

ESSENTIAL



Computing

Basic 7

Facilitator's Guide



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CAMBRIDGE

**FREE
DIGITAL CODE
INSIDE**



ESSENTIAL

Computing

Basic 7

Facilitator's Guide

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Tourists told me what they think of Elmina. Ghana needs to do some things differently by Alexander Diani Kofi

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How to use this Teacher's Guide

This Teacher's Guide sets out to provide practical ways to teach tasks required by the Computing curriculum for high schools, closely following the curriculum requirements and outcomes, tied to the strands and sub-strands and the performance indicators. A FREE downloadable resource pack is provided, with activity source files that can be used on a projector in your classroom or printed out. Also included is additional content specifically for the teacher – an e-book providing guidance on integrating ICT in the classroom and printable classroom posters.

In the Learner's Book, the Contents page indicates the strands and the main topics in each strand. At the beginning of each strand, there is an Introduction section, listing the information covered in that strand. These introductions can be used in a variety of ways that might assist in lesson preparation. Each strand ends with a Summary of the content covered and a 'Check your progress' section, which includes questions relating to the whole strand.

The Learner's Book is packed with activities. The HOW TO boxes have step-by-step instructions and screenshots from popular computer applications to familiarise learners with practical tasks, even before they log on to their computers.

In this Teacher's Guide, you can expect to find an explanation of the purpose of each activity, which links to the performance indicators and core competencies listed in the curriculum. The resources required to teach this concept are listed, including the source files needed to complete the activity.

Clear guidance is provided on what needs to be done and how to assess learners. Instructions for the learner are also provided. The teacher can support the learner during the activity or evaluate if the correct steps were covered once the activity is complete.

Links to websites

There are several additional links to websites and YouTube videos to supplement and reinforce the content covered in the Learner's Book. It would be wise to adopt an open mind to mobile phones and electronic devices in the classroom to enhance the learning process.

Low resources schools

The 'Low Resources Schools' section caters for schools or lessons where electronic devices are not available. Teachers in such situations should prepare in an entirely different way. However, numerous parts of lessons do not require learners to be working on a computer. Teachers might be able to use the following ideas:

- Prepare flashcards with keywords by placing a picture on one card and its definition on another card. Hand one card to each learner randomly and ask learners to find their match.
- Ask learners to explain or describe in their own words their understanding of their keyword.
- Create or provide classroom posters for your display boards. Use these for reference during explanations.
- Create 'fill in the missing words' worksheets.
- Draw information-rich sketches on a writing board, develop a discussion or explanation as the drawing is being developed, and use the Learner's Book as a point of reference.
- Ask learners to do the activities that do not require the use of a computer.

Answers

The Answers section provides possible answers for the activities. These are by no means exhaustive, and the teacher should consider any other reasonable solutions. Learners are encouraged to create their digital resources to prepare our 'digital natives' for their future world of work.

Assessment in the Common Core Programme

Monitoring progress

School Based Assessments (SBA) cover all types of assessment, including Assessment as learning in which learners reflect on their own progress.

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

The following are samples of relevant records that can be kept on the learner's learning:

- Learner's Progress Record (Cumulative Record)
- Learner's Report Card
- School-Based Assessment Termly Recording Register.

Each strand in this course has plentiful exercises and assignments that can be used to assess the learner's progress in achieving the required indicators. The course encourages the creation of a learning-centred classroom that engages learners in meaningful 'hands-on' activities. At the end of each strand, there are exercises and activities to allow the teacher to assess the learner's abilities.

Reporting School-Based Assessment (SBA) in the Common Core Programme

The Common Core Programme provides levels of proficiency to be attained and descriptors for all grade levels of the programme, as shown in the table below.

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 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

Level of Proficiency	Benchmark	Grade Level Descriptor
4: Developing (D)	40–53%	Learner demonstrates developing level of knowledge, skills and values but needs help throughout the performance of authentic tasks
5: Emerging (E)	39% and below	Learner is emerging with minimal understanding in terms of knowledge, skills and values but needs a lot of help

The grading system presented shows the letter grade system and equivalent grade boundaries. In assigning grades to learners' test results, or any form of evaluation, the above grade boundaries and the descriptors may be applied. The descriptors (Highly Proficient [HP], Proficient [P], Approaching Proficiency [AP], Developing [D], Emerging [E]) indicate the meaning of each grade.

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' achievement.

Strand 1: Introduction to Computing

THIS RESOURCE WILL PROVIDE INFORMATION FOR THE TEACHER, COVERING EACH OF THE ACTIVITIES IN THE LEARNER'S BOOK.

For each activity, there will be:

- The number of the activity, its purpose, and how it benefits the learners
- A list of resources
- Links to websites and videos needed for the activity, including the length of each video
- Explanation for the teacher on how the activity could be altered or further developed and some notes on how to carry out some of the steps requested of the learners
- Notes about how the activity can be assessed as well as suggestions for a plenary when the activity is complete
- The contents of the activity for the learners
- The answers or expected outcome for the activity.

Sub-strand 1: Components of computers and computer systems

Activity 1.1: Individual

Purpose:

Discuss the fourth generation of computers: Discuss features of fourth generation computers, identify a microchip and explore the architecture of a processor.

Exhibit strong memory, intuitive thinking and respond appropriately. Identify underlying themes, implications and issues when listening. (Core competencies CI6.1 and CC7.4)

Resources:

- Learner's Book pages 1–3
- An internet connection and a computer or other device capable of connecting to the internet
- The link below

Link:

Online article: A computer history

<https://demarscomputerhistory.weebly.com/4th-generation.html>

Teacher:

In Basic 6, learners encountered the concept of generations of computers. Use the material in the Learner's Book to refresh the learners' memories. Encourage learners to look up the glossary words (bold green) in the glossary on pages 224–228 of the Learner's Book.

Assessment:

Review the learners' answers to identify those who are struggling to understand the content and successfully identify the correct answers. Although the content is presented in an easy, conversational style, it may challenge some learners because it is essentially a technical article, not a human-interest story. To succeed in computing studies, they will be challenged repeatedly to do their own research and will be confronted with many technical articles, most of which will be highly technical and formal in style. The sooner they develop the skills to filter out unnecessary detail to find the essential information, the more confident they will be doing research on their own.

Plenary:

Carry out a hands-up survey of the possible answers, then ask some of the learners who have the correct answers to explain the steps they followed to find the answers. This should reveal various tools one could use to find the correct information in a technical article.

LEARNERS

Accurately copy the link to the one-page article given in the Learner's Book and paste it in the address bar of an internet browser to retrieve it. Read through the article and answer the questions in Question 2.

ANSWERS

2. a. Ted Hoff, an Intel employee
b. Bill Gates and Paul Allen
c. Steve Wozniak developed the first Apple computer
d. The name Microsoft comes from the term 'microprocessing software'.

Activity 1.2: Individual

Purpose:

Examine the uses of the output devices: graphing plotter, data and multimedia projectors as well as a pico projector.

Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group.

Demonstrate the ability to find and utilise digital content. (Core competencies CC8.1 and DL5.3)

Resources:

- Learner's Book pages 3–6

Teacher:

This activity tests the learner's ability not to simply copy one of the diagrams in the Learner's Book, but to demonstrate their understanding of how a central processing unit works in a diagram that makes sense to them. If you consider that showing them two diagrams might lead to confusion, ask them to draw their own diagrams without looking at the illustrations.

Assessment:

There are various ways to assess this activity. You could gather all the diagrams and assess them yourself or ask stronger learners to assess the weaker learners.

You could also do the following:

- Move through the class to find learners who have successfully understood how a CPU works as evidenced in their diagrams.
- Divide the learners into small groups consisting of at least one strong learner per group.
- Let the strong learner demonstrate how their diagram reflects their understanding of the CPU.
- Let the weaker learners attempt to find out what they did not understand, such as the flow of data and the functions of the two components (the ALU and the CU).

Plenary:

Ask the class for feedback on the activity.

1. Did they find it useful to draw what they had learnt and understood in a diagram?
2. Would they have preferred to explain it in words, which might have been easier to do?
3. Did they enjoy the challenge?

LEARNERS

Draw a diagram of a CPU that shows what you have learnt about the components of a CPU and how data passes through it.

ANSWERS

When they compare drawings, learners should answer YES to all the following questions.

1. Are all the structures in the CPU present? YES/NO
2. Are the structures in the correct places? YES/NO
3. Are the structures correctly labelled? YES/NO
4. Are the arrows in the correct places? YES/NO
5. Do the arrows point in the correct directions? YES/NO

Activity 1.3: Pairs

Purpose:

Demonstrate understanding in the use of input devices (barcodes, scanner, etc.).

Exhibit strong memory, intuitive thinking, and respond appropriately. Identify underlying themes, implications and issues when listening. (Core competencies CI6.1 and CC7.4)

Resources:

- Learner's Book pages 6–9

Teacher:

It is advisable to do this activity yourself to explain how you obtained a barcode for a simple and familiar item, such as a packet of sugar or an exercise book, and how you decoded its barcode to find out which country it came from and who the manufacturer is. Pair the learners before the demonstration so that learners can check with one another that they understood the instructions correctly.

Assessment:

The activity is informally assessed by peer-assessment. Circulate in the classroom during the peer assessment.

If any gaps in the learners' understanding are apparent, point out any instruction that was misinterpreted or omitted. If the majority of the learners did not successfully complete the activity, ask a pair of learners who carried out the activity correctly to demonstrate it to the class.

Plenary:

Ask learners if the activity helped them understand that a barcode system can work in many commercial, industrial and financial settings. Ask for examples from each, such as tracking products in online stores, stock control in a warehouse and on invoices to assist in accounting.

LEARNERS

Carefully read through the instructions and plan your project before performing the activity.

ANSWERS

Each pair of learners should be able to:

- present a unique item, which shows that each pair did their own work
- correctly state the manufacturer and country of origin
- correctly identify the positions of the product code and the check digit.

Activity 1.4: Individual

Purpose:

Examine full-sized external hard drives, hard drive speed, disk caching, storage portable hard drives, optical discs and drives.

Exhibit strong memory, intuitive thinking; and respond appropriately. Demonstrate the ability to find and utilise digital content. (Core competencies CI6.1 and DL5.3)

