface.

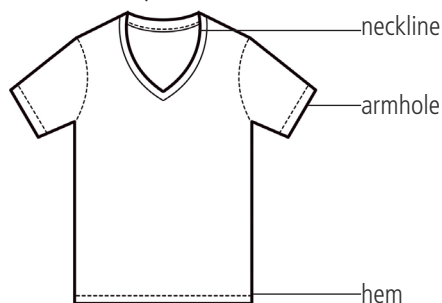
b) Apply emulsion paint on interior walls and ceilings.

c) Apply oil paint on wood and hard metal structures. (3)

20. a) A savoury food garnish is a small amount of salty or spicy food we use to decorate prepared food such as rice, riced yam and boiled plantain. We can use tossed or sautéed vegetables such as onion, tomato and carrot to garnish savoury dishes.

b) A sweet food garnish is a decoration for sweet dishes such as cakes, sweet biscuits, puddings and ice creams. We can use fruits such as strawberry, mango and grapes, nuts, sprinkles, almonds and cherries to garnish sweet dishes. (4)

21. (3)



Total: 50 marks

Module 4 Technology

Topic 4.1 Simple structures and mechanisms, electric and electronic systems

This module has one topic.

Content standard

- B7.4.1.1 Demonstrate understanding of structures in construction.

Indicators

- B7.4.1.1.1: Outline the uses of structures in construction.
- B7.4.1.1.2: Discuss the causes of structural failures in construction.
- B7.4.1.1.3: Design and make simple structures.

Core competencies

- **Communication and collaboration (CC)**
 - CC 8.1: Speak clearly and explain ideas.
 - CC 8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP 6.5: Select alternatives that adequately meet selected criteria.
- **Creativity and innovation (CI)**
 - CI 5.2: Merge simple or complex ideas to create novel things.
 - CI 5.4: Visualise alternatives to see possibilities and identify problems and challenges.
 - CI 6.1: Exhibit strong memory, intuitive thinking and respond appropriately.
 - CI 6.10: Reflect on work and explore thinking behind thoughts and processes.

1. Introduction

This module looks at different structures, both natural and man-made and studies the functions of each structure. Examples include shell, solid and frame structures.

Learners can use ICT extensively in this module as they create a PowerPoint presentation, make sketches using MS WordPads and do research about structural failure disasters in Ghana and around the world.

For anyone who chooses a career in technology that incorporates construction, it is important to know what can cause structural failure. One must also prevent poor workmanship, poor materials and making bad decisions. Avoiding making this type of error can save costs and even save lives.

2. Learning expectations

Learners need to be able to:

- Explain what is meant by structures in construction.
- Identify and classify structures under natural and man-made.
- Classify structures under frame and shell.
- Discuss the uses of structures in construction.
- Make sketches of both frame and shell structures and prepare a sketch album to use as material for learning structures.
- Explain what a structural failure in construction is.
- Identify types of structural failure.

- Observe where structural failures occur in structures in the environment.
- Discuss causes of structural failures.
- Discuss how static and dynamic forces can cause structures to fail.
- Make sketches and notes about structural failures.
- Identify compliant and resistant materials, tools and equipment for making structures.
- Plan and design an artefact.
- Make mock-ups of simple structures.
- Test and evaluate the mock-ups by indicating the strengths and weaknesses of structures and make modifications.

Duration

Teachers can teach this topic in six periods.

3. Resources needed

- Learner's Book
- Simple shells and frames
- Photos and articles about structural failures in buildings in Ghana and elsewhere

4. Using ICT

Teachers can use cell phones, laptops, projectors, audio portable speakers, flash drives, presentations in MS PowerPoint, and MS WordPads to make any sketches when teaching this topic.

Activities that require ICT

Page	Activity	ICT required
134	4.2	Question 1: Do research about structures.
136	4.5	Do research about structural collapses in Ghana and around the world. Learners use their findings to create an MS PowerPoint presentation.
138	4.6	Learners can draw their sketches using MS WordPads.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read and do research to find information about structures, the materials used to build the structures, reasons why the structures were built and the things that could go wrong.
- Prepare teaching and learning resources (pictures of structures, natural and man-made, videos or reports about structures that have failed).
- If possible, collect models of structures such as an empty bird's nest.
- Do research on the internet to find more information.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, demonstration, pair work

5.3 Relevant background knowledge

Learners have fair knowledge about basic structures and can recognise whether they are natural or man-made.

6. Suggested homework

Below are suggestions for additional activities for homework.

1. Look for three examples of manmade structures and three examples of natural structures in your neighbourhood. Draw each structure.
2. Learners complete Activity 4.4 for homework.

7. Assessment

7.1 Assessment questions

1. Name five examples of man-made structures and any five examples of natural structures.
2. Explain the difference between a frame structure and a shell structure. Give an example of each.
3. Explain each structural failure.
a) crack b) split c) break
4. Explain how poor design and poor materials can cause structure failure.

Answers

1. Examples include (any five of each):
Man-made structures: bridges, walls, buildings, desks, chairs, cupboards
Natural structures: shells, nests, ant heaps, honeycombs, webs, rabbit warrens
2. See the table on page 133 in the Learner's Book.
3. a) A crack is a thin, jagged space that opens in a structure that was previously solid.
b) A split divides a structure in two.
c) When a break occurs, a structure falls apart completely.
4. See page 137 in the Learner's Book.

7.2 Reflective practice or diagnostic assessment exercises

1. How well are learners able to recognise structures in their environment?
2. Can learners tell the difference between man-made and natural structures?
3. Can learners tell the difference between frame and shell structures?
4. Can learners identify a crack, a split and a break, and tell the difference between these structural failures?
5. How well do learners understand what can cause structural failure?

8. Answers

ACTIVITY 4.1

LB page 132

Learners work in groups.

- 1, 2. A **Natural structure:** The spider web handles the weight of prey, wind gusts, and the spider itself. Their stretchy silk absorbs impact and distributes forces, allowing them to capture prey, support the spider's movement, and even provide shelter for some species.
B **Man-made structure:** The bridge carries the load of the traffic that use it. It can resist most weather conditions and it provides support to a road that is suspended across a body of water.
C **Man-made structure:** The power towers carry electricity cables across a country. They can resist most weather forces and attacks by animals. They provide support for electricity cables.
D **Natural structure:** The nest can support a light load of eggs and birds. It is lightweight and cannot resist much pressure, but stays whole for as long or longer than it takes for chicks to hatch. It provides protection and support to a bird and her chicks.

ACTIVITY 4.2

LB page 134

Learners work on their own.

1. Learners sketch frame and shell structures. They prepare an album that includes pictures of materials that can be used to make the different structures.
2. Learners display their albums. Teachers can use the rubric, *PowerPoint presentation/oral* on page 118 of this Facilitator's Guide to assess albums.

ACTIVITY 4.3

LB page 134

Learners work in groups.

1. Learners do research about the uses of structures in construction. They need to find at least five interesting facts about the following.
 - a) The loads structures were designed to carry without toppling over or collapsing
 - b) How the different parts of a structure are supported
2. Learners use their information to create a poster, which they present to the class. Teachers use the rubric, *Creating a poster* on page 117 of this Facilitator's Guide to assess the posters.

ACTIVITY 4.4

LB page 135

Learners work on their own.

1. Learners study buildings in their neighbourhood. They look for signs of structural damage, such as cracks or collapsed parts. They can ask people who know a building to explain what caused the damage they notice.
2. Learners write a one-page report about the information they found and present it to the class.

ACTIVITY 4.5

LB page 136

Learners work in pairs.

- 1, 2. Learners do research to find information about structural collapse incidents in Ghana and in other parts of the world. They can search on the internet or in newspapers or reference books. Learners need to include facts about the following:
 - Why did each collapse occur?
 - Were proper building rules followed?
 - Did the builders have the correct permits?
 - What effect did each structural failures have?
3. Learners write a report about one example they found. Teachers can use the rubric, *Writing a paragraph/report* on page 119 of this Facilitator's Guide to assess learners' reports.

ACTIVITY 4.6

LB page 138

Learners work on their own.

1. Learners sketch three examples of structural failures and prepare an album with notes about the following (they can use MS WordPads for their sketches):
 - a) The nature of the failure, for example cracks, splits or breakages
 - b) The cause of the failure, such as poor design, poor material, weak joint or fatigue
 - c) The nature of the force, such as static or dynamic forces.
2. Learners display their albums. Teachers can use the rubric, *PowerPoint presentation/oral* on page 118 of this Facilitator's Guide to assess their work.

ACTIVITY 4.7 Practical: Design and make simple structures

LB page 139

Learners work in pairs to design and make a simple structure. They follow the instructions in the Learner's Book.

Teachers can use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide. to assess learners structures.

REVISION ANSWERS

(Learner's Book page 140)

1. B All structures are built by humans. (1)
2. C human skull (1)
3. A They consist of triangular units. (1)
4. B Fatigue weaknesses in structures develop over time. (1)
5. B cars, tanks, tins and helmets (1)
6. The differences are explained on page 133 in the Learner's Book. (5)
7. A static force that acts on an object does not cause it to change its size, position or direction. An example is the weight of the building acting on the ground.
A dynamic force that acts on an object can cause the object to change its size, position or direction. An earthquake is a dynamic force. (4)
8. Causes of structural failure (any three):
 - poor design
 - poor materials
 - weak joints
 - structural fatigue. (6)
9. Learners write a paragraph about a structural failure about which they found information. Check that they explained what happened and why. (5)

Total: 25 marks

Topic 5.1 Communicating designs

This module has four topics.

Content standard

- B7.5.1.1 Demonstrate knowledge and skills of drawing materials, instruments or equipment, lines and their applications, and freehand sketching.

Indicators

- B7.5.1.1.1: Identify drawing materials, instruments and equipment used for graphic communication.
- B7.5.1.1.2: Discuss the types of lines used in graphic communication.
- B7.5.1.1.3: Make sketches of lines, curves, objects, and write the letterings.
- B7.5.1.1.4: Make sketches of objects.

Core competencies

- **Communication and collaboration (CC)**
 - CC 8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.
 - CP6.7: Implement strategies with accuracy.
- **Creativity and innovation (CI)**
 - CI 5.2: Ability to merge simple or complex ideas to create novel things.
 - CI 6.10: Reflect on work and explore thinking behind thoughts and processes.

1. Introduction

Designers must use the correct materials, instruments and equipment when they make drawings and designs. Each line and shape communicates an instruction and specification. Many designs are used in many countries around the world and so we must always use the rules that apply to graphic communication. If we do not do so, a design could be misinterpreted and an artefact may not work properly.

In this first topic, learners will work with different types of lines, curves and objects, and they will write lower- and upper-case letters. They will also make two-dimensional and three-dimensional sketches of objects. Learners will make many freehand drawings and so teachers need to ensure that learners follow instruction carefully and only use ICT when they are allowed to do so.

2. Learning expectations

Learners need to be able to:

- Identify drawing materials, instruments and equipment.
- Discuss the uses of drawing materials, tools and equipment.
- Demonstrate appropriate usage and manipulation of drawing materials, instruments and equipment.
- Demonstrate how to care for and maintain drawing materials and instruments or equipment.
- Use a clean tissue to wipe the surface of instruments and equipment.
- Identify lines that are used to communicate ideas.

- Describe the features and uses of the lines.
- Illustrate the applications of lines in drawn objects.
- Make a chart with information about how we use lines in drawing.
- Identify lower- and upper-case letters.
- Discuss the principles of lettering.
- Set out drawing paper and prepare a title block that includes name, school, class, date and drawing number.
- Discuss what is meant by sketching.
- Illustrate the techniques of sketching objects in two-dimensional plane figures.
- Illustrate the techniques of sketching objects in three dimensions.
- Sketch plane objects and pictorial objects to build an album.

Duration

Teachers can teach this topic in ten periods.

3. Resources needed

- Learner's Book
- Drawing materials such as graphite pencil, drawing paper, ruler, compass, set square, T-square, drawing board
- Posters with information about types of lines, different lettering, and drawings of three-dimensional objects from different angles (on dot and plain paper)

4. Using ICT

Teachers can use cell phones, laptops, projectors, audio portable speakers, flash drives, presentations in MS PowerPoint, and MS WordPads to draw sketches when teaching this topic.

Activities that require ICT

Page	Activity	ICT required
144	5.3	Use MS WordPad for drawing.
145	5.4	Use MS WordPad to draw a diagram.
146	5.6	Use MS Word to create a title block.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Do research to find information about graphical design, illustrations and sketches.
- Prepare teaching and learning resources (drawing equipment and tools, objects, sketches, videos, copies of drawings).
- Find information on the internet.

5.2 Teaching strategies

Brainstorming, discussion (groups and whole class), group work, demonstration, pair work, drawing skills, MS Word and MS WordPad

5.3 Relevant background knowledge

Learners have fair knowledge about constructing drawings from Mathematics, and they should know how to use some of the drawing equipment. They should have developed the motor skills to control the pencil and know how to read and measure accurately.

6. Suggested homework

Practical activities such as Activity 5.4 and Activity 5.5 can be given as homework if there is not enough time in class for learners to complete the work.

Learners who need extension work can draw different objects from different angles as shown on page 147 in the Learner's Book. Learners should draw shapes that have straight edges.

7. Assessment

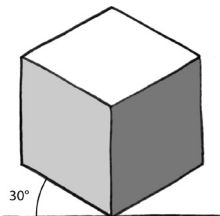
7.1 Assessment questions

1. List the five points to follow when caring for drawing materials and equipment.
2. List two materials or pieces of equipment used in graphic drawings. Explain how they are used.
3. Explain the difference between an object line, a leader line and a hidden line.
4. **a)** Draw the isometric view of a cube.
b) What are the other two views called?

Answers

1. See the list on page 142 in the Learner's Book.
2. See the table on page 143 in the Learner's Book.
3. An object line is a thick solid line that outlines an object.
A leader line points to a part of a drawing with instructions about how to construct it.
A hidden line is a line or surface that is hidden from view and shown as a dashed line.

4. **a)**



b) Oblique and perspective views

7.2 Reflective practice or diagnostic assessment exercises

1. Do learners know the correct ways to care for and maintain drawing materials and equipment?
2. How well can learners name and describe the uses of the various drawing materials and equipment?
3. Are learners able to identify the different types of lines according to their appearance and function?
4. Do learners know how to construct a title block accurately?
5. Can learners identify, name and draw the three different ways of drawing a three-dimensional form?

8. Answers

ACTIVITY 5.1 Practical: Identify materials and instruments

LB page 142

Learners work in pairs.

1. Learners identify the tools and equipment in the table on page 143 in the Learner's Book. They discuss the purpose of each item.
2. Learners demonstrate how to hold and use each tool in the table on page 143. If possible, give learners the drawing instruments to handle. Teachers give feedback and guidance. Teachers can show learners videos about how to set up drawing paper on a drawing board and how to use a set square and a T-square to draw lines. They can find an example at [youtube.com/watch?v=RzA1F28KBAg](https://www.youtube.com/watch?v=RzA1F28KBAg) and they can find more examples, if necessary.

ACTIVITY 5.2 Practical: Clean materials and instruments

LB page 142

Learners work in groups.

Each learner demonstrates how to clean one tool. Teachers watch as many demonstrations as possible and give feedback when learners are not cleaning tools correctly.

ACTIVITY 5.3 Practical: Use lines in a drawing

LB page 144

Learners work on their own.

1. Learners draw a diagram and follow instructions. They can use an MS WordPad if possible. Drawings must include outlines, hidden lines and curved lines.
 2. Learners insert a dimension line on their drawings.
- Learners can swap diagrams and check each other's work.

ACTIVITY 5.4 Practical: Identify and draw lines and arcs

LB page 145

Learners work on their own.

1. Learners draw parallel vertical lines.
2. Line B is an arc.

ACTIVITY 5.5 Practical: Draw lines and curves

LB page 146

Learners work on their own. Learners may not use MS WordPads.

1. Learners draw freehand horizontal and vertical, and inclined straight lines.
2. Learners draw curved lines and arcs.

The teacher should check learners' freehand lines while they work and give feedback as necessary.

ACTIVITY 5.6 Practical: Draw a title block

LB page 146

Learners work on their own.

Learners follow instructions and draw a title block. They should use MS Word. Learners hand in their work and teachers check the measurements. This activity is not for assessment.

Linking Topics 5.1 and 5.2: Design communication and sketching to design thinking

Questions

1. Recall the different drawing materials and instruments we learned about, such as pencils and rulers. Why are these tools important for effective communication in design?
2. Imagine you are tasked with designing a new type of school bag. How could sketching be helpful in the early stages of this design process?
3. We learned about different types of lines used in drawing, such as straight lines and curved lines. How can these different lines be used in sketching to communicate design ideas?
4. Consider the process of writing lettering. Why might clear and consistent lettering be important in design sketches?
5. Why do you think proper care and maintenance of drawing materials is important for creating effective design sketches?
6. Imagine you are working on a design project to create a more user-friendly dustpan and brush set. Describe the steps involved, explaining how both sketching (communication) and design thinking (idea generation) are crucial in this process.
7. List examples in everyday life where clear communication is essential for completing a task or project.
8. Research a specific design project (e.g., designing a new type of bicycle) and the role of sketching in the initial stages. Present your findings to the class, explaining how sketches helped communicate and develop the design concept.

Answers

1. Drawing tools help create clear and accurate visual representations of design ideas, facilitating communication with others involved in the design process.
2. Sketching allows for quick exploration of different design concepts, experimenting with shapes, layouts, and functionalities for the school bag.
3. Straight lines might be used to represent rigid structures, while curved lines could depict more organic or flowing shapes within the design.
4. Clear and consistent lettering ensures the design notes and details on the sketches are easily readable and understood by others.
5. Worn-out pencils or broken rulers can make it difficult to create precise and clear sketches, hindering effective communication of design ideas.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider how damaged pencils or blunt pen leads could create faint or unclear lines, making it difficult to interpret the design ideas in the sketch. Similarly, broken rulers could affect the accuracy of measurements and dimensions within the sketch.
- Question 6: Encourage students to break down the process into steps. They might mention sketching different designs for the dustpan and brush set based on the user's needs (design thinking), followed by using clear lines and lettering to communicate the chosen design concept in the sketch.

Topic 5.2 Designing

Content standard

- B7.5.2.1 Demonstrate understanding of designing.

Indicators

- B7.5.2.1.1: Work with a given design brief.
- B7.5.2.1.2: Generate ideas.

Core competencies

- **Communication and collaboration (CC)**
 - CC 8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP5.2: Analyse and make distinct judgement about viewpoints expressed in an argument.
- **Creativity and innovation (CI)**
 - CI 5.2: Ability to merge simple or complex ideas to create novel things.
 - CI 5.5: Ability to try new alternatives and different approaches.
 - CI 6.10: Reflect on work and explore thinking behind thoughts and processes.

1. Introduction

This short topic outlines the basic design brief and how to apply it. It requires problem-solving thinking and so teachers should give learners a few practical examples to solve.

2. Learning expectations

Learners need to be able to:

- Study a given design brief and identify a problem.
- Analyse a problem and list the possible ideas for a solution.
- Use freehand sketches to generate three possible ways to solve the problem and write descriptive notes.
- Verify if the generated ideas satisfy the solution for the problem.
- Select the best design and draw a picture to illustrate it.
- Add suitable dimensions to the selected design.
- Prepare a simple working drawing of a design for the working drawing, which is prepared in communication design and, for example, shows front elevation, plan and end view.

Duration

Teachers can teach this topic in four periods.

3. Resources needed

- Learner's Book
- Poster that shows basic designs

4. Using ICT

When teaching this topic, teachers can use cell phones, laptops, projectors, audio portable speakers, flash drives, presentations in MS PowerPoint, and MS WordPads for sketches.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read and research information about design briefs.
- Prepare teaching and learning resources (videos about solving problems using a design brief)
- Find more information on the internet.

5.2 Teaching strategies

Brainstorming, group work, demonstration, whole class discussion, pair work

5.3 Relevant background knowledge

Learners have a fair knowledge about drawing from the previous topic, but they are unlikely to have used a design brief to solve a problem. Ask the class if they have worked with design briefs before.

6. Suggested homework

Teachers can give learners useful links that suggest design briefs and problems. An example is technologystudent.com/designpro/problem1.htm.

7. Assessment

7.1 Assessment question

Which five questions should a design brief address?

Answer

Five questions a design brief should address:

- Who is experiencing the problem?
- Why does it matter?
- What is the problem?
- What are the challenges?
- Where does it happen?

7.2 Reflective practice or diagnostic assessment exercise

How well do learners understand what a design brief is and how to use it to problem-solve?

8. Answers

ACTIVITY 5.7

LB page 149

Learners work in pairs.

1. Learners answer the design brief questions.

Who is experiencing the problem? Mrs Opoku

Why does it matter? Mrs Opoku wants to be more prepared and organised for meetings.

What is the problem? She has too much paperwork and needs to sort and arrange it so she can always find documents quickly.

What are the challenges? Her office is too small, she handles her own paperwork, there is a lot of paperwork and her time is limited.