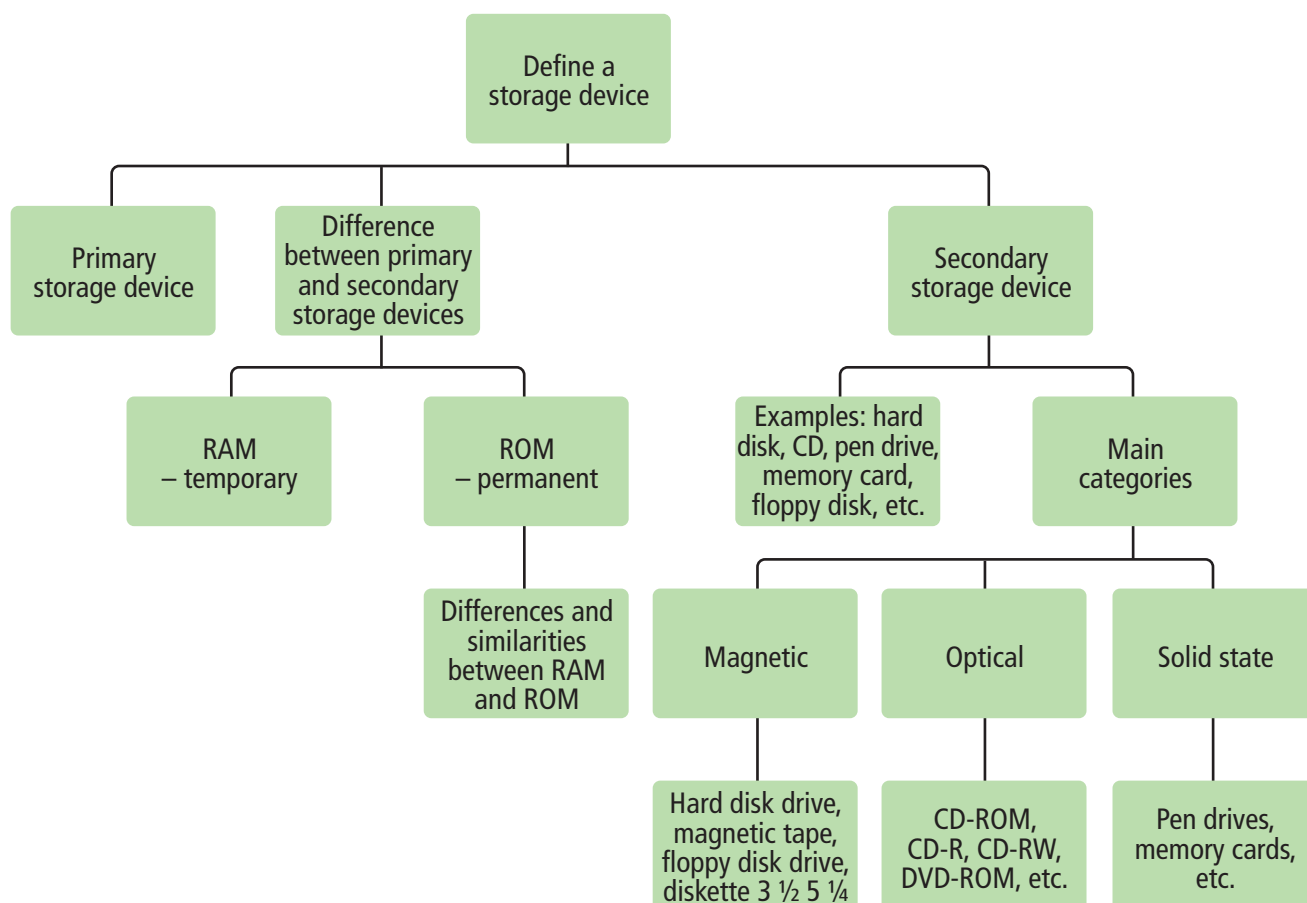
Resources:

- Learner's Book pages 9–15

Teacher:

Before learners can truly get to grips with secondary storage, they need to know that there is an important difference between a storage device and a storage medium. A storage medium is used to store data written to it by a storage device. The storage capacity, therefore, refers to the storage medium and speed refers to the speed of the drive.

The best way for learners to grasp the concepts of storage devices, media and capacities is to see physical examples of the three main types: electromagnetic storage in the form of a hard drive containing a hard disk, solid state storage in the form of an SSD or flash drive, and an optical drive with a blank rewritable disc.



Assessment:

The fill-the-blank questions need to be answered individually. The answers will clarify whether the learner has understood the essentials of secondary storage.

Plenary:

Ask learners to mark their own questions as you go through the answers in class. Encourage learners to discuss any answers that do not make sense to them with a classmate.

LEARNERS

Carefully read through the instructions and plan your project before performing the activity.

ANSWERS

1. Compact discs (CDs) can store data up to 700 megabytes (MB), whereas digital versatile discs (DVDs) can store up to 8.4 GB of data.
2. The performance of a hard disk is affected by seek time, spindle speed and latency.
3. Solid state drives (SSDs) run 100 times faster than hard disk drives and their access rates are close to zero seconds.

Remedial activity:

Review learners' understanding of the terminology in this section. For example, they could match the names of different types of storage to pictures.

Activity 1.5: Individual

Purpose:

Discover the latest Windows® operating system (Start screen, use of tiles, taskbar buttons, preview thumbnails), peeking (Desktop Peek) into a window on a taskbar.

Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. (Core competency CC8.1)

Resources:

- Learner's Book pages 16–17

Teacher:

Learners can do the hands-on process of previewing thumbnails instead of icons on the computer while making notes on each correct step, rather than trying to write the steps from memory. In other words, this should be a closed-book exercise, which will help them commit the steps to memory for this and any other onscreen process.

Assessment:

Learners need to present the correct steps in the correct sequence. They can ask a classmate to follow their list of steps to check that the steps are clear and accurate.

Plenary:

Ask learners to think of steps they consistently struggle with, in any application, and to use this method to improve their skills with navigating computer applications effectively.

LEARNERS

Close your Learner's Book and use a computer to complete the steps. Write down the steps in the correct order.

ANSWERS

- Step 1:** Type control panel in the Start menu search box.
- Step 2:** Click the Control Panel link on the right.
- Step 3:** Select System and then select Advanced system settings.
- Step 4:** Click the Settings button in the Performance section.
- Step 5:** Select the Show Thumbnails instead of icons checkbox.
- Step 6:** Click OK.

Activity 1.6: Pairs

Purpose:

Practise file management techniques (file and folder management users and accounts).

Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. Interpret and apply learning in new contexts. (Core competencies CC8.1 and CI6.9)

Resources:

- Learner's Book pages 18–21
- Blank paper
- Access to their own documents held on computer (where applicable)

Teacher:

Use the diagram on page 5 to explain different types of storage devices.

The class should be split into pairs and have a piece of blank paper each. When learners have designed their plan for folders, it will be a good idea to check their designs briefly before giving them the go-ahead to start creating the folders according to their design.

Assessment:

Assessment can be conducted during the plenary discussion.

Plenary:

Ask learners what they found easy and difficult about the task. Ask the learners if their new folder structure is exactly the same as the one they designed. If it differs at all, ask for an explanation, which should be well-reasoned.

LEARNERS

Work with a partner to plan a system for managing your computer folders. Draw your system.

ANSWERS

Learners' diagrams may differ. The design and created file structure will resemble the example in the Learner's Book. The created file structure will be the same as the design. They should be able to explain their reasons for structuring their folders and subfolders as they have.

Activity 1.7: Individual

Purpose:

Practise file management techniques (file and folder management users and accounts).
Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. Interpret and apply learning in new contexts. (Core competencies CC8.1 and CI6.9)

Resources:

- Learner's Book pages 21–22

Teacher:

If there are less-able learners in the class, it could be a good idea to pair learners for this item. Explain to the class that **reserved characters** are those characters that are kept for use in the programming of the software.

LOW RESOURCES SCHOOLS

Classify the following file extensions under their required file type (format):

.tiff .mov .MP3 .pdf .MP4 .exe .jpg .apk .txt .csv .png

Audio	Image	Video	Text	Software

ANSWERS

Audio	Image	Video	Text	Software
MP3	.tiff	.MP4	.csv	.exe
	.jpg	.mov	.pdf	.apk
	.png		.txt	

Assessment:

Go through the learners' answers with the class. Explain any misunderstandings and note which learners need extra practice.

Plenary:

Ask the learners to explain why reserved characters cannot be used as part of file names.

LEARNERS

Use your Learner's Book, the internet or other available books to research file extensions.

ANSWERS

1.	Extension	File type	Use
	.docx	Microsoft® Word	Word processing
	.gif	Graphs Interchange Format	Images
	.xls	Microsoft® Excel	Spreadsheets
	.pdf	Portable Document Format	Used when a file needs to be shared with others in a way that will not let them change anything in the file
	.txt	Plain text (unformatted text) file	A file that contains plain text without any formatting so that it can be read and used in many different programmes
	.html	Hypertext markup language	Programming language used to write websites
	.mp4	Video file	Videos are stored in this file type
	.pptx	Microsoft® PowerPoint	Presentations
	.zip	Compressed file	Compresses files to a smaller size for storing or to send attached to an email, etc.
	.accdb	Microsoft® Access	Database

2.	Filename	✓ or ✗	Why
	Untitled1.docx	✗	Cannot know what is in this file.
	Myfile.docx	✗	Cannot know what is in this file.
	English\essay.docx	✗	The backslash is a reserved symbol and cannot be used in a file name.
	English essay?.docx	✗	The question mark is a reserved symbol and cannot be used in a file name.
	21-04-30 English essay.docx	✓	Correct. The date is in order of year, month, day.
	English essay final.docx	✗	Do not know which English essay, there may be others.
3.	Homework.docx	✗	Do not know what subject it is, or which week.
	Reserved characters are those characters that are kept for use in the programming of the software. The reserved characters for use in file names with Windows 10 are:		
	< (less than)	> (greater than)	: (colon)
	" (double quote)	/ (forward slash)	\ (backslash)
	(vertical bar or pipe)	? (question mark)	* (asterisk)

Activity 1.8: Individual

Purpose:

Practise file management techniques (file and folder management, users and accounts).

Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. Interpret and apply learning in new contexts. (Core competencies CC8.1 and CI6.9)

Resources:

- Learner's Book pages 22–24

Teacher:

Encourage learners to think about the concepts of privacy and security in terms of computer usage on a shared local computer or a computer connected to a network. Without protection, anyone with access to the computer has access to all the files, no matter who owns them. This can cause serious consequences when files are personal or contain confidential or sensitive material, such as a doctor's report on your health or the financial statements of a company.

Files and folders can be 'locked away' from prying eyes using file permissions in conjunction with user access permissions. If a user's account denies that user access to another user's files, that should protect the other user. However, if the unauthorised user manages to access the files, permissions on the files will bar access.

Assessment:

The questions test the learner's understanding of their right to privacy and secure access, as well as how those rights can be achieved.

Plenary:

Although this is an individual activity, it can be done in pairs and small groups to assess learner collaboration and engagement with the subject. You can then give the correct answers in class for learners to assess their own work.

LEARNERS

Use the questions in the Learner's Book to apply the knowledge you have gained in this section of work.

ANSWERS

1. Your friend set the Read permission on the file, which means you can view its contents but cannot add to it or change it in any way.
2. Because a guest account can be accessed by anyone who has access to the computer.
3. The Administrator account

Sub-strand 2: Technology in the community

Activity 1.9: Class/Group

Purpose:

Describe and give examples of at least five technology tools for learning in each subject (e.g. spreadsheets, virtual museum, Scrabble, presentation, Scratch, etc.). Demonstrate the use of at least three technology tools. Demonstrate the ability to find and utilise digital content. Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. (Core competencies DL5.3 and CC8.1)

Resources:

- Learner's Book pages 25–26
- Internet access and a computer or mobile device capable of connecting to the internet
- Presentation software, such as Microsoft® PowerPoint

Links:

- Invite the learners to submit some of their own links after the activity.

Teacher:

The first part of the activity is a group brainstorming session to identify technology tools that can be found online to help with learning. Ask leading questions to move the discussion along. After the brainstorming session is over, the class should be split into small groups to work together for the rest of the activity.

Assessment:

While the groups are working on their presentations, walk around and observe learners' communications skills. Ensure that all learners are engaged and not holding back.

Plenary:

After each group presents, ask the rest of the class to give feedback. Ensure that all comments are constructive.

LEARNERS

Work in a group to suggest ways that technology tools can aid learning.

ANSWERS

1. Some of the technology tools identified that are online to help with learning include:
 - Google® forms: Online software that gives learners an easy way to ask questions and receive feedback from the teacher.
 - Kahoot!®: Learners can create questionnaires and quizzes.
 - ClassDojo®: Learners make their own avatars and gain and lose points based on classroom behaviour.
 - Note-taking apps: These act as digital notebooks for learners.
 - Encyclopaedias: Wikipedia®; Encyclopaedia Britannica®; Funk & Wagnalls® multimedia encyclopaedia, etc.
 - HowStuffWorks: Easy explanations of how things work.
 - Online museums: National Museum of Ghana; The British Museum, London; The Louvre, Paris; Nasa Museum, Virginia, US, etc.
 - Games for learning: ICT games, maths games, language games, etc.
 - Scrabble GO®
2. Small group presentations should include information on one of the tools including:
 - further exploration of one of the tools from the brainstorming session
 - purpose of the tool
 - explanation of how that tool works
 - opportunity for questions to be asked
 - how to use the tool for different uses.

Activity 1.10: Pairs

Purpose:

Discuss the benefits of using technology tools in learning.