Where does it happen? In her office at Junior High School

2. Learners may suggest innovative ideas such as using dust covers for filing, using a scanner to scan documents to be used electronically, finding storage space with shelves and appointing an assistant. Accept all reasonable answers that can be supported.

Learners work in groups.

Learners identify a problem, draw freehand sketches to show possible solutions, discuss their ideas and make a freehand drawing that shows their best solution. Learners may not use MS WordPad for freehand sketches. Use the rubric, *Drawings* on page 118 of this Guide to assess sketches.

Linking Topics 5.2 and 5.3: Design thinking to meal planning

Questions

1. Recall the different stages of design we learned about, such as generating ideas. Name everyday situations where generating ideas might be helpful.
2. Imagine you are tasked with planning a healthy and delicious dinner for your family. How can the concept of generating ideas be applied to this situation?
3. We learned about different factors to consider when planning a meal, such as nutritional needs. Why is it important to consider these factors when planning meals?
4. Consider the concept of a design brief, which outlines the requirements for a design project. How does a recipe function like a design brief in meal planning?
5. Why do you think clear communication of the plan is important during meal preparation, especially when working with others in the kitchen?
6. Imagine you are working on a design project to create a new and exciting after-school snack for your classmates. Describe the steps involved, explaining how both design thinking (generating ideas) and meal planning (considering factors) are crucial in this process.
7. List examples in everyday life where planning is necessary before starting a task or project.
8. Research a specific cooking method (e.g., grilling) and the advantages and disadvantages to consider when planning a meal that uses this method. Present your findings to the class, explaining how these factors influence the planning process.

Answers

1. Generating ideas can be helpful in various situations, such as planning a birthday party, deciding on what to wear, or even organising your study space.
2. By brainstorming different meal options, and considering dietary preferences and available ingredients, students can generate creative and delicious dinner ideas.
3. Considering factors like nutritional needs ensures meals provide a balanced diet for the family, while budget limitations help plan cost-effective meals, and available food helps avoid unnecessary purchases.
4. A recipe outlines the ingredients and steps involved in creating a dish, similar to how a design brief provides the requirements and specifications for a design project. Following a recipe ensures a successful meal outcome, just like following a design brief helps achieve the desired design.
5. Clear communication of the plan helps ensure everyone involved knows their tasks, avoids confusion during preparation, and promotes teamwork in the kitchen.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider how unclear communication could lead to someone using the wrong ingredients or following incorrect steps, potentially ruining the meal or creating safety hazards.
- Question 6: Encourage students to break down the process into steps. They might mention brainstorming snack ideas based on taste preferences (design thinking), followed by considering factors like available ingredients, nutritional value, and ease of preparation (meal planning), before finalising the design (snack choice).

Topic 5.3 Planning for making artefacts and products

Content standard

- B7.5.3.1 Demonstrate understanding of planning for making artefacts or products.

Indicators

- B7.5.3.1.1: Discuss the factors to consider when planning a meal.
- B7.5.3.1.2: Demonstrate skills in planning for preparing food using moist methods of cooking.

Core competencies

- **Communication and collaboration (CC)**
 - CC 8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.
- **Creativity and innovation (CI)**
 - CI 5.2: Ability to merge simple or complex ideas to create novel things.

1. Introduction

People eat different types of meals daily, for example, many people eat breakfast, lunch, snack, elevenses, brunch and supper. Somebody plans, prepares and serves meals. In this topic, the focus is on the factors to consider when planning meals.

2. Learning expectations

Learners need to be able to:

- Identify and explain the different types of meals that are served in a day.
- Explain the factors to consider when planning meals.
- Discuss in groups, reasons for cooking food.
- Identify the different moist methods of cooking, for example, boiling, stewing and poaching.
- Discuss the three types of boiling food.
- Discuss the advantages and disadvantages of boiling food.
- Explain what is meant by stewing.
- Identify foods that can be stewed.
- Discuss the principles of or guidelines for stewing.
- Discuss the advantages and disadvantages of stewing foods.

Duration

Teachers can teach this topic in four periods.

3. Resources needed

- Learner's Book
- Charts that show factors to consider when planning meals.
- Pictures of kitchen essentials

4. Using ICT

When teaching this topic, teachers can use cell phones, laptops, projectors, audio portable speakers, flash drives, presentations using MS PowerPoint, and MS WordPads to draw sketches.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Find information about meal planning.
- Prepare and collect teaching and learning resources that are relevant to lessons about meal planning such as charts with pictures and real-life objects.
- Download pictures that support the information and pictures in the textbook.

5.2 Teaching strategies

Role play, brainstorming, discussions (group and whole class), group work, pair work

5.3 Relevant background knowledge

Learners have fair knowledge about some of the meals people eat each day. Some learners eat before they go to school. Some learners can identify the major meals in a day easily.

6. Suggested homework

Below are suggestions for additional questions learners can answer for homework.

1. Find out from your family what a few of the factors are that they consider when planning meals.
2. **a)** List the types of meals that are served in a day.
b) Which of these types of meals do you eat regularly?
3. Give reasons why you eat some types of meals, but not others.

7. Assessment

7.1 Assessment questions

1. Explain the each type of meal.
a) breakfast **b)** lunch **c)** supper
d) snack **e)** brunch **f)** elevenses
2. Explain the following factors that people consider when they plan meals.
a) Nutritional needs of family members **b)** Food available
c) Family budget

Answers

1. **a)** Breakfast is the first meal of in the day. It is usually eaten between 6 a.m. and 9 a.m. Breakfast provides the energy needed to be active and alert. It should be high in energy such as banku, waakye, porridge and bread. It should be simple and quick to prepare.
b) Lunch is the second big meal of the day. It is usually eaten between noon and 1 p.m. Lunch is usually cooked food such as rice, beans, fish, meat and vegetables. It is often eaten at school or at food stalls and can include dishes such as banku, kelewele and chibom.
c) Supper is the third big meal. It is usually eaten in the evening. Supper generally consists of cooked dishes such as egg and meat stews and it includes vegetables. Fruit is often a side dish.
d) A snack is a small amount of food people eat between big meals. Snacks can boost our energy and help us stay full between meals. Healthy snacks include fruit, nuts and boiled eggs.
e) The word brunch combines the words breakfast and lunch. Bruch is a big meal people eat late in the morning. It replaces breakfast and lunch and is often planned for special occasions.
f) Elevenses usually consists of biscuits or a small pastry that people eat when they drink coffee or tea. At work, people take a small break in order to have elevenses. Traditionally, elevenses was at 11 a.m., but now people have it earlier. Elevenses does not replace lunch. It is a treat.

2. Factors people consider when planning meals:

Nutritional needs: Food helps us grow strong and fight illness. We need 3 types: body building (meat, beans), energy (rice, oil), and protection (fruits, vegetables). Everyone needs all three daily.

Availability: We often choose what is nearby. Seafood is available by the coast, and local options are cheaper than transported ones. Seasons influence the availability of different foods.

Budget: Families have different amounts for food. This is called the food budget. Those with less may struggle to afford daily meat and milk.

7.2 Reflective practice or diagnostic assessment exercises

1. Were learners able to explain the different types of meals that are served in a day?
2. Were learners able to explain the factors to consider when planning meals?

8. Answers

ACTIVITY 5.9

LB page 151

Learners work in pairs.

1. A waakye for breakfast B banku and soup for lunch C egg jollof for supper
2. Teachers can guide discussions about all the meals that learners ate on the previous two days.
 - a) Below is an example of a food diary.

Day	Type of meal	Time
Monday	Breakfast	7:00 a.m.
	Snack	10:00 a.m.
	Elevenes	11:00 a.m.
	Lunch	12:00 noon
	Supper	5:00 p.m.
Tuesday	Brunch	11:00 a.m.
	Snack	1:30 p.m.
	Supper	5:00 p.m.

- b) Learners discuss similarities and differences between their diaries.
 - c) Learners discuss and list the ingredients in their food and categorise it.
3. Learners discuss the snacks they eat and whether they are nutritious.

ACTIVITY 5.10

LB page 151

Learners work in groups.

1. Teachers can guide learners as they plan a meal using local ingredients. An example meal could be groundnut soup with fish, crab, oysters, kokonte and cut watermelon.
2. Learners illustrate the meal they planned.
3. Below are answers that refer to the example in question 1.
 - a) Yes, the main dish (groundnut soup) will provide the protein and mineral base for the meal. Kokonte will provide the carbohydrate base for the meal and a dessert of cut or sliced watermelon) will satisfy the protective part of the food.
 - b) Watermelon is available most of the year. Oysters and crabs are always available.
 - c) The meal could cost about GH¢30.00 depending on the number of people.

ACTIVITY 5.11

LB page 152

Work in groups.

Teacher should encourage all learners to take part in the class discussion.

We cook food to make it taste better, to soften the texture, to kill the bacteria in certain raw foods, and to use heat to combine certain foods. Cooked food helps us stay warm in cold weather.

Teachers can add information from their own experiences and, for example, mention their food preferences. They should also discuss food that cannot or should not be eaten raw such as meat and chicken.

ACTIVITY 5.12

LB page 153

Learners work in groups.

1. Food boils at boiling point while food stews below boiling point.
2. Do not boil food for longer than necessary or overcook it.
3. Unripe pawpaw

Linking Topics 5.3 and 5.4: Meal planning to making artefacts

Questions

1. Why is it important to plan a meal before cooking it?
2. Imagine you are tasked with creating a healthy and tasty snack for the class using readily available fruits. How can the concept of meal planning be applied to this task?
3. List similarities between planning a meal and planning to use sewing and crocheting techniques.
4. Consider the advantages and disadvantages of different cooking methods, like boiling. How can understanding these factors influence your plan for the fruit snack?
5. Why is it important to follow a recipe when cooking?
6. Imagine you are working on a design project to create a new and visually appealing vegetable platter for a school event. Describe the steps involved, explaining how both meal planning (considering factors) and creating artefacts (using compliant materials) are crucial in this process.

Answers

1. Planning a meal helps ensure it is nutritious, fits the budget, and uses available ingredients, leading to a successful and enjoyable cooking experience.
2. By considering factors like nutritional value, available fruits, and class preferences, students can plan a healthy and delicious snack for the class.
3. Both meal planning and creating artefacts using sewing or crocheting require planning the steps involved, considering materials, and anticipating potential challenges.
4. Knowing that boiling softens fruits might influence the choice of fruits used in the snack or the preparation method (e.g., chopping vs. leaving whole).
5. Following a plan or recipe helps ensure the dish is prepared correctly, resulting in the desired taste, texture, and overall success of the food artefact.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider how not following a plan could lead to using the wrong ingredients or improper cooking methods, potentially ruining the dish or creating safety hazards.
- Question 6: Encourage students to break down the process into steps. They might mention considering factors like available vegetables, colours for visual appeal, and ease of preparation (meal planning), followed by using vegetables as compliant materials to create an artistic arrangement on a platter (creating artefacts).