Demonstrate the ability to find and utilise digital content. Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. (Core competencies DL5.3 and CC8.1)

Resources:

- Learner's Book pages 26–29
- Internet access and a computer or mobile device capable of connecting to the internet
- The links below

Links:

1. Microsoft® OneNote digital note-taking app
<https://www.microsoft.com/en-sg/microsoft-365/onenote/digital-note-taking-app?ms.url=onenotecom&rtc=1>
2. Evernote® note-taking app
<https://evernote.com/>
3. Google® Keep note-taking app
<https://keep.google.com/u/0/>

Teacher:

Encourage the learners to discuss the online learning technologies that they have recently learnt about. If possible, learners can download a note-taking app, selected from the above links, which will provide them with a digital notebook and give them first-hand experience of using online technologies for learning.

Assessment:

Move between the pairs and evaluate their discussions and note-taking. If possible, assist pairs to download the note-taking apps to their digital devices.

Plenary:

Invite feedback from random pairs and ask the rest of the class to comment.

LEARNERS

Make notes of your discussion about the uses of technology for learning.

ANSWERS

Answers will vary, but should include some of the information in the Learner's Book and ideas generated in Activity 1.9.

Activity 1.11: Individual/Group

Purpose:

Examine the negative impact of computers and computer use on the environment. Propose environmentally responsible practices that can be used to reduce the negative impact of computers and computer use on the environment.

Exhibit a sense of nationality and global identity. Speak clearly and explain ideas in a clear order with relevant detail. Recognise one's emotional state and their preparedness to apply emotional intelligence. (Core competencies CG6.4, CC8.1 and PL5.3)

Resources:

- Learner's Book pages 29–32
- The internet, a computer or other device with access to the internet
- The links below

Links:

1. Online newspaper article
<https://www.bloomberg.com/news/articles/2019-05-29/the-rich-world-s-electronic-waste-dumped-in-ghana>
2. Video: A news report from a waste dump in Agbogbloshie (9 minutes)
<https://www.youtube.com/watch?v=aDjDGrrDD7o>

Teacher:

Before starting the activity, learners should watch the video and read the news article. At that point, a class discussion could take place for learners to air their views. Learners should then start on the activity by taking time to reflect on the ideas in Question 1. When you think they are ready, the class should be split into small groups of five or six to carry on the discussion and make notes on their ideas following their reflections. Depending on the amount of support needed, learners can create a presentation in small groups or individually.

Assessment:

All the learners should contribute to the whole-class and small-group discussions. They should all be able to express a view, both in the discussion and in the presentation. All learners should be involved in the preparation and delivery of the presentations.

Plenary:

Ask what points the presentations had in common. Encourage discussion by asking the learners to ask each other questions after each presentation.

LEARNERS

First work individually to reflect on the ideas given. Discuss your ideas as a group and make a presentation for the class. Make sure all members of the group contribute to the presentation. Ask your teacher if anything is unclear.

ANSWERS

The results will be in the ideas expressed in the presentations.

Remedial activity:

Ask learners to work in pairs to discuss these questions to review the concepts.

- What is e-waste?
- What factors lead to e-waste?
- What environmental and health problems does e-waste cause?
- What can be done to solve the problem of e-waste?

Activity 1.12: Pairs

Purpose:

Create a component from disposed computer parts.

Exhibit a sense of nationality and global identity. Speak clearly and explain ideas in a clear order with relevant detail. Recognise one's emotional state and their preparedness to apply emotional intelligence. (Core competencies CG6.4, CC8.1 and PL5.3)

Resources:

- Learner's Book page 33
- Old or broken computer parts and other electronic e-waste collected from people and businesses in the community

- Various appropriate tools
- The internet, access to a computer or mobile device with access to the internet
- The link below

Link:

Video: Ideas on how to make items from e-waste (19 minutes)

https://www.youtube.com/watch?v=WLP_L7Mgz6M

Teacher:

Show the video and then ask the class what they found most interesting and what they would like to make. Learners may need advice on their choice of project. The activity can also be done by the whole class working together on a big project, such as creating an animal, which first may have to be modelled in wire netting for the parts to be attached to. This may have cross-curricular implications for Art or other subjects.

Learners will need advice about collecting from the local community. To avoid many learners calling on the same people or businesses, the area should be divided up. Learners should be given a letter stating that they are collecting items of e-waste for a recycling project at school.

Assessment:

- The drawing and instructions must be clear and workable.
- The collection of e-waste from the community should be conducted with courtesy and the school project explained to the donor. Any arrangements made with donors to collect items, should be adhered to.
- How well did learners work with each other?
- Does the final object represent the original plan? If not, learners should be able to explain why there were alterations.
- Is the object useful or decorative? Does it work correctly?

Plenary:

Ask learners what they enjoyed most about the activity and where the items that they made will be displayed. Discuss with the class the idea of inviting the donors to view what has been made from their discarded computers.

LEARNERS

Watch the video and work with a partner to come up with a suitable idea for a project. Work together and follow the steps to create your project. Ask your teacher if anything is unclear.

ANSWERS

A good result for this activity is that a suitable item has been made; the left-over e-waste collected has been suitably disposed of. The community has been alerted to recycling their e-waste effectively.

Sub-strand 3: Health and safety in the use of ICT tools

Activity 1.13: Pairs

Purpose:

Describe health measures and current regulatory requirements and potential computing-related disorders. Describe safety measures in using ICT tools.

Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CC8.1 and DL5.1)

Resources:

- Learner's Book pages 34–39
- A large sheet of paper for each pair
- The links below

Links:

1. Video: Eye safety (1:51 minutes)
https://www.youtube.com/watch?v=_7hwZv36JMU
2. Video: 9 tips for a healthy ergonomic workstation (3:01 minutes)
https://www.youtube.com/watch?v=K88q_oEwRS8
3. Video: RSI and how to prevent it (3:42 minutes)
https://www.youtube.com/watch?v=agZe-tyj_1s

Teacher:

The three videos can either be shown to the whole class using a data projector, or viewed in pairs on a computer. Before watching the videos, instruct the learners to identify one particular health hazard that they learnt about in the videos and make some notes.

Assessment:

Review the infographics to establish if learners are able to explain how to avoid common health hazards associated with the regular use of ICT tools.

Plenary:

After each pair presents their infographics, ask another pair to summarise the nature of the health hazard described and how to prevent it.

LEARNERS

Read through the activity before you watch the videos. Make notes on one particular hazard. Use your notes to compile an infographic.

ANSWERS

Each infographic should identify a particular health hazard, explain the potential health risks associated with the hazard, and describe preventative measures.

Activity 1.14: Class

Purpose:

Describe safety measures in using ICT tools.

Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CC8.1 and DL5.1)

Resources:

- Learner's Book pages 39–40

Teacher:

Introduce the scenarios one by one. Ask questions to lead the discussion.

Assessment:

Assess the learners' ability to summarise their ideas and articulate them clearly.

Plenary:

After each scenario has been discussed, ask the class to summarise the hazard and preventative measures. Write the summaries in point form on the board and have the learners copy the summaries into their books.

LEARNERS

Take part in a class discussion about hazards that are common when working around computers. Make notes of how to deal with the hazards.

ANSWERS

Answers will vary but should reflect understanding of the content taught.

Activity 1.15: Pairs

Purpose:

Demonstrate how to apply health and safety measures in using ICT tools. Explore safety measures at workstations.

Recognise one's emotional state and their preparedness to apply emotional intelligence. Provide new insight into a controversial situation or task. (Core competencies PL5.3 and CP5.7)

Resources:

- Learner's Book pages 41–44
- A computer per pair
- A printer, or paper and a pen per pair

Teacher:

This activity could be varied by deliberate hazards being set beforehand for learners to assess the risks. It could also be extended by asking learners to write 500 words evaluating their findings. If appropriate, learners could be asked to assess their workstation at home as an additional task for homework.

LOW RESOURCES SCHOOLS

Join your group.

1. Select one of the hazards discussed and plan a drama about the cause of the health hazard and possible ways to reduce the risk.
2. Demonstrate your drama to the class in not more than five minutes.

ANSWERS

Answers will vary. This activity is informally assessed. Assess the groups while they are discussing their health hazards to make sure they are on track. All learners should participate equally in the demonstrations.

Assessment:

Check that the table has the appropriate headings. If a computer and word processor software are not available, the pairs can create their own table on a piece of paper. The learners must complete the form sensibly.

Plenary:

Take a hands-up survey of how many learners spotted each type of hazard leading to risk. Encourage a full-class discussion on the findings. Finally, ask what changes they will be making, if any, to be more responsible for their own workstation ergonomics.

LEARNERS

Work with a partner to carry out a risk assessment of a room with workstations at your school. Ask your teacher if anything is unclear.

ANSWERS

The information in this sub-strand should be used to complete the form. During discussion after the activity, learners should show a responsible attitude to their use of computer workstations.

Remedial activity:

Ask learners to review the content of this section and list the causes of these common problems related to computer use: back and neck pain, headaches, eye strain and repetitive strain injury.

Check your progress

ANSWERS

1.
 - a. mouse: manual
 - b. barcode reader: automatic
 - c. smartcard: automatic
2.
 - a. Accept any valid answer. An example would be a motion sensor in an alarm system.
 - b. The answer needs to be relevant to the answer in a. Example of a suitable answer: without a motion sensor the system would not be able to pick up movement in the building and a person would need to be employed as a guard to watch for intruders.
3. (graphing) plotter
4. CD, DVD
5. taskbar
6. The file can be opened and the contents can be viewed, but changes cannot be made and saved.
7.
 - a. Arithmetic Logic Unit
 - b. The ALU performs arithmetic and logical operations and holds data temporarily while performing calculations.
8. RISC processors
9. Accept any two of:
 - They have moving parts so the surface of the disk could become damaged.
 - They use a lot of power.
 - They are noisy.
 - The read/write speed is much slower than RAM.
10. Accept any two of:
 - They have no moving parts so are unlikely to be damaged.
 - They are very fast, with instant-load performance, so they are quicker than HDDs.
 - They are lightweight and small so are easy to carry around.
 - They need less power to operate so the battery in a portable computer lasts longer.
 - A computer with an SSD boots up in seconds. An HDD needs much more time and will continue to be slower than an SSD while in operation. SSDs also transfer files faster than HDDs.
11. Accept any two of:
 - Keep the name short but relevant to its content. Make it clear what is in the file, for example Maths homework.
 - When including a date in a filename, put the year first, then the month, then the day. This is because files will sort into order by year.
 - Do not use symbols or any special characters in a filename.
 - Avoid using punctuation except for the hyphen (-) in the date.
 - If you are likely to save different versions of your files, it is necessary to include a version number. You would usually add V1, V2, and so on.
12. File extensions are the link to the application that was used to create a file. Without the correct file extension, the computer will not know which application to use to open the file.
13. Microsoft Excel

Check your progress

- 14.** Accept any two of:
 - Helps you to think creatively
 - Helps you use reasoning to solve problems
 - Teaches you to work collaboratively
 - Helps teach you computational thinking skills
 - Helps you understand simple programming principles to enable you to advance smoothly into high-level programming
 - Can be used to communicate ideas
- 15.** Virtual museums can be visited without having to travel long distances to foreign countries, which takes time and money and might not be possible. They can also be visited from remote villages where museums may not exist.
- 16.** E-waste
- 17.** Accept any two of:
 - Turn off devices when not using them.
 - Use sleep mode if you are not going to use a device for a short while.
 - Unplug devices when not using them for a long time.
- 18.** Accept any three of the following:
 - Take regular breaks.
 - Use a wrist rest.
 - Flex your arms and wrists regularly.
 - Focus away from the monitor into the distance regularly.
- 19.**
 - a.** RSI: repetitive strain injury
 - b.** CTS: Carpal tunnel syndrome
- 20.** Risk of tripping

Strand 2: Productivity Software

THIS RESOURCE WILL PROVIDE INFORMATION FOR THE TEACHER SURROUNDING EACH OF THE ACTIVITIES IN THE LEARNER'S BOOK.

For each activity, there will be:

- The number of the activity, its purpose, and how it benefits the learners
- A list of resources
- Links to websites and videos needed for the activity, including the length of each video
- Explanation for the teacher on how the activity could be altered or further developed and some notes on how to carry out some of the steps requested of the learners
- Notes about how the activity can be assessed as well as suggestions for a plenary when the activity is complete
- The contents of the activity for the learners
- The answers or expected outcome for the activity.

Sub-strand 1: Introduction to word processing

Activity 2.1: Group

Purpose:

Explain the importance of word processing software.

Explain ideas in a clear order with relevant detail, using correct construction and structure of speech.

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CC8.2 and DL5.1)

Resources:

- Learner's Book pages 49–51
- A large sheet of paper and a marker pen per group
- Internet access and a computer or mobile device capable of connecting to the internet
- The links below

Links:

1. Video: Description of a word processor (4 minutes)
<https://www.youtube.com/watch?v=GzEmnu3VdT0>
2. Definition of 'word processor'
<https://techterms.com/definition/wordprocessor>

Teacher:

This activity will get learners to think about what a word processor is and provide possible definitions. The activity works best as group work but can also be set as a homework activity. Put learners into groups of four or five. Appoint one learner in each group as the writer.

Assessment:

Review the learners' explanations during the feedback session and explain any misunderstandings.

Plenary:

Have a whole-class discussion after the individual group presentations to decide, as a class, on a definition that states what the term 'word processor' means.

LEARNERS

- In your group, discuss the meaning of the term 'word processor'. Make a note of your group's ideas.
- Decide between yourselves who in the group will present the group's ideas to the whole class.
- Improve your definition, based on feedback from the other groups.

ANSWERS

An example of a typical definition of word processor is 'a computer program that runs on general purpose computers allowing the input, editing, printing and saving of documents'.

Activity 2.2: Group

Purpose:

Explain the importance of word processing software.

Explain ideas in a clear order with relevant detail, using correct construction and structure of speech.

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CC8.2 and DL5.1)

Resources:

- Learner's Book pages 51–52
- A large sheet of paper and a marker pen per group
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Link:

Video: Why do we need word processors? (1.59 minutes)

https://www.youtube.com/watch?v=Det_z3Drav0

Teacher:

Brainstorming this subject will help to build and share ideas and trigger new ideas. Brainstorming sessions provide a break from the normal routine and are an opportunity for learners to stretch their minds to think around different subjects, to work with others to find solutions to different problems and to learn from the experience. Start by reminding learners of the rules of brainstorming, among others:

- Accept all ideas.
- Do not criticise others' ideas.
- Combine and improve on ideas.

Depending on your class's familiarity with computers, you can either show the video before or after the brainstorming session. If the class has regular access to computers, showing the video after the discussion can bring fresh ideas to the discussion. Those who are less exposed to computers will benefit from seeing the video before brainstorming.

Ask learners why word processors are important and how they are used by businesses, in education, and at home. Write the major points elicited on the board.

Assessment:

Learners' responses should demonstrate that they realise that word processors are needed in most modern workplaces and that being able to use word processing effectively is, therefore, a very important skill to learn for their futures.

Plenary:

Ask learners to consider their own communities and to list the most common uses of word processors in the community.

LEARNERS

Brainstorm to find reasons:

1. Why word processors are important
2. Why they are needed
3. Who uses them.

ANSWERS

Some examples are:

1.
 - They save time: people can type faster than they can write.
 - They benefit the environment because daily paperwork is reduced by sending documents via email, so reducing the use of paper and the carbon footprint caused by delivery of physical documents.
 - Because the documents are electronic, time and resources are saved as there is no need to file, photocopy or replace damaged paper documents.
2.
 - Improved efficiency: It is easy to organise files, recall them and to make changes to them.
 - Improved accuracy: Using spellcheckers and similar tools.
 - Reduced cost of stationery supplies, such as printing paper and ink, photocopy paper, filing cabinets, pens, paperclips, etc.
 - Reduced costs of postage and delivery of stationery.
3. Any type of business, factories, hospitals, shops, doctors, schools, universities, libraries, leisure centres, etc.

Activity 2.3: Individual/Group

Purpose:

Explain the importance of word processing software.

Explain ideas in a clear order with relevant detail, using correct construction and structure of speech.

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CC8.2 and DL5.1)

Resources:

- Learner's Book page 52
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Link:

Online article: Examples of word processors

<https://smallbusiness.chron.com/examples-word-processors-66990.html>

Teacher:

Introduce the lesson by asking learners the name of the word processor that they use. Then ask them how many different types of word processor they think there are.

Allow the learners to brainstorm names of other word processing software. As the learners call out the names of word processing software, write the names on the board in the form of a spider diagram (refer to the answer on the next page for an example).

Share the online article with the learners.

Assessment:

Ensure that the names suggested are software used for word processing. Explain any misunderstandings that may arise.

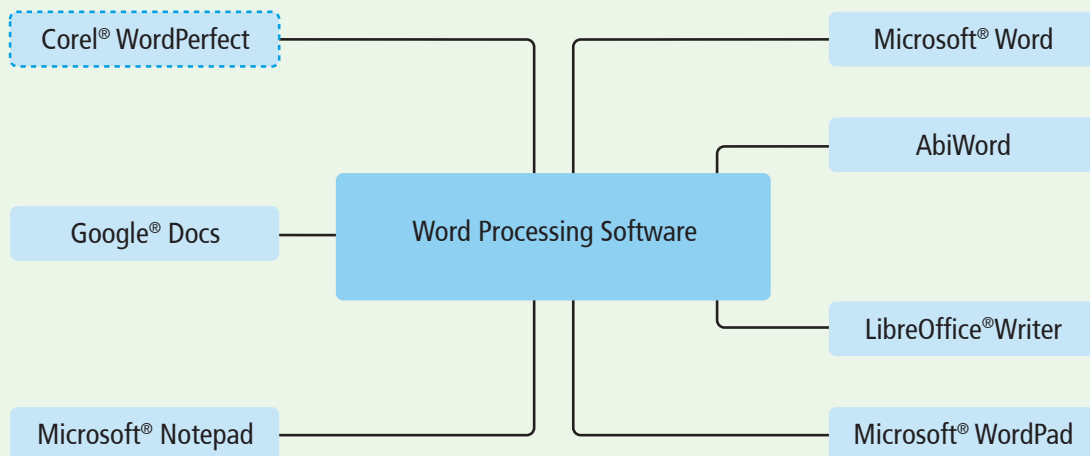
Plenary:

Ask learners to identify two word processing packages that are available free of charge. (Two of: Dropbox® Paper, Google® Docs, LibreOffice® Paper)

LEARNERS

- Research the names of word processing software packages. Share the names with the class.
- Draw a spider diagram in your book and add the names to it.

ANSWERS



Activity 2.4: Pairs/Individual

Purpose:

Demonstrate how to insert, select, delete and move text.

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 53–55
- Internet access and a computer or mobile device capable of connecting to the internet
- Projector
- The link below

Link:

Video: How to swap between insert and overwrite modes using the keyboard (3.02 minutes)

<https://www.youtube.com/watch?v=-j5wMwgGC5w>

Teacher:

Often, learners using a word processor can mistakenly trigger the overwrite mode without understanding what has happened. This activity looks at the different ways that overwrite or insert can be chosen and used. Learners will put into practice their editing skills to create the poster, and their thinking and collaborative skills to create the content. The reflection should give depth to their learning.

Demonstrate, with the use of a data projector linked to your computer, an example of how to use overwrite from the Learner's Book. Ask learners to complete Question 1 of this activity. When learners are ready to move on, project the video, or allow them to watch it on their own computer, then carry on with the rest of the activity.

LOW RESOURCES SCHOOLS

Move into your various groups. One group at a time, watch a short video downloaded onto your teacher's phone. While watching, write down your observations when insert and overwrite modes are used.

After watching the video, each group should write on a manila card how a sentence will look **before** and **after** each of the modes are used. Indicate the implications of using each of the modes on the sentence (document) being written.

The group leader presents what they have to the entire class.

ANSWER

If overtyping mode is used, any text that is inserted will overwrite the text to the right of the cursor as the user types. If insert mode is used, the existing text moves to the right without being overwritten. Using the example sentence 'This is my example.' and adding the word 'test':

Before:	This is my example.
After (using insert mode):	test This is my example.
After (using overtyping mode):	test is my example.

Assessment:

Before the learners finalise their posters, review them to check the accuracy of the instructions.

Plenary:

Instruct learners to complete Step 5 of the activity, the reflection.

LEARNERS

- Your teacher will demonstrate an example of how to use overtyping mode.
- Complete Question 1 before watching the video.
- Work in pairs to create a poster. Ask another pair to give feedback on your poster.
- Reflect on the editing tools used to create your poster.

ANSWERS

The posters should be clear and correct in the instructions. They should be illustrated to help to clarify the instructions.

Activity 2.5: Individual

Purpose:

Demonstrate how to find and replace content and undo edited changes.

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 55–57
- Internet access and a computer or mobile device capable of connecting to the internet
- Projector, linked to computer, or pictures
- The links below
- *Activity 2.5_Text.docx*

Links:

1. Online article: How to edit a Word 2016 document
<https://www.universalclass.com/articles/computers/office-365/how-to-edit-a-word-2016-document.htm>
2. Video: Using Find and Replace in Word (2:38 minutes)
<https://www.youtube.com/watch?v=jAJaXWFDJWI>

Teacher:

Show a projected example of Microsoft® Word interface from your projector. Show pictures if electronic resources are not available. Demonstrate the editing toolbar under the Home tab. Give the learners access to *Activity 2.5_Text.docx*.

LOW RESOURCES SCHOOLS

1. One group at a time, watch a short video (on Find and Replace in Word) downloaded onto your teacher's phone.
2. While watching, take note of your observations on how these features are used.
3. Write your observations on a manila card. Indicate instances where these features are required when preparing a document.
4. Present your responses to the class.

ANSWERS

Answers will vary. Learners should explain that this feature helps you to quickly find and correct spelling or formatting errors in a document. Replace All is useful for replacing all words incorrectly spelt in a particular way, for example US English spelling rather than British English spelling. Find Next allows one to view each use of the word and make corrections only where necessary, for example the use of 'practise' as a verb and 'practice' as a noun.

Assessment:

Review learners' answers to ensure that they understand how to use these features in Word.

Plenary:

Ask individual learners to summarise, step by step, how to apply each of the features covered in this section. Write the steps on the board. Ask the rest of the class to give feedback. Encourage learners to write notes of the processes to follow.

LEARNERS

Open the file *Activity 2.5_Text.docx* and practise using editing tools to insert, select, delete, overwrite and move text. Correct spelling errors and find synonyms using the Thesaurus function. Save your work as <your name>_Activity 2.5_Text.docx.

ANSWERS

Note that the use of the Thesaurus could result in learners selecting different words, but they should all be appropriate for the context.

In this century, broadband has become a necessity because ICT is so important for the growth of the information society. Broadband is necessary for economic growth and job creation worldwide, so it brings with it the prospects of an improved life.

Broadband enables the development of ICT and brings with it many new possibilities for existing businesses and industries, as well as those just starting up.

Some of the transformations that broadband is making are to:

- health care
- energy resources
- public safety
- the ability to be able to access and share information.

Broadband is helping Ghana's economy to experience growth and now new ways of utilising the internet to help the public are being developed.

In conclusion, investment and innovation will help to encourage ordinary citizens' use of ICT.

WORD COUNT: 129 words

Remedial activity:

Encourage learners to reflect on which aspects of Activity 2.5 they found difficult and practise the skills by doing the task again.

Activity 2.6: Individual

Purpose:

Demonstrate how to spell check, carry out content translation, language setting.