Topic 5.4 Making artefacts from compliant, resistant materials and food ingredients

Content standard

- B7.5.4.1 Demonstrate skills of making artefacts and products.

Indicators

- B7.5.4.1.1: Demonstrate skills in preparing food using moist methods of cooking.
- B7.5.4.1.2: Demonstrate skills of making sewing and crocheting artefacts or products.
- B7.5.4.1.3: Use compliant materials to make mock-ups.

Core competencies

- **Communication and collaboration (CC)**
 - CC 8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP6.5: Ability to select alternatives that adequately meet selected criteria.
- **Creativity and innovation (CI)**
 - CI 5.2: Ability to merge simple or complex ideas to create novel things.
 - CI 5.5: Ability to try new alternatives and different approaches.
 - CI 6.3: Ability to select the most effective creative tools for work and give reasons for choice.
 - CI 6.10: Reflect on work and explore thinking behind thoughts and processes.

1. Introduction

Food preparation

People cook food to make it edible, improve its flavour and kill germs. Food can be cooked using moist or dry methods. In this topic, the focus is on boiling and stewing as moist methods of cooking food. Learners will learn to identify the types of boiling and look at, for example, foods that can be boiled, the advantages and disadvantages of boiling food and they will stew a dish of food and display it for appraisal.

Sewing

Learning to develop skills in sewing and crocheting can boost a person's self-esteem. These skills will help people become independent and increase career opportunities. In this topic, learners will demonstrate their skills in making sewing and crocheting artefacts and products.

Compliant materials

Earlier this year, learners had the opportunity to improve their drawing skills, they learnt about design and how to solve problems. However, often it is not easy to explain a design on paper and so people make mock-ups. A mock-up can show proportion and it can be made to scale so that it is a miniature version of the final artefact. Although it is not always functional (in other words, it does not include all with working parts), it can give someone who needs the artefact a good idea about how well the design meets their requirements.

2. Learning expectations

Learners need to be able to:

- Prepare a meal by choosing one of the three boiling methods to use when making a stew.
- Make specimens or samples of basic sewing stitches.
- Make specimens of basic crocheting stitches: chain, slip stitches, double crochet and treble.

- When planning to make a mock-up, organise card board or paper as the main materials they will use.
- Using the cutting list and drawings, use appropriate tools to measure, marking out and cut the different parts of the design.
- Check the different parts and dimensions to ensure the mock-up will be accurate.
- Fold the parts of the materials they developed to form the required mock-up.
- Use appropriate joining materials, tools and equipment to complete the mock-up.
- Apply a suitable finish to the mock-up.
- Test and evaluate the mock-up and modify it if necessary.

Duration

Teachers can teach this topic in ten periods.

3. Resources needed

- Learner's Book
- Charts that give reasons why people eat food.
- Pictures that show moist methods of cooking.
- A cooking source (coal pot, gas or stove), ingredients for making stew, saucepan and so on
- Charts that show finished works where basic sewing and crocheting stitches were used.
- Items that show basic sewing and crocheting stitches
- Pieces of fabric, sewing thread, needles, crochet thread, crochet pin and so on
- Materials such as milk cartons and boxes
- Cutting and gluing materials
- Drawing materials and equipment for the design
- Examples of mock-ups

4. Using ICT

When teaching this topic, teachers can use laptops, projectors, audio portable speakers, flash drives, presentations using MS PowerPoint, and MS WordPads for sketches. Teachers can show videos that demonstrate how to make basic sewing and crocheting stitches. There are many videos available on YouTube.

5. Teaching methodology

Food preparation

5.1 Preparation

The teacher should:

- Do research to find reasons why we prepare food in certain ways and methods of preparing food.
- Prepare and collect teaching and learning resources that are relevant for lessons about food hygiene. For example, prepare charts with pictures and collect real objects.
- Download pictures that support and help explain concepts.

5.2 Teaching strategies

Role play, brainstorming, group work, whole class discussion, pair work, thought showers, guessing games

5.3 Relevant background knowledge

Learners have a fair knowledge of some methods people use to cook food. Some learners will have used these methods to cook food at home. Other learners will have watched and helped their parents and guardians use various methods when preparing food.

Sewing

5.1 Preparation

The teacher should:

- Read and research information about basic sewing stitches.
- Read and research information about basic crocheting stitches.
- Prepare teaching and learning resources (charts and real-life objects).

5.2 Teaching strategies

Brainstorming, whole class discussion, individual practice

5.3 Relevant background knowledge

Learners have fair knowledge of a few basic stitches. The girls have been wearing dresses that were made using some of these basic stitches.

Compliant materials

5.1 Preparation

The teacher should:

- Read and do research to find information about models and mock-ups.
- Prepare teaching and learning resources (objects and materials) and ask learners to bring relevant objects to class.
- Do research on the internet to find additional information, including videos, that show how mock-ups work and how they are made.

5.2 Teaching strategies

Pair work, demonstration

5.3 Relevant background knowledge

Learners may have fair knowledge of using nets to make three-dimensional objects as they have learnt this in Mathematics. They might have used solid objects such as wooden blocks to build structures.

6. Suggested homework

Below are suggestions for additional activities for homework.

Food preparation

1. Ask your parents or guardians which methods they use to prepare family meals and why they use these methods.
2. Give examples of foods that are prepared using the cooking methods you have learnt about in this topic.

Sewing

3. Practise making basic sewing and crocheting stitches.

Compliant materials

4. Bring materials from home that you can use to make models and mock-ups.
5. Work in a group. Start to make a simple model at home and bring it to class and combine it with models other members of your group have made to form a set of models or a larger model.

7. Assessment

Food production

7.1 Assessment questions

1. Give three reasons why we cook food.
2. Discuss the three reasons mentioned above.
3. List the two main methods of cooking food.
4. Give three examples each of food that is cooked using moist cooking and dry cooking.
5. What is boiling?
6. Identify and explain the types of boiling.
7. Give three examples of foods that can be boiled.
8. Describe what happens when food boils.
9. State three advantages of boiling food.
10. State two disadvantages of boiling food.
11. How will you boil food that is available in your area?
12. What is stewing?
13. Give three examples of foods that can be stewed.
14. State two advantages to stewing food.
15. State two disadvantages to stewing food.
16. How will you boil any of your local foods?

Answers

1. We cook food to make it edible, improve its flavour and kill germs.
2. **Make food edible:** We cannot chew certain foods when they are raw. Examples include yams and potatoes, which are high in fibre. The fibres are softened when food is cooked and the food becomes easy to chew and to swallow.
Improve the flavour of food: The taste of foods such as carrots changes when it is cooked. Ingredients such as spices and sugars that we add when we cook food enhances the flavour of the food. We can use the same ingredients to create different tastes. For example, we can add different ingredients to cocoyam, canned soups, chips and mpotompoto.
Kill germs: Germs are present in raw foods such as raw eggs and chicken. Cooking these foods thoroughly kills the germs.
3. Moist and dry cooking
4. Examples of moist cooking: boiling, stewing, poaching and steaming
Examples of dry cooking: grilling, baking and roasting
5. Boiling is a moist method of cooking food at a temperature of 100 °C in water or in a liquid such as stock or milk.
6. Ways to boil food:
 - The food absorbs the liquid, for example, cooking rice and beans.
 - The liquid forms part of the finished dish, for example, soup and porridge.
 - The liquid or stock is thrown away, for example, eggs, yam and cassava.
7. Examples of food that can be boiled (any three): rice, beans, soup, porridge, eggs, yams and cassava.
8. Food boils at a temperature of 100 °C, in water or liquid. Bubbles rise to the surface of the liquid and make a light explosive sound as they pop.
9. Advantages of boiling food include:
 - Boiling is a safe and simple method of cooking.
 - Boiling is a quick way to cook, particularly when you want to soften food and make it easy to chew and digest.
 - Boiling requires no fat or oil, which means that it is healthier than methods such as deep-frying.

10. Disadvantages of boiling food include:
 - Some soluble nutrients are lost when we throw away the water in which food is boiled.
 - Boiled dishes are seldom attractive.
11. Answers will differ depending on the area in which learners live.
12. Stewing is a moist method of cooking food. Food is cooked slowly in liquid over gentle heat for a long time.
13. Foods that can be stewed (any three): unripe pawpaw, tomato, cabbage
14. Advantages to stewing food include:
 - Stewing is an economic way of using heat as most of the cooking is done at low temperatures.
 - Stewing is a good way to cook cheaper cuts of meat and lower the cost of a meal.
15. Disadvantages to stewing food include:
 - It takes a very long time to stew food.
 - The food needs constant attention while it is stewing as you need to control the amount of liquid and the temperature. So, it is not suitable for families who do not have much time to spend in the kitchen.
16. Answers will differ depending on the area in which learners live.

7.2 Reflective practice or diagnostic assessment exercises

1. Were learners able to give three reasons for cooking food?
2. Were learners able to discuss three reasons for cooking food?
3. Were the learners able to list the two main methods people use to cook food?
4. Did learners give three examples each of food that is cooked using moist cooking and dry cooking?
5. Were learners able to define boiling?
6. Were learners able to identify and explain the types of boiling?
7. Were learners able to give three examples of foods that are boiled?
8. Did learners describe the principles that are involved in boiling food?
9. Were learners able to give three advantages to boiling food?
10. Were learners able give two disadvantages to boiling food?
11. Were learners able to describe how they would boil local food?
12. Were learners able to define stewing?
13. Did learners give three examples of foods that are stewed?
14. Were learners able to give two advantages of stewing food?
15. Were learners able to give two disadvantages of stewing food?
16. Were learners able to describe how they would boil a local food?

Sewing

7.1 Assessment questions

1. List four basic stitches in sewing.
2. List four basic stitches in crocheting.

Answers

1. Basic sewing stitches (any four): running stitches, even tacking, long and short tacking, back stitches, over casting
2. Basic crocheting stitches (any four): chain stitches, slip stitches, double crochet, treble crochet

7.2 Diagnostic assessment exercises

Were the learners able to demonstrate skills of making artefacts or products in sewing and crocheting?

Compliant materials

7.1 Assessment questions

Give three reasons why it is a good idea to make a mock-up of an artefact before you make the artefact.

Answers

Reasons to make a mock-up:

- The mock-up will show whether the dimensions are correct and whether the parts fit.
- You can use the mock-up to test how well the artefact will meet a client's requirements.
- You can use the mock-up to check if the cutting list is complete.

7.2 Diagnostic assessment exercises

How well do learners understand how to make a mock-up and how to use a mock-up?

8. Answers

ACTIVITY 5.13 Practical: Prepare a meal

LB page 155

Learners work in groups.