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 58–62
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below
- *Activity 2.6_Suguru.docx*

Link:

Video: Using Thesaurus in Word (1:35 minutes)

<https://www.youtube.com/watch?v=chZttDeixjg>

Teacher:

Guide the learners through the HOW TO boxes that explain how to use the Language tools under the Review tab. Give them time to practise on their own before giving the learners access to *Activity 2.6_Suguru.docx*.

LOW RESOURCES SCHOOLS

1. One group at a time, watch a short video (on using the Thesaurus function in Word), downloaded onto your teacher's phone.
2. While watching, take notes of your observations on how this feature is used and how it can be useful.
3. Write your observations on a manila card.
4. Present your responses to the class.

ANSWERS

Answers will vary. Learners should understand that a thesaurus allows one to improve communication by using the most effective words. For example, you can select a synonym to replace overused words, or choose an antonym where a word has been incorrectly used.

Assessment:

Move around while the learners are doing the activity and take note if they are working systematically through the instructions. For example, they should change the translation language to Swahili before attempting to do Question 3.

Plenary:

Ask small groups of learners to explain to each other the steps they followed to carry out each instruction. They should be able to explain giving clear, step-by-step details.

LEARNERS

Read through the activity before you start, to make sure you understand what is expected of you. Ask your teacher to explain anything that is unclear. Complete the activity and save your work as *<your name>_Activity 2.6.Suguru.docx*.

ANSWERS

Suguru is a game that is also known as Tectonics or Number Blocks. Do not mistake Suguru for Sudoku though. If you think of playing Suguru, you will need to know the rules.

You will see a grid of squares that are sub-divided into blocks of squares. The blocks usually contain between 1 and 5 squares but could be more for some games. You need to fill each block with numbers that correspond to how many squares there are in a block.

For a block with 5 squares, you will need to write in the numbers 1 to 5. For a block with 4 squares, you will write in the numbers 1 to 4, etc.

The difficult thing is that any square next to a number, horizontally, vertically, or diagonally, cannot contain the same number. However, some of the numbers are already done for you, but the number of clues gets fewer as the puzzles get harder.

The first thing to do is to look for a block with only one cell and write in the number 1.

You are advised to play the game using a pencil and to have an eraser with you in case you need to start again.

Bahati nzuri kucheza Suguru!

WORD COUNT: 206 words

Activity 2.7: Individual

Purpose:

Demonstrate how to use text decoration, change text case, text size and colour.

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Demonstrate the ability to visualise alternatives, see possibilities and identify problems and challenges. (Core competencies DL5.1 and CI5.4)

Resources:

- Learner's Book pages 62–66
- *Activity 2.7_Elmina.docx*
- Data projector

Teacher:

Guide the learners to explore the various options under the Font tab. Give them time to apply the steps themselves.

LOW RESOURCES SCHOOLS

1. Explain how you would use the following change case features in Word:
Upper case
Sentence case
Toggle case
Capitalise each word.
2. Give reasons why you will need to change the text colour in a document from the default (black colour).

ANSWERS

Answers may vary but possible answers include:

- Upper case is useful for headings and sub-headings. It can also be used when you want to highlight a particular sentence in a paragraph and you do not want to italicise the text. However, we need to be careful when using upper case in an email or message as it can indicate that the writer is shouting.
- Sentence case is used to make sure all the first words of a sentence are capitalised.
- Toggle case is a useful tool if you have been typing with caps lock on. To fix this error, you simply highlight the incorrect text, change case, then select toggle case. It is less time-consuming because you will not have to retype text.
- Capitalise each word is useful for headings and titles.
- You can highlight certain words and important information by changing the text colour from the default (black) to another colour.

Assessment:

Walk around and informally assess if the learners can find where to change font type and size, text colour, text case and text effects. Give assistance where necessary. Review the documents to assess the learners' ability to interpret and organise information, and consider options to successfully carry out instructions.

Plenary:

Project an unformatted piece of text. Ask learners to describe how best to use font to improve the readability of the text. They should be able to explain how to implement the changes, as well as why a particular change is needed.

LEARNERS

Open the word processing file *Activity 2.7_Elmina.docx*. Make the necessary changes according to the activity. Ask your teacher if anything is unclear.

ANSWERS

- TOURISTS TOLD ME
WHAT THEY THINK
OF ELMINA. GHANA
NEEDS TO DO SOME
THINGS DIFFERENTLY**

Heading in red, font size 36, black outline and blue shadow

- What the research uncovered
Why is the research important?
Discussion of key components of research
Conclusion**

Subheadings in Arial Rounded MT Bold, blue, sentence case

Activity 2.8: Individual

Purpose:

Demonstrate how to align text, indent paragraphs, bullet, line space and shade.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Show the ability to visualise alternatives, see possibilities and identify problems and challenges. (Core competencies DL5.1 and CI5.4)

Resources:

- Learner's Book pages 66–71
- *Activity 2.8_Elmina.docx*
- Data projector

Teacher:

Work through the various HOW TO? features with the learners, giving them plenty of time to explore the different options on their own. Emphasise that these features make a document attractive and easier to read.

LOW RESOURCES SCHOOLS

Items 1 to 7 consist of the three columns labelled Response, Formatting terms and Definition, under which are definitions of text formatting terms labelled A to I. Match each term with the appropriate definition by writing the letter of the alphabet in the appropriate box of the Response column.

	Response	Formatting terms	Definition
1.		Borders and shading	A. Creates ordered lists whose items are numbered with various styles.
2.		Bullets	B. Begins a block of text further away from the margin than the main part of the text.
3.		Numbering	C. Creates space in between texts so that both edges of each sentence are aligned with both margins.
4.		Indentation	D. Brings into line the end of each line along the right margin.
5.		Justify	E. Defines a longhand font based on a formalised form of calligraphic handwriting.
6.		Right align	F. Enables you to select from a list of predetermined or custom boundaries styles to add to selected text, paragraphs or page.
7.		Line spacing	G. A mark or symbol found before a text usually for creating an unordered list of items.
			H. Determines the distance between lines of text in a document.
			I. A collection of characters that has similar appearance.

ANSWERS

	Response	Formatting terms	Definition
1.	F	Borders and shading	A. Creates ordered lists whose items are numbered with various styles.
2.	G	Bullets	B. Begins a block of text further away from the margin than the main part of the text.
3.	A	Numbering	C. Creates space in between texts so that both edges of each sentence are aligned with both margins.
4.	B	Indentation	D. Brings into line the end of each line along the right margin.
5.	C	Justify	E. Defines a longhand font based on a formalised form of calligraphic handwriting.
6.	D	Right align	F. Enables you to select from a list of predetermined or custom boundaries styles to add to selected text, paragraphs or page.
7.	H	Line spacing	G. A mark or symbol found before a text usually for creating an unordered list of items.
			H. Determines the distance between lines of text in a document.
			I. A collection of characters that has similar appearance.

Assessment:

Move around and ask individual learners questions that are not included in the activity. For example, ask them to show you how to centre the heading, or to choose another style of bullets. Informally assess if the learners are familiar with all the options, not just those in the questions. Review the documents to assess learners' ability to interpret and organise information, and consider options to successfully carry out instructions.

Plenary:

Draw icons found under Paragraph tab. Ask the learners to name them, explain what they are used for, and how to use them.

LEARNERS

Open the document *Activity 2.8_Elmina.docx*. Make the necessary changes to the formatting. Save your document. Ask your teacher if anything is unclear.

ANSWERS

Learners' answers will vary, based on their choices, but should resemble the model answers below.

1.

**Tourists told me what they think of Elmina.
Ghana needs to do some things differently**
2. Alexander Diani Kofi Preko does not work for, consult, own shares in or receive funding from any company or organisation that would benefit from this article, and has disclosed no relevant affiliations beyond their academic appointment.
3. The Conversation is funded by:
 - The National Research Foundation
 - The Cape Peninsula University of Technology
 - Rhodes University
 - Stellenbosch University
 - University of Cape Town
 - University of Johannesburg
 - University of Kwa-Zulu Natal
 - University of Pretoria
 - University of South Africa.
4. **We believe in the free flow of information.
Republish our articles for free, online or in print, under Creative Commons licence.**
5. The study showed that specific tour services – namely community interaction, tour guide performance, transport, food and souvenir shopping – positively influenced international tourist satisfaction in Elmina. And this satisfaction had a positive bearing on the intention to revisit Elmina.

Activity 2.9: Individual

Purpose:

Demonstrate how to set tabs and apply formatting.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Show the ability to visualise alternatives, see possibilities and identify problems and challenges. (Core competencies DL5.1 and CI5.4)

Resources:

- Learner's Book pages 71–75
- *Activity 2.9_Market day.docx*

Teacher:

Guide the learners through setting tab stops, using the various HOW TO? boxes. Give them time to experiment themselves.

LOW RESOURCES SCHOOLS

1. Give the appropriate key words to complete the sentences below.
 - a. Tabs are used to format _____.
 - b. By default, the insertion point moves _____ cm when the tab key is pressed.
 - c. If the ruler of Word cannot be seen, you can get it displayed under the Ribbon by using the _____ tab.
2. Explain the main purpose for setting up tabs when preparing documents in Word.

ANSWERS

1.
 - a. paragraphs
 - b. 1.27
 - c. View
2. Tabs are a way of aligning the text in a paragraph, so you can have control over the placement of the text.

Assessment:

Walk around and informally assess if the learners can use the ruler to set tabs. Add an incorrect tab stop and ask them to remove it. Check that they can explain what the tab symbols mean. Give assistance where necessary. Review the documents to assess learners' ability to interpret and organise information, and consider options to successfully carry out instructions.

Plenary:

Ask individual learners to explain to the class how to set tab stops, using the ruler and the dialog box. Cover the left tab, centre tab and right tab.

LEARNERS

- Your teacher will demonstrate an example of how to use overtype mode.
- Complete Question 1 before watching the video.
- Work in pairs to create a poster. Ask another pair to give feedback on your poster.
- Reflect on the editing tools used to create your poster.

ANSWERS

- | | | |
|----|--------------|--------------------------------------|
| 1. | First Prize | Air flight tickets |
| | Second Prize | Two nights for two at a 5-star hotel |
| | Third Prize | Two nights for two at a 4-star hotel |
| 2. | Fruit | Total |
| | Apples | 4562 |
| | Bananas | 789 |
| | Pears | 1254 |
| | Oranges | 7452 |
| | Peaches | 89 |

Sub-strand 2: Introduction to presentations

Activity 2.10: Group

Purpose:

Explain the importance of presentation software.
Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner’s Book pages 76–77
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Link:

Online article: What Are Benefits of PowerPoint?
<https://smallbusiness.chron.com/benefits-powerpoint-55958.html>

Teacher:

Start by asking the learners if they remember using PowerPoint in previous grades. Ask them to name the features that you explored in previous grades, such as WordArt text, adding images, footers, etc. Write this list on the board. Ask them what they enjoyed about the software and what they found challenging. Read through the introductory text before dividing the learners into groups for the activity.

Assessment of activity:

Move around during the group work session to make sure that all learners are engaged. Take note of the learners’ communication skills while they participate in the discussion. Review the groups’ answers to assess their ability to analyse a question, interpret and organise information, and use the information to answer the question.

Plenary:

Refer learners to the illustration on page 76. Ask each group to offer a different reason why presentation software makes meetings, such as the one shown, more efficient.

LEARNERS

- In your group, discuss presentation software and its benefits. Give examples of presentation software packages.
- Make notes to answer the questions in the Learner’s Book. Nominate one member of the group to give feedback to the whole class.
- Improve your notes with ideas from other groups.