Each group prepares a meal with accompanying dishes. Use the rubric, *Food preparation/demonstration* on page 116 of this Facilitator's Guide to assess learners' work.

ACTIVITY 5.14 Practical: Make specimens of sewing stitches

LB page 157

Learners work on their own and discuss what they learnt in groups.

Learners make specimens of two sewing stitches. Use the rubric, *Sewing preparation/demonstration* on page 117 of this Facilitator's Guide to assess learners' work.

ACTIVITY 5.15 Practical: Make specimens of crotchet stitches

LB page 158

Learners work on their own and discuss what they learnt in groups.

Learners make specimens of two crotchet stitches. Use the rubric, *Sewing preparation/demonstration* on page 117 of this Facilitator's Guide to assess learners' work.

ACTIVITY 5.16 Practical: Make a mock-up for an artefact

LB page 159

Learners work in pairs.

Learners follow the instructions to create a mock-up of a box.

Groups then test and evaluate their mock-up by asking:

- Do the parts fit?
- Is the box sturdy?
- Are the dimensions of the box functional?
- Is the box attractive?

Use the rubric, *Demonstration: artefacts/tools* on page 116 of this Facilitator's Guide to assess learners' work.

REVISION ANSWERS

(Learner's Book page 160)

1. B a triangular tool with specific angles. (1)
2. A One end of a straight line is never higher than the other end. (1)
3. a) set squares
b) T-square
c) compass (3)
4. a) dimension lines
b) dashed lines
c) thick continuous lines
d) thin continuous lines (4)
5. J and H (1)
6. a) A is isometric.
b) C is oblique.
c) B shows perspective. (3)
7. a) False. Growing children and teenagers need body-building food every day.
b) False. Brunch is a big meal people eat late in the morning to replace breakfast and lunch.
c) True.
d) False. Snacks such as fruit can be healthy. (4)
8. Boiling is a moist method of cooking food at a high temperature (100 °C) in water or a liquid such as stock or milk. (You can boil yams, sweet potatoes and cassava.)
Steaming is a moist method where steam from boiling water cooks the food. (You can steam abol and yakayake.) (6)
9. Advantage of stewing food: Stewing uses heat economically as most of the cooking is done at low temperatures.
Disadvantage of stewing food: It takes a long time to cook food. (2)
10. Advantage of boiling food: It is a safe and simple method of cooking.
Disadvantage of boiling food: Some soluble nutrients are lost when the water in which food is boiled is thrown away. (2)
11. a) back stitches b) overcast stitches c) tacking (3)

Total: 30 marks

This module has two topics.

Topic 6.1 Career pathways and career opportunities

Content standard

- B7.6.1.1 Demonstrate awareness of own learning styles, interests, biases, beliefs and reasons for pursuing Career Technology.

Indicators

- B7.6.1:1.1: Evaluate own learning styles, interests and reasons for pursuing Career Technology.

Core competencies

- **Communication and collaboration (CC)**
 - CC 8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP5.1: Ability to combine information and analyse to make distinct judgement.
- **Personal development and leadership (PL)**
 - PL5.1: Understanding of one self (strengths, weaknesses, goals and aspirations, reacting and adjusting to novel situations).

1. Introduction

This topic will help learners identify their own skills and interests in areas such as food technology, sewing, masonry, woodwork and metalwork. They will look at their gender and social biases and reflect on how these biases affect their choices in life and career. Many learners adopt the outlooks of their peers and adults and so it is important to provide a broader outlook on the possibilities and opportunities they have.

2. Learning expectations

Learners need to be able to:

- Think–pair–share with whole class’ learning styles, interests and reasons for pursuing Career Technology. They need to ask themselves why they are studying Career Technology.
- Examine own biases and beliefs, as a male or female, about some vocations.

Duration

Teachers can teach this topic in four periods.

3. Resources needed

- Learner’s Book

4. Using ICT

Teachers can use cell phones, laptops, projectors, portable speakers, flash drives, PowerPoint presentations, and MS WordPads to draw sketch when teaching this topic.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Read and research information about careers in the different technology fields.

- Prepare teaching and learning resources (find videos about gender bias and stereotyping in certain careers, and information about careers in technology).
- Look for more information on the internet.

5.2 Teaching strategies

Brainstorming, discussion (group and whole class), group work, demonstration, pair work

5.3 Relevant background knowledge

Learners have fair knowledge about entrepreneurs and selling items at school fairs and markets.

6. Suggested homework

Learners research gender bias in the workplace and present their findings to the class.

7. Assessment

7.1 Assessment questions

1. What do you need to know about yourself before you can choose the career that suits you best?
2. What does the term, gender role, mean?

Answers

1. To choose the correct career, you have to:
 - Understand yourself; your talents, interests and personality.
 - Free yourself from set ideas about what is possible and what is not possible.
 - Think about what it means to do a job.
 - Be willing and able to learn the skills needed to do a job.
2. Gender role refers to the fact that society views men and women differently. This includes how they live, how they work, what they should do, and how they should behave according to their gender.

7.2 Reflective practice or diagnostic assessment exercises

1. How well are learners able to identify their own characteristics and the jobs that are most suitable for them?
2. Are learners able to identify stereotypes and bias based on gender, and overcome these stereotypes?

8. Answers

ACTIVITY 6.1

LB page 162

Learners work in groups.

1. A carpenter B potter C tailor D chef or baker E IT technician

Learners discuss the techniques, knowledge of materials and understanding of tools, as well as factors such as training and apprenticeship, for each job.

2. Learners chose a job. Teachers should walk around the class and ensure that each learner has chosen a job and understands what he or she needs to do in the job and what training they need.

ACTIVITY 6.2

LB page 163

Learners work in pairs and then take part in a class discussion.

1. Teachers can guide learners as necessary when they discuss the points in the Learner's Book.
2. Teachers can give learners 10 minutes to decide which two points are the most important.
3. Learners take part in a class discussion where they motivate the two points they have chosen. Ask learners to write a full list on the board.

Learners work in groups.

1. **a)** A Workers are repairing an electrical appliance (iron).
 B The worker is making pastry.
 C The worker is working at a construction site.
b) Some learners may not see anything unusual, but others may say that it's unusual to see women doing traditionally male jobs and men doing traditionally female jobs.
2. **a)** Accept learners' initial answers, but explain that making dresses is not a gender-specific career and that anyone can make beautiful dresses. Some of the world's most successful dress designers are male.
b) Accept learners' initial answers, but explain that both males and females can work in engineering. There are many female engineers in the world today, although in some countries, engineering still seems to be a traditionally male career.

Linking Topics 6.1 and 6.2: Career exploration and entrepreneurship

Questions

1. Recall the different reasons we discussed for pursuing Career Technology, such as your interest in practical skills. List personal skills or interests that might be relevant to a career in technology.
2. Imagine you are highly interested in electronics and enjoy working with your hands. How could these interests and skills be applied to a career path in technology?
3. We learned about different roles within a business, but today we are focusing on entrepreneurs. What does the term "entrepreneur" mean?
4. List skills you develop through Career Technology subjects that could be beneficial for an entrepreneur.
5. Why is it important to consider the advantages and disadvantages of becoming an entrepreneur?
6. Imagine you discover a local need for phone repairs but limited repair shops. Describe the steps involved in potentially starting a small phone repair business, explaining how your skills and interests, combined with the characteristics of an entrepreneur, could be helpful.

Answers

1. Interests in electronics, problem-solving, or working with tools could be relevant to careers in electronics repair, computer maintenance, or carpentry.
2. These interests and skills could be applied to careers like repairing electronic devices, building electronic circuits, or even developing new technological products.
3. An entrepreneur is someone who starts and manages their own business.
4. Skills like problem-solving, critical thinking, and working with different materials, could be beneficial for an entrepreneur starting and running their own business.
5. Considering advantages (independence, potential for high profits) and disadvantages (financial risk, long working hours) helps to make an informed decision.

Teacher guidance for open-ended questions

- Question 5: Guide students to consider the financial stability offered by established jobs compared to the potential risks and rewards of starting a business.
- Question 6: Encourage students to break down the process into steps. They might mention identifying the local need and their skills (interests and skills), researching phone repairs and startup costs (considering advantages and disadvantages), and demonstrating entrepreneurial characteristics like initiative and planning to launch their business.

Topic 6.2 Establishing and managing a small business enterprise

Content standard

- B7.6.2.1 Demonstrate understanding of establishing and managing a small business enterprise.

Indicators

- B7.6.2.1.1: Explain what is meant by 'entrepreneurship' and 'entrepreneur'.
- B7.6.2.1.2: Describe the characteristics of a successful entrepreneur.
- B7.6.2.1.3: Explain the advantages and disadvantages of being an entrepreneur.
- B7.6.2.1.4: Identify entrepreneurial opportunities in the locality.

Core competencies

- **Communication and collaboration (CC)**
 - CC8.1: Speak clearly and explain ideas.
 - CC8.2: Explain ideas in a clear order with relevant details.
- **Critical thinking and problem-solving (CP)**
 - CP5.1: Ability to combine information and analyse to make distinct judgement.
 - CP5.1: Ability to combine information and ideas from several sources to reach a conclusion.

1. Introduction

Learners look at the characteristics of a successful entrepreneur, and the advantages and disadvantages of being an entrepreneur. They will learn how to identify entrepreneurs in their community and apply all they have learnt to their businesses. We can learn a lot from observing the people who are around us, who are working in a job that we would like to have. Encourage learners to spend time looking at all the opportunities in your area and start to identify the type of work they would like to have when they are older. Hopefully, learners can use the skills they acquire to create their own businesses.

2. Learning expectations

Learners need to be able to:

- Describe entrepreneurship as the activity of setting up a business or businesses, and taking on financial risks in the hope of making a profit.
- Understand that an entrepreneur sets up a business or businesses and takes on financial risks in the hope of making profit.
- Explain the characteristics of an entrepreneur.
- Discuss the characteristics that help an entrepreneur be successful.
- Discuss in groups, the advantages and disadvantages of being an entrepreneur.
- Explore businesses in your area. Observe and interact with entrepreneurs, taking into consideration the safety and welfare of learners.
- Do research about entrepreneurial opportunities.
- Give the names of a few popular enterprises in your area.
- Visit a few enterprises in your potential trade area and find information about the following:
 - How was the business started?
 - Which challenges does the business face?
 - What are the solutions to the challenges?

Duration

Teachers can teach this topic in four periods.

3. Resources needed

- Learner's Book
- Access to the internet, if possible

4. Using ICT

Teachers can use cell phones, laptops, projectors, portable speakers, flash drives, PowerPoint presentations, and MS WordPads to draw sketches when teaching this topic.