ANSWERS

1. Presentation software is used to create slides to accompany an oral presentation.
2. Presentation software makes it easy to create slides that add meaning to an oral presentation. Two examples are slides that incorporate images (such as graphs and diagrams) and slides that summarise important facts. The slides also help the presenter keep on track during the presentation.
3. Any three of: Microsoft® PowerPoint, Corel® Presentation, Adobe® Persuasion, Google® Slides, Keynotes®

Activity 2.11: Individual

Purpose:

Explore features of the Microsoft® PowerPoint interface.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 77–78
- Data projector
- *Activity 2.11_About Ghana.pptx*
- Internet access and a computer or mobile device capable of connecting to the internet
- The links below

Links:

1. Video: Setting up a data projector (9:11 minutes)
<https://www.youtube.com/watch?v=Ly1Y4ytO100>
2. Video: Connecting a data projector to a laptop (5:20 minutes)
<https://www.youtube.com/watch?v=Nmfq0qr9GoQ>

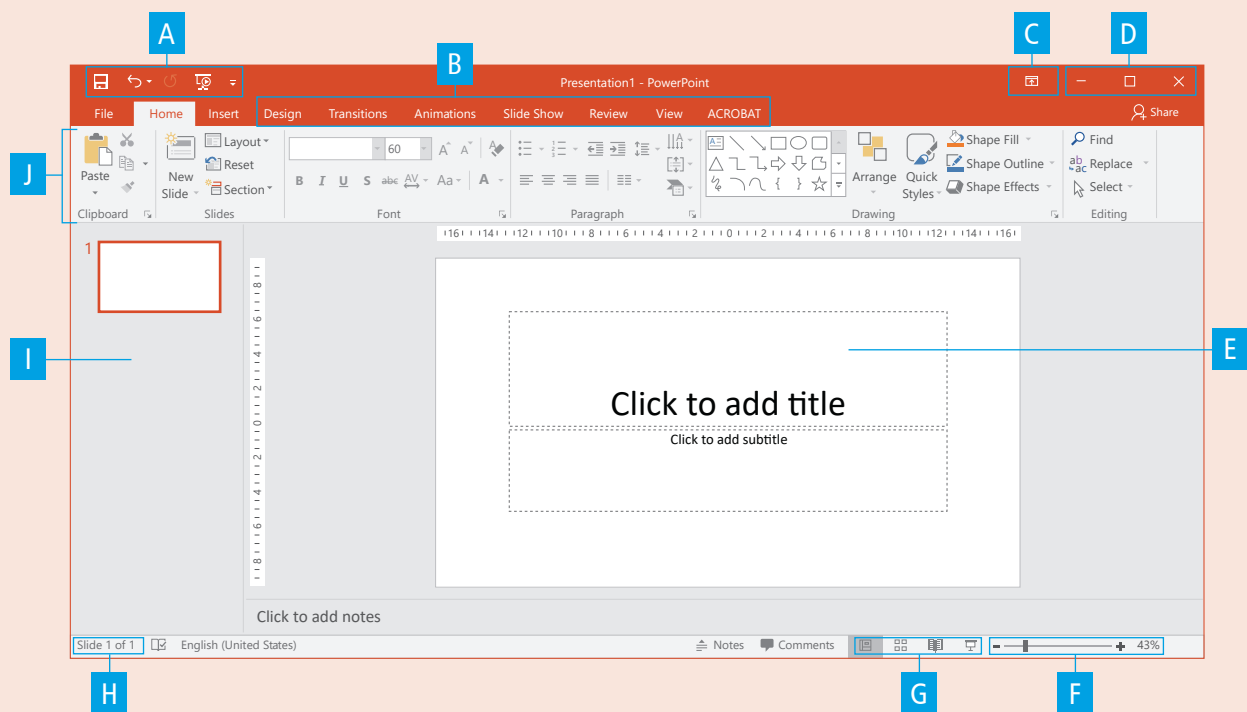
Teacher:

Using either the HOW TO? box or the videos, guide the learners through the steps to use a data projector. If time allows, show the videos. Give them time to follow the steps themselves and to select the Duplicate and Extend viewing options. Give the learners access to *Activity 2.11_About Ghana.pptx*.

LOW RESOURCES SCHOOLS

The image below is the interface of Microsoft® PowerPoint. Study it carefully and use it to answer the questions that follow.

1. Identify the parts labelled A to J on a manila card.
2. Explain the function of each of the parts labelled A to J.
3. Paste your manila card on the board for members of the class to assess the responses of your group.



ANSWERS

- A.** Quick access toolbar: Gives access to commonly used commands, such as Save, Undo, Redo, etc.
- B.** Tabs: Each tab has a group of options with a similar function, for example, Design.
- C.** Ribbon display options: Allows you to choose whether to show the ribbon, tabs and commands.
- D.** Minimise, Maximise and Close options: Shrink, enlarge and close the window.
- E.** Slide pane: View current slide.
- F.** Zoom in/out sliding bar: Make slide bigger or smaller.
- G.** View buttons: Change between Normal view, Slide sorter view and Slide show view.
- H.** Status bar: Shows the number of the slide that is currently displayed, the total number of slides, and the name of the design template in use or the name of the background.
- I.** Slideshow outline/Thumbnails: Shows a thumbnail of all your slides. You click the thumbnail to view the slide in the Slide pane.
- J.** Ribbon: Area containing all the Tabs.

Assessment:

Move around the class while the learners are busy and observe learners' skills at connecting the projector to the computer, finding the presentation and manipulating the keyboard to find the projection options. Give assistance where necessary.

Plenary:

Ask learners to describe:

1. What to do if the slideshow does not automatically project.
2. What the presentation will look like if you select the Duplicate option.
3. What the presentation will look like if you select the Extend option.

LEARNERS

- Open the file *Activity 2.11_About Ghana.pptx*.
- View the slide show, using a data projector. Experiment with viewing the presentation using the Duplicate and Extend options.

ANSWERS

Learners should be able to locate and project the given PowerPoint presentation, using both the Duplicate and Extend options.

Activity 2.12: Individual

Purpose:

Explore features of the Microsoft® PowerPoint interface.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 79–82
- *Activity 2.12.1_About Ghana.pptx*
- *Activity 2.12.2_About Ghana.pptx*
- Internet access and a computer or mobile device capable of connecting to the internet
- The links below

Links:

1. Online article: Understand the difference between PowerPoint templates and themes
<https://support.microsoft.com/en-us/office/understand-the-difference-between-powerpoint-templates-and-themes-e2408e10-e015-43b3-8b29-b99d128ae448>
2. Video: How to apply and insert template themes (1:50 minutes)
<https://www.youtube.com/watch?v=ksFndsXr4IE>

Teacher:

Explain to learners that using a theme gives your presentation a consistent style and adds to its professionalism. Using a template saves time and ensures consistent style. Guide the learners through the HOW TO? boxes. Give them time to apply the steps themselves. Give the learners access to *Activity2.12.1_About Ghana.pptx* and *Activity2.12.2_About Ghana.pptx*.

It is advisable to split this activity into three parts:

- The HOW TO? box on applying a theme, followed by Question 1
- The HOW TO? box on using a template, followed by Question 2
- Question 3.

Assessment of activity:

While learners are completing Questions 1 and 2, move around and informally assess if they are able to complete the required actions. As they experiment with different themes, encourage them to give their opinions about the various looks created.

While they complete Question 3, move around and discuss individual presentations. Ask the learners about the look they aim to achieve. Take note of their problem-solving skills as they choose various features. Review the slide shows to assess their ability to interpret and organise information, and use the information to carry out instructions.

Plenary:

Ask learners to explain the difference between themes and templates. They should be able to define a theme as a predefined set of colours, fonts and visual effects that give a slideshow a unified professional look. They should be able to define a template as a blueprint for a slide presentation and mention that templates can contain layouts, colours, fonts, effects, background styles and even content.

LEARNERS

- You are going to practise using themes and templates. Read the questions before beginning the activity. Ask your teacher if anything is unclear.
- Save your work as <your name>_Activity 2.12.1_About Ghana.pptx and <your name>_Activity 2.12.3_About Ghana.pptx.
- You are also going to design a seven-slide presentation and save it as <your name>_Staying healthy and safe.pptx.

ANSWERS

1. Answers will vary, depending on each learner's chosen style.
2. Refer to the model answer below.
3. Learners create their own presentations on staying healthy. Their presentations will vary but must include the specified features.





Remedial activity:

Pair a more confident learner with a weaker learner to help the weaker learner to understand where they could improve.

Activity 2.13: Individual

Purpose:

Explore features of the Microsoft® PowerPoint interface.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 82–84
- *Activity 2.13_About Ghana.pptx*
- Internet access and a computer or mobile device capable of connecting to the internet
- The links below

Links:

1. Video: How to check spelling in PowerPoint (1:33 minutes)
<https://www.youtube.com/watch?v=vKZGf2TxCes>
2. Video: How to use the thesaurus in PowerPoint (0:59 minutes)
<https://www.youtube.com/watch?v=18Y4aDqybBo>

Teacher:

Emphasise to the learners that, no matter how attractive or interesting a presentation is, spelling or accidental typing errors will ruin it. Similarly, language can be adapted to avoid overused words or to choose words more suitable for the target audience. PowerPoint has features under the Review tab that can make this easier.

Guide the learners through the HOW TO? boxes on running a spell check and using a thesaurus. Alternatively, watch the videos in the links. Make sure that the learners understand that, when using a thesaurus, it is very important to consider the context of the word. Give them time to apply the steps themselves. Give the learners access to *Activity 2.13_About Ghana.pptx*.

LOW RESOURCES SCHOOLS

1. In your groups, read the scenario below.
A presentation prepared by Mawusi is full of spelling and grammatical errors. She also needs to find synonyms for some of the words in her presentation. You are to suggest proofing features in PowerPoint to assist Mawusi correct the errors as well as to find the appropriate synonyms.
2. Enumerate the procedure (steps) for using the proofing feature that you have suggested.

ANSWERS

To run a spellcheck:

- Step 1:** Under the Review tab, in the Proofing group, click the **Spelling** command.
- Step 2:** For each error in your presentation, PowerPoint will offer one or more suggestions. You can select a suggestion and click on the **Change** button to correct the error. To correct all occurrences of the same error, click on **Change All**.
- Step 3:** After you have reviewed the last error, a dialog box will appear confirming that the spelling check is complete. Click **OK**.

To find synonyms:

- Step 1:** **Select** the word that you want a synonym for.
- Step 2:** Under the Review tab, in the Proofing group, click the **Thesaurus** command. The Thesaurus task pane will appear on the righthand side and contains synonyms and antonyms of the selected word.
- Step 3:** Once you find the word you need, hover the cursor on that word to see a down-arrow button. Click on this down arrow and choose the option you want:
- **Insert:** This option inserts the word at the cursor position on the active slide.
 - **Copy:** This option copies the word to the clipboard so you can paste it wherever you want to.

Assessment:

Walk around the class and informally assess the learners' ability to use the proofreading options as required. Give assistance where required. Review the slide shows to assess their ability to interpret and organise information, and use the information to carry out instructions.

Plenary:

Ask random learners to give their answers to the questions. Write the answers on the board and ask if anyone disagrees. In the case of Question 2, ask for other suggestions from the class. Ask each learner to justify why he or she chose another word.

LEARNERS

- You are going to practise correcting spelling errors and using the Thesaurus function in PowerPoint.
- Read through the activity and make sure you understand what is required.
- Save your work as *<your name>_Activity 2.13_About Ghana.pptx*.

ANSWERS

1. Make the following corrections:
Slide 2: loation (location) Slide 4: pplation (population)
Slide 5: mettals (metals).
2. Slide 2: Situated (any of: located, positioned, sited, found)
Slide 5: Emerging (any of: developing, emergent)

Activity 2.14: Individual

Purpose:

Explore features of the Microsoft® PowerPoint interface.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 84–87
- *Activity 2.14_About Ghana.pptx*

Teacher:

The translation option can be useful if the presentation is in English, for example, but the presenter wants to provide handouts for the French-speaking audience. The translated text can be spell checked by changing the language preferences.

Choosing language preference is also important for running an English spell check. Explain that correct English spelling varies between the United States and the United Kingdom. A common example is words that end in -ise (UK English) are spelled -ize (US English). Most African countries follow UK English spelling. PowerPoint's proofing language can be changed accordingly.

Guide the learners through the HOW TO? boxes on translating text and setting the proofing language. Give them time to apply the steps themselves. Give the learners access to *Activity 2.14_About Ghana.pptx*.

Assessment:

Move around and check that the learners are able to perform the required actions. Answer questions and offer assistance where necessary. Review the slide shows to assess their ability to interpret and organise information, and use the information to carry out instructions.

Plenary:

Divide the class into four groups and assign each group a topic: spell check, thesaurus, language preferences, translate. Give the groups ten minutes to set ten questions on their topic; they need to provide short answers too. Use the questions to conduct a class quiz, organised in teams. Groups may not answer questions they set themselves.

LEARNERS

Before running a spell check, it is important to check that your version of PowerPoint is set on the correct proofing language option. Read through the instructions in the Learner's Book and make sure you understand what to do. You are also going to practise using the translation function in PowerPoint. Save your answer as <your name>_Activity 2.14_About Ghana.pptx.

ANSWERS

1. If English (United States) is selected, Slide 3 will present a spelling error ('neighbouring' is used instead of the American English spelling 'neighboring').
2. Slide 3: see below.
Slide 5: answers will vary depending on learners' chosen language, for example, *émergent* is the French translation.

पड़ोसी देश

- Ivory Coast in the west
- Burkina Faso in the north
- Togo in the east



Activity 2.15: Group

Purpose:

Demonstrate how to use special characters. Design a seven-slide presentation using the tools under the Insert ribbon.

Demonstrate the ability to visualise alternatives, see possibilities and identify problems and challenges. Demonstrate the ability to work with all group members to complete a task successfully. (Core competencies CI5.4 and CC9.6)

Resources:

- Learner's Book pages 88–89
- Projector
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Links:

Online article: 10 PowerPoint tips to make your slides more effective

<https://www.ispringsolutions.com/blog/10-powerpoint-tips-to-make-your-slides-more-effective>

Teacher:

Read through the HOW TO? section on special characters and allow learners time to experiment with finding and inserting special characters. Encourage them to find and make notes of shortcuts for symbols that they will use often, such as mathematical symbols.

Using the projector, take the learners through the online article in the link. This will give them useful tips about effective slides. Divide the learners into groups for the activity.

LOW RESOURCES SCHOOLS

In your groups, brainstorm the following questions:

1. How do themes and templates assist you in the design of your presentation?
2. How beneficial do you find presentation software as a student? Explain your answer.

ANSWERS

1. Themes and templates make the presentation look professional using consistent colours, layout, fonts, etc. They make designing a presentation quick and easy.
2. Answers will vary but must be supported by examples and reasons.

Assessment:

Walk around and observe learners' communication skills as they discuss the task. Take note of how groups split the work among themselves and how well they were able to work together to complete the activity. Review the groups' slide shows to assess their ability to interpret and organise information, and use the information to carry out instructions.

Plenary:

If one member of each group projects the presentation, ask the remaining group members questions about the slideshow, such as how they inserted special characters, how they chose a template, how they chose a proofing language, etc.

LEARNERS

- You are going to practise what you have learnt about PowerPoint so far by creating a seven-slide presentation.
- Plan your presentation carefully, using the list of requirements in the Learner's Book.
- Save your presentation as *<your name>_Activity 2.15_Solids.pptx*.
- Project your presentation to the class.

ANSWERS

Learners create their presentations on the importance of specific solids. Their presentations will vary but must meet the criteria specified.

Activity 2.16: Individual

Purpose:

Demonstrate how to change text case, text size, text colour and decorate text.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Show the ability to visualise alternatives, see possibilities and identify problems and challenges. (Core competencies DL5.1 and CI5.4)

Resources:

- Learner's Book pages 90–94
- *Activity 2.16_Flowers.pptx*
- Data projector

Teacher:

Work through the HOW TO? boxes about changing text case, changing font size, changing font colour, decorating text and applying text effects. Give the learners time to practise the skills themselves. Walk around and offer assistance where needed. Learners may need help when first they use the Eyedropper tool.

LOW RESOURCES SCHOOLS

Join your group and discuss the following.

1. What is a font?
2. What does it mean to format text in a presentation?
3. What is the function of the Eyedropper feature in the colours dialog box? List the steps and give examples of how it could be used.

ANSWERS

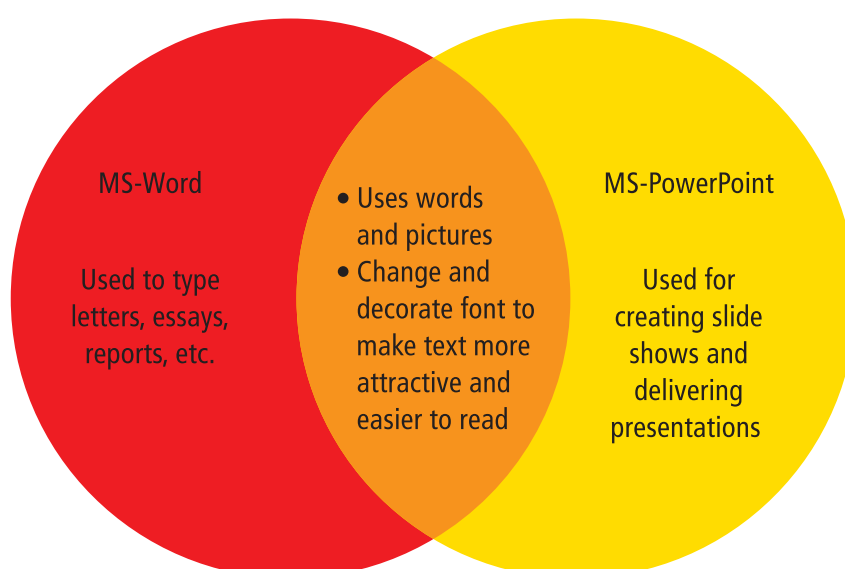
1. A font is a combination of characters that make text in a word processor.
2. Formatting text in a presentation means changing the font type, font size, font colour and font effects.
3. The EyeDropper function can be used to match colours and text on your slides.
 - Select the text to match a colour. Click on the EyeDropper option from the font colour drop down option. The mouse pointer turns into an eyedropper tool. As you move the mouse over other text colours, a live preview of the colour you are pointing at appears in a square. Select the colour you want to match to apply it to the selected text.
 - For example, if you have a heading, you can match the font colour of the heading to the same colour in a picture on the same slide. This will make your presentation look neat and professional.

Assessment:

Move around while the learners are completing the activity and informally assess that they can apply the required changes. Review the slide shows to assess learners' ability to interpret and organise information and consider options to successfully carry out instructions.

Plenary:

Remind the learners that they practised similar skills in Strand 2 Sub-strand 1. Draw two overlapping circles on the board and label them Word and PowerPoint. Ask the learners to list the main uses of the two programs and the features they have explored. They should identify that both packages allow the user to change text case, font size and colour, to decorate text and apply text effects.



LEARNERS

Open the presentation file *Activity 2.16_Flowers.pptx*. Format the presentation as necessary. Save the document. Ask your teacher if anything is unclear.

ANSWERS

Colours and text effects may vary, but should be similar to those shown below.

MOST BEAUTIFUL FLOWERS IN THE WORLD

A kaleidoscope of colours

Water Lilies

- Queen of all aquatic flowers in the world
- 70 different types of water lilies in the world
- Grow in still shallow freshwater
- Attention grabbing beauty
- Protect ecosystem – balancing water temperature



Bleeding Heart

- Heart shape
- Pink-white coloured flowers
- Stunningly beautiful flower
- Grows well in moist cool climate
- 20 flowers open on each arching stem



Tulips

- Beautiful and instant attention grabber
- 3000 varieties from 150 different species in the world
- Most cultivated flowers in the world
- Cup-shaped – open in Spring



Dahlia

- Great variety in size and colour
- 42 different species of dahlia in the world
- Native to Mexico
- Stunningly colourful flowers bloom between mid-summer and first frost



Roses

- Most beautiful flower in the world
- Most fragrant and romantic
- Native to Asia
- Each colour of the rose symbolizes a certain value



Bird of Paradise

- Also known as Crane flower
- Belongs to Steritiaceae family
- Name of family is attributed to the shape of the flower



Hibiscus

- Tropical beauties
- Gives an exotic look to your garden
- Durable plants
- Colourful blooms
- Attract hummingbirds and butterflies



Oriental Poppy

- Mesmerising flower
- Native to Turkey – mainly found in Caucasus
- It is a perennial plant



Start your own garden or business



Activity 2.17: Individual

Purpose:

Demonstrate how to align text, indent paragraphs, borders and shades.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Show the ability to visualise alternatives, see possibilities and identify problems and challenges. (Core competencies DL5.1 and CI5.4)

Resources:

- Learner's Book pages 94–99
- *Activity 2.17_Flowers.pptx*
- Data projector

Teacher:

Guide the learners through the HOW TO? features that explain the features found in the paragraph tool under the Home tab. While they practise on their own, move between the learners and give assistance where needed.

LOW RESOURCES SCHOOLS

1. Name the feature used to specify the thickness of a border around a text.
2. What is the purpose of indenting text on a presentation slide?
3. Under what circumstance would you prefer to bullet a list on a slide instead of the use of numbering?

ANSWERS

1. Weight
2. Indenting text is useful when making points under a heading, so that they stand out from the paragraph.
3. Numbering a list is useful when the items on the list need to be numbered, while bulleting is useful for a more general list of items.

Assessment:

Observe the learners as they complete the activity and informally assess their competence. Review the slide shows to assess the learners' ability to interpret and organise information and consider options to successfully carry out instructions.

Plenary:

Draw the relevant icons on the board and ask different learners to name the icon, explain what it is used for, and explain how it can enhance a presentation or slide show.

LEARNERS

Open the presentation *Activity 2.17_Flowers.pptx*. Apply the necessary formatting. Save the document. Ask your teacher if anything is unclear.

ANSWERS

Styles may vary, but should be similar to those shown below.

Bleeding Heart

- Heart shape
- Pink-white coloured flowers
- Stunningly beautiful flower
- Grows well in moist cool climate
- 20 flowers open on each arching stem



Water Lilies

- Queen of all aquatic flowers in the world
- 70 different types of water lilies in the world
- Grow in still shallow freshwater
- Attention grabbing beauty
- Protect ecosystem – balancing water temperature



Tulips

- ❖ Beautiful and instant attention grabber
- ❖ 3000 varieties from 150 different species in the world
- ❖ Most cultivated flowers in the world
- ❖ Cup-shaped – open in Spring



Dahlia

- Great variety in size and colour
- 42 different species of dahlia in the world
- Native to Mexico
- Stunningly colourful flowers bloom between mid-summer and first frost



Activity 2.18: Pairs

Purpose:

Demonstrate the use of the Slide Master, design template, and be able to give a five-slide presentation using the tools of the tabs studied.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Show the ability to visualise alternatives, see possibilities and identify problems and challenges. (Core competencies DL5.1 and CI5.4)

Resources:

- Learner's Book pages 99–103
- *Activity 2.18_Water.jpg*

Teacher:

Making sure a presentation looks professional is important. Using the Slide Master View helps you make sure your presentations are consistent. Allow the learners to use the Slide Master View to make the necessary changes to their presentations.

LOW RESOURCES SCHOOLS

Join your group members.

1. Discuss the benefits of using the Slide Master View in preparing a presentation using slides in PowerPoint.
2. Araba has made changes to the Slide Master of her presentation. However, the changes did not affect the place holders on all slides. Discuss two ways to get the changes to show on all the slides in the presentation.
3. Present the outcome of your discussion to the class.

ANSWERS

1. Slide Master View allows you to quickly edit any feature of your presentation to give it the same look and feel throughout.
2. On the View tab, in the Master View, click on the Slide Master button. Select the Slide Master. Go to the Slide Master tab to change the theme, theme colours, fonts and background for the whole presentation. This can also be done by using the Home tab.