Activities that require ICT

Page	Activity	ICT required
166	6.6	Use the internet to find information about successful entrepreneurs.
168	6.9	Use MS PowerPoint to prepare a presentation.

5. Teaching methodology

5.1 Preparation

The teacher should:

- Do research about careers in the different fields of technology.
- Prepare teaching and learning resources (find videos about entrepreneurs and entrepreneurship, in a way that makes it easy for learners to understand).
- Find out more about small business support in Ghana, for example, look at the following sites and simplify the information to it easier for Basic 7 learners to understand:
<https://ghanatalksbusiness.com/2021/04/top-5-national-institutions-that-can-help-support-and-grow-your-business>
or <https://www.forbes.com/sites/meghanmccormick/2020/05/30/female-entrepreneurs-support-women-led-small-businesses-in-ghana-with-new-investment-fund/?sh=f592fa22133e>.
- Do research on the internet to find more information

5.2 Teaching strategies

Brainstorming, discussion (groups and whole class), group work, demonstration, pair work

5.3 Relevant background knowledge

Learners have fair knowledge about entrepreneurs and selling items at school fairs and markets. They should be able to identify entrepreneurs in their community even if they do not fully understand what it takes to be an entrepreneur.

6. Suggested homework

Learners should observe businesses in their communities and make notes about what they sell or offer, how they serve the community, and any gaps in the market that could be filled.

7. Assessment

7.1 Assessment questions

1. List any five characteristics of a successful entrepreneur and briefly explain how each one helps the business succeed.
2. Which of the following is an advantage or a disadvantage to an entrepreneur? Give a reason.
 - a) Irregular income stream
 - b) Benefits to communities
 - c) Pressure from competition
 - d) Financial risks

Answers

1. See the list on page 165 in the Learner's Book.
2.
 - a) An irregular income stream is a disadvantage. Not earning a regular income can be difficult to manage, particularly when families have many everyday needs.
 - b) Benefits to communities is an advantage. If you start a business in a community where you know what the needs and budgets of the people are, you will be able to provide exactly what people need at a price that they are willing to pay.
 - c) Pressure from competition is a disadvantage. Entrepreneurs have to be one step ahead of big name businesses as they do not have a brand name to fall back on.
 - d) Financial risks are a disadvantage. There are no guarantees when you start a business and many entrepreneurs put all their savings into a business and they hope it will be successful. It may take quite a lot of time to achieve success.

7.2 Reflective practice or diagnostic assessment exercises

1. How well can learners identify the characteristics of successful entrepreneurs?
2. How well do learners understand the advantages and disadvantages of being an entrepreneur?

8. Answers

ACTIVITY 6.4

LB page 165

Learners work in groups.

1. **A** The person who is working in a shop could be the owner or an employee. Teachers can walk around the class and listen to group's reasoning.

ACTIVITY 6.5

LB page 166

Learners work in groups.

1. Learners can refer to the list on page 165 in the Learner's Book and check which characteristics apply to Ruth. For example: She is creative and she looked for opportunities. She recognised the value of a local product and how it would suit local skin types, and created a product that most people would want to use.
2. She used a local ingredient and employed local women, using her own style and knowledge of her country and her community to create her product.

ACTIVITY 6.6

LB page 166

Learners work in pairs.

Learners do research to find examples of entrepreneurs and identify the skills and characteristics that helped them become successful entrepreneurs. Teachers can check to see if learners' work is up to date in their workbooks.

ACTIVITY 6.7

LB page 167

Learners work in pairs.

Learners' answers will differ. The purpose of this activity is to make learners aware of their own abilities and encourage entrepreneurship in learners who do not recognise it in themselves.

ACTIVITY 6.8

LB page 168

Learners work on their own.

- A** Advantages: Flexibility, benefits communities
- B** Advantages: Benefits communities, New useful ideas
- C** Advantages: Benefits communities, Income and employment
- D** Advantage: Self-fulfilment
- E** Disadvantage: Funding

ACTIVITY 6.9

LB page 168

Learners work in small groups.

1. Each group identifies a local entrepreneur they want to study.
2. They decide which business to observe.
3. Learners prepare a questionnaire of six to eight questions to ask the entrepreneur.
4. Learners prepare a report and present it to the class. It can be a printed or written report that they present as an oral, or using an MS PowerPoint presentation. Teachers can use the rubric, *PowerPoint presentation/oral* on page 118 of this Facilitator's Guide to assess learners' presentations.

ACTIVITY 6.10

LB page 168

Learners work in pairs to research entrepreneurial opportunities in their community and write a report on their findings. The reports:

- must be two to four pages long
- describe a business that can provide the service
- outline the plans to set up the business, including costs and selling price.
- list the product or service that is lacking

Teachers can use the rubric, *Writing a paragraph/report* on page 119 of this Facilitator's Guide to assess learners' reports.

REVISION ANSWERS

(Learner's Book page 169)

1. **B** Finding out what suits your interests and abilities
D Learning skills that can help you find a job. (2)
2. **B** Tailor with his own kiosk
D Small business offering a service looking after pets (2)
3. **B** Only men work as engineers. (1)
4. **C** Some chefs start their own businesses. (1)
5. Technology includes the skills, methods, techniques and processes that are used to produce goods or services. Everyone should have these skills. If they do not, the country would not produce any goods or services. (3)
6. Accept all correct examples.
a) Entrepreneurship: type of self-employment; a person sets up a new business (usually small) and runs it. (2)
b) Entrepreneur: a person who sets up their own business, taking all the risks and gaining all the profits (2)
7. See the list on page 165 but accept other reasonable answers. (6)
8. See the table on page 167 but accept other reasonable answers. (4)
9. Answers will differ depending on entrepreneurial opportunities in the area where learners live. (2)

Total: 25 marks

Rubrics

Demonstration: artefacts/tools

Ratings	3	2	1	0
Identification	Identifies and names the tool(s) needed.	Identifies most of the tools needed.	Identifies one or two of the tools needed.	Cannot identify the tool(s).
Knowledge	Knows what the tool(s) are used for and understands the task.	Knows of most uses for tool(s) and has a basic grasp of the task.	Knows of one or two uses, and does not understand the task fully.	Does not know what the tool(s) is used for and fails to grasp the task.
Demonstration or technique	Knows how to use or clean the tool safely and correctly.	Knows how to use or clean the tool, but needs one or two corrective measures.	Has a basic knowledge of how to use or clean the tool; misses some safety processes.	Does not know how to use or clean the tool and has no grasp of safety procedures.
Use of PPE (if relevant)	Knows what PPE to use and how to use it.	Does not use all the correct PPE.	Only uses some PPE.	Does not use any PPE.
Final product (if relevant)	Final product is exact, correct and finished neatly.	Final product is mostly correct and neat.	Final product has a few good points, but is not usable.	Final product is incorrect and not usable.

Total: 15

Food preparation/demonstration

Ratings	3	2	1	0
Health and cleanliness	Hair is tied back, hands are clean, wearing apron and mask.	Some elements of untidiness, but hands are clean.	Several elements of untidiness, but hands are clean.	If hands are not clean, award 0 even if other elements are present.
Working with others	Helpful, encouraging, friendly, worked well as a team.	Struggled with one or two skills but were generally successful.	Struggled to work as a team and only finished under teacher instruction.	Failed to work as a team and did not complete task.
Technique	Knew all the cutting and prepping techniques and executed them well. Used correct utensils.	Knew most cutting and preparation techniques and executed them satisfactorily. Used correct utensils most of the time.	Knew a few cutting and preparation techniques and struggled with execution. Used incorrect utensils at times.	Did not cut or prepare correctly or properly.
Ingredients	Identified all the ingredients and prepared the correct amounts.	Identified most ingredients and prepared most amounts correctly.	Struggled to identify ingredients and did not prepare most quantities correctly.	Could not identify ingredients and quantities were wrong.
Recipe	Followed the recipe exactly.	Missed a few steps or ingredients.	Struggled to follow the recipe; needed guidance.	Could not follow recipe.
Final	Dish is tasty, correct and finished neatly.	Dish is mostly correct and neat. Tastes acceptable.	Dish is close to what it should be, but it does not taste good.	Did not present final dish.
Timeliness	–	Dish was completed on time.	Dish was not completed on time.	Dish was not completed.

Total: 20

Sewing preparation/demonstration

Ratings	3	2	1	0
Knowledge	Followed all the procedures.	Followed most procedures.	Followed a few procedures.	Did not know what to do.
Speed	Finished ahead of time.	Finished on time.	Finished a few minutes late.	Did not finish.
Neatness	All stitches are firm and evenly placed.	Most stitches are firm and evenly placed.	Most stitches are loose and uneven.	Stitches could not be identified.
Dexterity (sewing)	Threaded the needle, held the needle and fabric correctly.	Struggled a little to thread the needle, held fabric correctly most of the time.	Needed guidance in to thread the needle and hold the fabric.	Could not thread a needle or hold the fabric and sew.
Dexterity (crocheting)	Cast on a stitch and held the needle and yarn correctly.	Struggled to cast on a stitch and hold the needle and yarn correctly.	Needed guidance to cast on a stitch and hold the needle and yarn correctly.	Could not cast on a stitch or hold the needle and the yarn correctly.

Total: 15

Creating a poster

Ratings	3	2	1	0
Heading	Heading is clear and relevant.	Heading is not completely relevant.	Heading is not relevant.	No heading.
Content	At least five main ideas are conveyed clearly.	Three or four main ideas are conveyed clearly.	One or two main ideas are conveyed clearly.	Ideas not relevant or non-existent.
Illustrations or pictures	All pictures have captions and labels. Labels are neat and no lines overlap.	Most pictures have captions and labels. Some lines overlap.	A few pictures have captions and labels. Most lines overlap or are missing.	No pictures or pictures without labels.
Creativity	Poster is well-designed. No visible pencil markings, colour is used well.	Poster is two-toned and has some visible pencil markings, limited use of colour.	Poster is bland. No colour or design, but all elements are present.	Poster lacks imagination.
Neatness	Poster is neat, spelling and grammar correct. No correction markings.	A few spelling and grammar errors. One or two correction markings.	Many spelling and grammar errors and correction markings. Or poster is untidy.	Poster is untidy and lacks cohesion.
Presentation	The presenter prepared well, spoke clearly and knows the subject matter.	The presenter knows the subject matter well and spoke quite well.	The presenter has limited knowledge and stumbled through the presentation.	The learner did not present the information.
Timeliness	–	The poster was completed on time.	The poster was not completed on time, it was submitted within two days.	No poster was submitted.

Total: 20

Drawings

Ratings	3	2	1	0
Heading or caption	Heading or caption is clear and relevant.	Heading or caption is not completely relevant.	Heading or caption is irrelevant.	There is no heading or caption.
Illustrations or pictures	Drawings are factually accurate and in proportion.	Drawings are mostly accurate and in proportion.	Drawings are identifiable but not accurate.	Drawings are not accurate.
Labels	Labels are neat and no lines overlap. All labels included.	Some lines for labels overlap. All labels included.	Quite a lot of lines for labels overlap. Some labels not included.	No labels included.
Neatness	Drawing is neat, spelling and grammar correct. No correction markings.	Some spelling and grammar errors. One or two correction markings.	Several spelling and grammar errors or correction markings. Or, drawings are untidy.	Drawings are not identifiable.

Total: 12

PowerPoint presentation/oral

Ratings	3	2	1	0
Topic	Topic was researched well and it is presented well.	Topic was researched quite well and it is presented quite well.	Topic was not researched well and it is not presented well.	Topic and presentation do not relate to task.
Presentation	Presentation is complete and it contains five or six relevant facts.	Presentation is complete, but it includes fewer than five relevant facts.	Presentation is complete, but it includes fewer than three relevant facts.	Presentation is incomplete.
Use of visuals	Visuals are relevant and captions are correct.	Not all visuals are relevant and not all captions are correct.	One or two visuals are relevant and most captions are not correct.	No visuals are included or all visuals are not relevant.
Body language	Presenter was prepared, spoke clearly and knows the subject matter.	Presenter does not know all subject matter and did not always speak clearly.	Presenter had limited knowledge and stumbled through the presentation.	Presenter did not speak.
Neatness	Presentation is neat, spelling and grammar are correct. There are no correction markings.	Presentation is quite neat. There are some spelling and grammar errors. There are one or two correction markings.	Presentation is not neat. There are several spelling and grammar errors and several correction markings.	Presentation is messy and very difficult to understand.
Timeliness	Presentation was ready on time and speaker was prepared.	Presentation was ready, but speaker was not prepared.	Presentation was ready a day late and speaker was not prepared.	No presentation was received and nobody delivered presentation.
Audience attention	–	Presentation held the class's attention throughout.	Presentation held class's attention for some of the time.	No presentation for class to watch.

Total: 20

Writing a paragraph/report

Ratings	3	2	1	0
Content	Covered all content well.	Covered some content quite well.	Covered content poorly.	–
Understanding	Very good understanding of topic. Used own words.	Showed some understanding of topic. Did not use own words throughout.	A lot of content was clearly taken from sources. Did not use own words.	–
Length	Stuck to the prescribed length.	Writing is a little too long or too short.	Writing is much too long or much too short.	–
Grammar and spelling	Spelling and grammar correct.	Spelling and grammar mostly correct.	Quite a lot of spelling and grammar errors.	–

Total: 12

Project

Ratings	3	2	1	0
Completion	All six categories are included in album.	One or two categories are missing from album.	Three to five categories are missing from album.	Included only one category or no categories included in album.
Content*	Sketches of four or five joining and assembling materials, tools and equipment included. Project includes one or two tools and materials learners researched.	Sketches of two or three joining and assembling materials, tools and equipment included. Project includes one tool and one material learners researched.	Sketch of one joining and assembling material, tool and equipment included. Project does not include tools or materials learners researched.	Sketches are missing or incomplete. Project does not include tools or materials learners researched.
Sketches*	All sketches have captions and labels are correct.	Most sketches have captions and most labels are correct.	A few sketches have captions and many labels are not correct.	No captions or labels are included.
Overall	Album is neat, spelling and grammar are correct. No correction markings were made.	Album is quite neat, some spelling and grammatical errors. One or two correction markings were made.	Album is not neat, several spelling and grammatical errors. More than two correction markings were made.	Album is messy and difficult to understand, it contains many spelling and grammatical errors.
Pair work	Pairs worked well together and completed project on time.	Learners worked on their own and also together. They completed project on time.	Learners did not work together. They did not complete the project on time.	Learners did not complete the project.

* Assess content and sketches for all six: sewing, food, woodworking, metalwork, plastics and building work.

Total: 45

For a mark out of 50, teachers can award marks out of 5 at their discretion for album cover, contents pages, page referencing, timeliness of submission and creativity.

Remedial activities

Topic 1.1: Personal hygiene and food hygiene

Questions

1. Why is it important for us to stay healthy?
2. What is one way to maintain good personal hygiene?
3. What can happen to food if it is not handled hygienically?
4. Why is the saying "Clean is safe" important when handling food?
5. What is one way to properly store food?
6. What is an example of a food preservation method?

Answers

1. Staying healthy helps us feel good, have more energy, and fight off illness.
2. Washing your hands with soap and water is one way to maintain good personal hygiene.
3. Food that is not handled hygienically can become contaminated with harmful bacteria, which can make you sick if you eat it.
4. "Clean is safe" means that keeping food clean throughout preparation, storage, and cooking helps prevent foodborne illness.
5. Storing food in a refrigerator or freezer is one way to properly store food and prevent spoilage.
6. Salting or drying fish is an example of a food preservation method that helps prevent spoilage.

Topic 1.2: Personal, workshop and food laboratory safety

Questions

1. What is one possible injury you could experience in a workshop or food laboratory?
2. Why is it important to store tools and equipment safely in the workshop or food laboratory?
3. How can good ventilation help keep the workshop or food laboratory safe?
4. What is the purpose of maintenance in a workshop or food laboratory?
5. Why is training important for safety in the workshop or food laboratory?
6. What is an example of responsible behaviour in the workshop or food laboratory?
7. What is the purpose of emergency drills in the workshop or food laboratory?

Answers

1. A cut from a sharp tool is one possible injury you could experience in a workshop or food laboratory.
2. Storing tools and equipment safely prevents them from falling or becoming hazards, and keeps the workspace organized.
3. Good ventilation helps remove harmful fumes, dust, or heat that could be a safety risk.
4. Maintenance ensures tools and equipment are in good working order, preventing malfunctions that could lead to accidents.
5. Training teaches students how to use tools and equipment safely, and what to do in case of an emergency.
6. Following safety instructions, using tools correctly, and cleaning up spills are all examples of responsible behaviour.
7. Emergency drills help students practice what to do in case of a fire, chemical spill, or other emergencies in the workshop or food laboratory.

Topic 1.3: Environmental health

Questions

1. What is one factor that contributes to environmental health?
2. Why is clean water important for environmental health?
3. What is sanitation?
4. What is one way to improve sanitation in your community?
5. How can littering harm the environment?
6. What is one way to reduce waste?
7. How can planting trees help reduce air pollution?

Answers

1. Clean water, disease control, proper sanitation, and clean air are all factors that contribute to environmental health.
2. Clean water is essential for drinking, cooking, and maintaining hygiene. Polluted water can spread diseases.
3. Sanitation refers to the practices that help keep our surroundings clean and prevent the spread of disease. This includes waste management and good hygiene practices.
4. Proper waste disposal, such as using bins and avoiding littering, can improve sanitation in your community.
5. Littering can pollute water bodies, harm wildlife, and create an unpleasant environment.
6. Reusing items instead of throwing them away, or composting food scraps, are ways to reduce waste.
7. Trees absorb carbon dioxide, a major air pollutant, and release oxygen, which helps improve air quality.

Topic 2.1: Compliant materials

Questions

1. What is one property of a compliant material?
2. Why are compliant materials useful in different technologies?
3. What is an example of a compliant material used in everyday life?
4. What is the raw material used to produce paper?
5. How is fabric different from a material like wood?

Answers

1. Compliant materials are flexible, bendable, or easily shaped.
2. Compliant materials are useful because they can be formed into different shapes and are often lightweight.
3. Paper, rubber bands, and fabrics are all examples of compliant materials used in everyday life.
4. Paper is typically produced from wood pulp.
5. Fabric is a compliant material made from woven or knitted threads, while wood is a rigid material with a strong cellular structure.

Topic 2.2: Resistant materials

Questions

1. What is one property of a resistant material?
2. Why are resistant materials important in construction projects?
3. What is the difference between a hardwood and a softwood tree?
4. What are the two main categories of plastics based on their heating behaviour?
5. How is timber different from the original tree trunk?
6. What is an example of a metal alloy?
7. What is one raw material used to produce cement?

Answers

1. Resistant materials are strong, durable, and can withstand wear and tear.
2. Resistant materials are used in construction projects because they can support weight, resist pressure, and last for a long time.
3. Hardwood trees generally grow slower, are denser and stronger, while softwood trees grow faster and are lighter and easier to work with.
4. The two main categories of plastics are thermoplastics, which can be softened and reshaped with heat, and thermosetting plastics, which harden permanently when heated.
5. Timber is processed wood, usually cut into specific shapes like planks or beams, while the original tree trunk is the complete round structure of the tree. Timber goes through processes like seasoning to improve its properties.
6. Stainless steel is an example of a metal alloy, which is a mixture of two or more metals to create a material with specific desired properties.
7. Limestone is one of the raw materials used to produce cement.

Topic 2.3: Smart and modern materials

Questions

1. What is the difference between a modern material and a traditional material like wood?
2. What is one example of a smart material?
3. How can temperature affect a thermochromic material?
4. Imagine a bracelet that changes colour when you step outside in the sunlight. What type of smart material might be used in this bracelet?
5. Why might shape memory materials be useful in the medical field?
6. Name an everyday situation where a material might be affected by moisture.

Answers

1. Modern materials are often developed with specific properties in mind, while traditional materials like wood have naturally occurring properties.
2. Shape memory alloys, self-healing concrete, or mood rings are all examples of smart materials.
3. Thermochromic materials change colour when the temperature changes. For example, a spoon might turn red when it gets hot.
4. This bracelet might use a photochromic material, which changes colour when exposed to light.
5. Shape memory materials can be deformed and then return to their original shape when heated, which could be useful for medical implants or stents.
6. Materials like wood can warp or swell when they absorb moisture, or eyeglasses might fog up in humid conditions.

Topic 2.4: Food commodities (animal and plant sources)

Questions

1. What is the general term for things we eat to provide our bodies with energy and nutrients?
2. What are food commodities?
3. Where can we get food commodities?
4. Why is it important to eat a variety of food commodities?
5. Give two reasons why we need to eat food.

Answers

1. Food is the general term for things we eat to provide our bodies with energy and nutrients.
2. Food commodities are the basic ingredients that we use to prepare meals. These can come from plants or animals.
3. We can get food commodities from farms, markets, and shops.
4. Eating a variety of food commodities ensures we get all the different nutrients our bodies need to stay healthy.
5. We need to eat food for energy to perform daily activities and for nutrients to help our bodies grow and repair themselves.

Topic 3.1: Measuring and marking out

Questions

1. What is one important reason for measuring and marking out materials before working on them?
2. Imagine you are baking a cake in the food laboratory. Why might it be important to measure the ingredients accurately?
3. In the sewing workshop, you are making a simple skirt. How can marking the fabric help ensure the skirt fits well?
4. Why might builders need to measure and mark out the foundation of a house?
5. When working with wood in the workshop, why is it important to mark cutting lines before using a saw?
6. What is one way to care for measuring tools to ensure they last longer?

Answers

1. Measuring and marking out helps ensure the final product is accurate, and the correct size, and avoids wasting materials.
2. Accurately measuring ingredients in the food laboratory helps ensure the cake bakes properly and has the correct taste and texture.
3. Marking the fabric allows you to cut accurately and ensures the skirt pieces are the same size for a proper fit.
4. Builders measure and mark out the foundation to ensure the house is built to the correct dimensions and is square and level.
5. Marking cutting lines on wood helps ensure straight and accurate cuts, avoiding wasted wood or mistakes.
6. Storing measuring tools in a clean and dry place and wiping them clean after use helps prevent rust and damage.

Topic 3.2: Cutting and shaping

Questions

1. What is the general term for tools used to cut materials into specific shapes?
2. Why is it important to secure the workpiece before using a saw?
3. Imagine you are helping prepare vegetables for a meal. What cutting technique would you use to get thin, flat pieces?
4. What is the difference between slicing and dicing vegetables?
5. In the wood workshop, why might you need to sharpen a chisel before using it?
6. How can cleaning a saw help maintain it in good condition?

Answers

1. Cutting tools are used to cut materials into specific shapes.
2. Securing the workpiece prevents it from moving or slipping, which can lead to accidents or inaccurate cuts.
3. Slicing would be the best technique to get thin, flat pieces of vegetables.
4. Slicing creates thin, flat pieces, while dicing creates small cubes.
5. A sharp chisel allows for cleaner and more precise cuts in wood.
6. Cleaning a saw removes sawdust and other debris that can clog the blade and affect its cutting performance.

Topic 3.3: Joining and assembling

Questions

1. What is the term for the process of connecting separate pieces to make a complete object?
2. Why is it important to choose the right joining method for a project?
3. Imagine you are sewing a shirt. What tool would you use to join the pieces of fabric together?
4. What is an example of a material used to join ingredients in food production?
5. How is soldering different from joining wood with nails?
6. What is one material commonly used to join bricks in building construction?

Answers

1. Joining or assembling is the process of connecting separate pieces to make a complete object.
2. The right joining method ensures the final product is strong, secure, and fits together properly.
3. A needle and thread would be used to join the pieces of fabric together when sewing a shirt.
4. Egg white, gelatin, or starches are materials used to join ingredients in food production.
5. Soldering uses melted metal to join two pieces of metal, while joining wood with nails uses a mechanical fastener to push through the wood pieces.
6. Cement or mortar is a common material used to join bricks in building construction.

Topic 3.4: Kitchen essentials

Questions

1. What is the general term for the tools, utensils, and appliances you need to prepare and cook food in the kitchen?
2. Why is it important to have the right kitchen essentials when cooking?
3. Name two examples of kitchen essentials used for preparing food.
4. Imagine you want to bake a cake. What kind of kitchen essentials might you use to mix the batter?

5. You finished cooking and need to serve your food. What type of kitchen essential would you use to put the food on?

Answers

1. Kitchen essentials are the tools, utensils, and appliances you need to prepare and cook food in the kitchen.
2. Having the right kitchen essentials makes cooking easier, and more enjoyable, and helps ensure your food is prepared properly.
3. A cutting board and a knife are two examples of kitchen essentials used for preparing food.
4. A mixing bowl would be a kitchen essential you might use to mix cake batter.
5. A plate is a type of kitchen essential you would use to serve food.

Topic 3.5: Finishes and finishing

Questions

1. What is the general term for the final touches applied to an object to improve its appearance or protect it?
2. Why might you add a finish to a piece of furniture?
3. Imagine you are helping prepare a delicious meal. What is an example of adding a finish to food for presentation?
4. What is the difference between garnishing and decorating food?
5. You finished sewing a pillowcase. What is one way you could add a finishing touch to the sewing project?

Answers

1. A finish is the final touches applied to an object to improve its appearance or protect it.
2. You might add a finish to a piece of furniture to make it look more attractive, protect it from scratches, or seal the wood.
3. Garnishing food with herbs, sliced vegetables, or a drizzle of sauce is an example of adding a finish for presentation.
4. Garnishing is adding a small amount of food for visual appeal, while decorating can involve more elaborate elements like frosting flowers on a cake.
5. Ironing the pillowcase or adding a decorative button or trim could be ways to add a finishing touch to the sewing project.

Topic 4.1: Simple structures and mechanisms

Questions

1. What is the main purpose of a structure in construction?
2. Imagine a bridge. What is one important job of the bridge structure?
3. What is the difference between a frame structure and a shell structure?
4. Give two examples of things that might cause a structure to fail.
5. What is the difference between a static force and a dynamic force acting on a structure?
6. Why is it important to design a structure carefully before building it?

Answers

1. The main purpose of a structure in construction is to support weight and prevent collapse.
2. The bridge structure needs to be strong enough to hold the weight of vehicles and people crossing it.

3. A frame structure uses beams and columns to create a rigid framework, while a shell structure uses curved shapes to distribute weight across the entire surface.
4. Poor quality materials or weak joints in the structure could both cause it to fail.
5. A static force is constant and unchanging, while a dynamic force is constantly moving or changing, putting stress on the structure.
6. Careful design ensures the structure is strong enough to withstand the forces acting upon it and prevents failures that could be dangerous.

Topic 5.1: Communicating designs

Questions

1. What is the general term for the tools you use to create drawings to communicate ideas?
2. Why is it important to take care of your drawing materials?
3. Imagine you are drawing a chair. What type of line might you use to show the outline of the chair?
4. How is a curved line different from a straight line in a drawing?
5. When making a sketch, why might you use lettering or writing?
6. What is one tip for making a good sketch of an object?

Answers

1. Drawing materials and instruments are tools used to create drawings to communicate ideas.
2. Taking care of your drawing materials keeps them in good condition and allows you to create clean and accurate drawings.
3. A thick, solid line would likely be used to show the clear outline or shape of the chair.
4. A straight line goes in a constant, unchanging direction, while a curved line bends and changes direction.
5. Lettering or writing can be used in a sketch to label parts of the object or add notes about the design.
6. Observing the object and drawing light lines at first to establish the overall shape are good tips for making a good sketch of an object.

Topic 5.2: Designing

Questions

1. What is the document that outlines the goals and requirements for a design project?
2. Imagine you are designing a phone case. What are some questions you might ask yourself to generate ideas for the design?
3. Why is it important to come up with many ideas when designing something?
4. What can you do with ideas that don't seem very good at first?
5. How can sketching or drawing help with generating design ideas?

Answers

1. A design brief is a document that outlines the goals and requirements for a design project.
2. You might ask yourself questions like: Who will be using the phone case? What colours or patterns would they like? Should it be protective or decorative?
3. Coming up with many ideas gives you more options to choose from and increases the chances of finding a good design solution.
4. Even ideas that seem bad at first can spark other ideas or inspire new approaches to the design problem.
5. Sketching or drawing allows you to quickly explore different design ideas visually and experiment with different shapes and layouts.

Topic 5.3: Planning for making artefacts and products

Questions

1. What is the general term for the process of thinking about and organising what you will cook before you start?
2. Why is it important to plan your meals before you cook?
3. Imagine you are planning breakfast, lunch, and dinner for your family. Name three different meals you might serve throughout the day.
4. What are two things you might consider when planning meals to meet your family's needs?
5. What is an advantage of boiling food?
6. When stewing food, why might it be a disadvantage to cook it for too long?

Answers

1. Planning meals involves thinking about and organising what you will cook before you start.
2. Planning helps ensure you have all the ingredients you need, saves time, and allows you to consider healthy options and budget.
3. For breakfast you might have porridge, for lunch fried rice with vegetables, and for dinner baked fish with yam. These are just examples, there are many options!
4. You might consider your family's nutritional needs and budget when planning meals.
5. An advantage of boiling food is that it is a healthy cooking method that helps preserve nutrients.
6. Stewing food for too long can make it soft and mushy, and some vegetables might lose their colour or flavour.

Topic 5.4: Making artefacts from compliant, resistant materials

Questions

1. What is the general term for cooking methods that use liquids to cook food?
2. Imagine you are boiling some vegetables. What is one advantage of using this moist cooking method?
3. What is the difference between boiling and stewing?
4. Why might someone use a compliant material like felt to create a mock-up before sewing?
5. Give two examples of skills needed for sewing or crocheting artefacts.

Answers

1. Moist cooking methods use liquids to cook food.
2. Boiling helps preserve nutrients in vegetables and is a healthy cooking method.
3. Boiling uses a large amount of water and cooks food quickly, while stewing uses a smaller amount of liquid and cooks food slowly over a longer period.
4. Compliant materials like felt are easy to cut and shape, allowing you to create a mock-up of your sewing project to check the size and fit before using your final fabric.
5. Sewing or crocheting skills needed for artefacts include using needles and thread or yarn and following patterns or instructions to create the desired shape.

Topic 6.1: Career pathways and career opportunities

Questions

1. Why do you think it is important to learn about different career options?
2. Name a career path in Career Technology that might be a good fit for your interests.
3. What are some ways you can learn more about your learning style (how you learn best)?
4. Should someone choose a career path in Career Technology just because of their gender?

Answers

1. Learning about different career options helps you find a path that matches your interests and skills, which can lead to a fulfilling job.
2. Learners' answers will differ.
3. You can learn about your learning style by reflecting on how you learn best in other subjects.
4. No, gender should not be the reason someone chooses a career path in Career Technology. Anyone can be successful in these fields if they have the interest and skills.

Topic 6.2: Establishing and managing a small business enterprise

Questions

1. What is the word for someone who starts their own business?
2. Imagine you live in your community and notice people must often travel far to buy fresh bread. What is an entrepreneurial opportunity you might see in this situation?
3. What are two advantages of being an entrepreneur (someone who owns their own business)?
4. What is one disadvantage of being an entrepreneur?
5. Name one characteristic of a successful entrepreneur.

Answers

1. An entrepreneur is someone who starts their own business.
2. You could open a local bakery selling fresh bread in your community.
3. 1) Being your own boss and 2) making a profit from your hard work.
4. It can be risky, and there is no guarantee of success.
5. A successful entrepreneur is creative and has good problem-solving skills.

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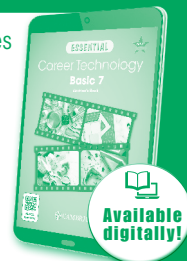
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