Assessment:

Review the slide shows to assess the learners' ability to interpret and organise information and consider options to successfully carry out instructions.

Plenary:

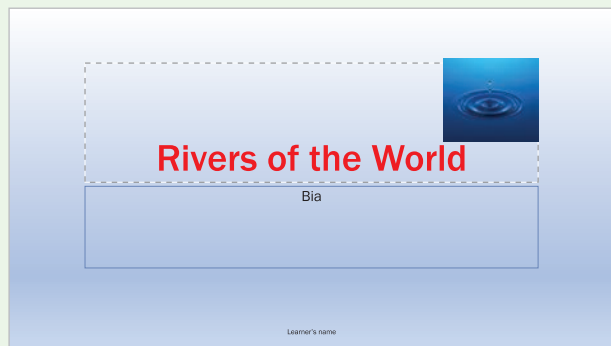
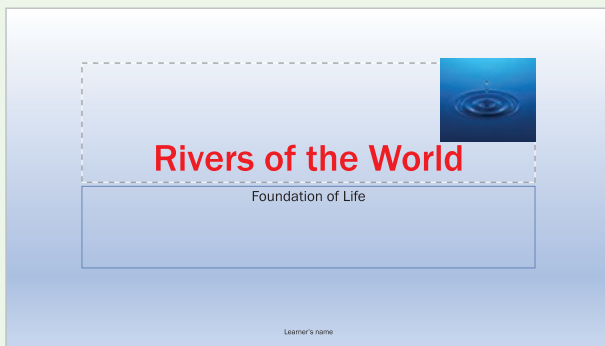
Conduct a class quiz about the PowerPoint features covered in this sub-strand. Divide learners into teams to set and answer questions.

LEARNERS

Create a blank presentation and save the presentation as *Activity 2.18_Rivers.pptx*. Work with a partner. Using the Slide Master feature, make the necessary changes. Save the document. Ask your teacher if anything is unclear.

ANSWERS

Presentations may vary, but the slides should be similar to those shown below.



Sub-strand 3: Introduction to electronic spreadsheets

Activity 2.19: Group

Purpose:

Explain the importance of electronic spreadsheets.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 104–106

Teacher:

Start by asking the learners if they remember using Excel in previous grades. Ask them to name the features that they explored in previous grades, such as changing the appearance of data and inserting formulas. Read through the introductory text before dividing the learners into groups for the activity.

Assessment:

Move around during the group work session and encourage all learners to participate. Take note of the learners' communication skills while they participate in the discussion. Review the groups' answers to assess their ability to analyse a question, interpret and organise information, and use the information to answer the question.

Plenary:

Refer the learners to the illustration on page 104. Ask groups to explain how the picture illustrates the benefits of electronic spreadsheets.

LEARNERS

Discuss the uses and benefits of electronic spreadsheets. Think about how spreadsheets can be used at home and in schools.

ANSWERS

1. The main purpose is to automatically perform calculations and create visual representations of numbers, for example graphs and charts.
2. Home: electronic spreadsheets are mainly used for household budgeting – planning and tracking the household's income and expenditure and short-, medium- and long-term savings.
School: learners' marks can be entered into spreadsheets and graphs can be used to represent what percentage of learners achieved what scores; average marks per grade can easily be calculated and shown graphically; clubs and departments of the school (for example a drama club or the sports department) can use the financial management functions; the whole school's finances can be planned and tracked on electronic spreadsheets; Excel can also be used as a scheduling tool.
3. Automatic recalculation saves a lot of time and eliminates errors creeping in through manual calculations.

Activity 2.20: Pairs

Purpose:

Explore features of the Microsoft® Excel interface.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 106–111
- *Activity 2.20_Basic editing.xlsx*

Teacher:

Guide the learners through the HOW TO? boxes on entering data in a cell, editing it, deleting the data and moving the data. Give them time to explore the various methods themselves. Encourage learners to use the shortcuts they have learnt in previous grades, such as Ctrl+C and Ctrl+V. Give the learners access to *Activity 2.20_Basic editing.xlsx*.

LOW RESOURCES SCHOOLS

1. Draw a table with 10 Rows and 5 Columns.
2. Label the columns from A to E.
3. Label the rows from 1 to 10.
4. Fill in the table with the data alongside.

	A	B	C	D	E
1	TRAVEL COST OF A TOURIST IN GHANA				
2		ADA	AKOSOMBO	SOGAKOPE	CAPE COAST
3					
4	FOOD AND DRINKS	300.00	740.00	600.00	400.00
5	ACCOMMODATION	1200.00	800.00	1020.00	1800.00
6	ENTERTAINMENT	450.00	320.00	200.00	530.00
7	TRANSPORT	660.00	800.00	710.00	970.00
8	INSURANCE	500.00	300.00	600.00	400.00
9	TOURIST SITE	2300.00	940.00	1300.00	1900.00
10	OTHERS	700.00	300.00	600.00	780.00

ANSWER

A	B	C	D	E
TRAVEL COST OF A TOURIST IN GHANA				
	ADA	AKOSOMBO	SOGAKOPE	CAPE COAST
FOOD AND DRINKS	300.00	740.00	600.00	400.00
ACCOMMODATION	1200.00	800.00	1020.00	1800.00
ENTERTAINMENT	450.00	320.00	200.00	530.00
TRANSPORT	660.00	800.00	710.00	970.00
INSURANCE	500.00	300.00	600.00	400.00
TOURIST SITE	2300.00	940.00	1300.00	1900.00
OTHERS	700.00	300.00	600.00	780.00

Assessment:

Walk around and check that all learners are able to perform the required actions. Take note of the learners' communication skills and how well they were able to work together. Review the spreadsheets to assess learners' ability to interpret and organise information, and to apply that information to solve a problem.

Plenary:

Have a fun group or class quiz. Taking turns, a learner describes what they are doing, and the rest of the group/class must guess what they are doing. For example: 'I click on the cell,' and the first person to guess correctly asks the next question.

LEARNERS

- Practise basic edits to an Excel spreadsheet, following the instructions in the Learner's Book.
- Save your work as <your name>_Activity 2.20_Basic editing.xlsx.

ANSWERS

	A	B	C
1	Ghana - Number of Female Graduates		
2			
3	Year	Number of Different Degrees	Percentage
4	2012	25	51,4
5	2013	27	49,7
6	2014	34	46,3
7	2015	26	51,8
8	2016	35	44
9	2017	37	41,3
10	2018	34	42
11			

Activity 2.21: Individual

Purpose:

Demonstrate how to set the cell data type.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 111–119
- Activity 2.21_Data types.xlsx

Teacher:

Read through the introduction to data types. Explain that numbers starting in zero, such as cell phone numbers, must be entered as text. Although Excel would automatically recognise a cell phone number as a number format, we must manually change the data type in order to have the zero displayed.

Guide the learners through the HOW TO? boxes on entering values and text in a cell, entering dates and times in a cell, and selecting different number formats. Give them time to explore the features themselves. Give the learners access to Activity 2.21_Data types.xlsx.

LOW RESOURCES SCHOOLS

1. Classify the following data under their respective data type as indicated in the table below.

Kintampo	'1234
11:24 AM	=sum(B2:B14)
#value!	=24/2+3-12 453
\$50	=OR(A2>=10, B2<5)
=NOT(A2>=10)	

Formula	Text	Numerical	Logical	Error

2. In your group, brainstorm possible conditions under which you will need to set and modify the cell type of values and labels in a worksheet.

ANSWERS

- 1.

Formula	Text	Numerical	Logical	Error
=sum(B2:B14)	Kintampo	11:24 AM	=OR(A2>=10, B2<5)	#value!
=24/2+3-12 453	'1234	\$50	=NOT(A2>=10)	

2. Labels describe the values in a spreadsheet. In order to have a spreadsheet that is easy to understand, it is important to set up 'labels', which provide information to the user, and 'values' which are the numbers that can be in formulas.

Assessment:

Move around and take note of individuals who are struggling. Observe if their group members are able to assist in an encouraging way. Offer assistance where needed. Make sure all group members are engaged. Review the spreadsheets to assess learners' ability to interpret and organise information, and to apply that information to solve a problem.

Plenary:

Ask learners to explain why these features are useful.

LEARNERS

- Practise identifying different types of data by completing the table in the Learner's Book. Reread pages 112–118 if you are unsure.
- Carry out the required formatting changes to a spreadsheet.
- Save your answer as <your name>_Activity 2.21_Data types.xls.

ANSWERS

2.

CELL ADDRESS	DATA TYPE	FORMAT
A2	text	general
C3	numerical	date
D4	text	text
E1	text	general
F2	numerical	custom
G3	numerical	general
J3	formula	percentage
K1	text	general

3.–6.

	A	B	C	D	E	F	G	H	I	J	K
				Phone Number Starting with area code	Online testing times	Total amount Paid to date for Online Tests	Mark 1	Mark 2	Average	Percentage Pass	Achieved
1	Name	Gender	Date of Birth								
2	Mawuli	Male	14 December 2004	0325621238	9:02 PM	GHC 80,00	56	12	34	34%	No
3	Aku	Female	09 May 2003	0324578545	10:05 AM	GHC 68,00	82	87	84,5	85%	Yes
4	Esi	Female	26 June 2004	0325689523	9:12 PM	GHC 71,00	67	65	66	66%	Yes

Remedial activity:

Pair a more confident learner with a weaker learner to help the weaker learner to understand where they can improve.

Activity 2.22: Group

Purpose:

Demonstrate how to align text, merge and wrap text, add borders and background shades. Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 119–126
- *Activity 2.22_Formatting cells.xlsx*
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Link:

Video: Formatting of an Excel spreadsheet (5:37)

<https://www.youtube.com/watch?v=QxQIXICuXvQ>

Teacher:

Guide the learners through the HOW TO? boxes on aligning text vertically and horizontally, wrapping text, merging cells, and choosing styles for cell borders and background fills.

There is a lot of room for experimentation in this section, so remind learners that the purpose of these formatting options is to make the spreadsheet easier to read. Give them plenty of time to explore the different features. Give the learners access to *Activity 2.22_Formatting cells.xlsx*.

LOW RESOURCES SCHOOLS

1. In your group, discuss possible conditions under which you will be required to:
Centre align text in a worksheet.
Wrap text in a cell.
Merge two or more adjacent cells.
Apply shades and borders to cells and their relevance to formatting a worksheet.
2. Present the outcomes of your discussion with the entire class.

ANSWERS

1. Answers will vary. Some suggestions are given below.
Centre align text in a worksheet: Create a heading.
Wrap text in a cell: If there is a lot of text in a cell, wrapping the text shows all the text without it overflowing to other cells.
Merge two or more adjacent cells: Indicate that a heading applies to two or more adjacent cells.
Apply shades and borders to cells and their relevance to formatting a worksheet: Borders and shading are useful for showing separate sections of the worksheet in a clear, easy-to-read way, such as a financial worksheet that separates income and expenditure with different borders and shading.

Assessment:

Walk around, checking that all learners are engaged and comfortable with the formatting features taught. Notice who is struggling and what is needed to resolve their difficulties. Review the spreadsheets to assess learners' ability to interpret and organise information, and to apply that information to solve a problem.

Plenary:

View groups' answers and ask them to comment on the effectiveness of the changes. Ask the learners to suggest other ways to make the spreadsheet more reader-friendly, for example using a thousand place separator to make the numbers easier to read.

LEARNERS

In your group, practise applying formatting changes to the spreadsheet *Activity 2.22_Formatting cells.xlsx*.

ANSWERS

Some of the learners' choices may vary, for example colour of lines or position of alignment, but should broadly represent the spreadsheet on the right.

	A	B	C	D	E	F
1	Fun and Entertainment World					
2	First					
3	Quarterly					
4	report					
5						
6	Branch	January	February	March	Total	% of Total
7	Accra	994714	863086	763335		
8	Tamale	454178	462652	201806		
9	Cape Coast	912237	919169	72581		
10	Takoradi	251688	91314	533189		
11	Kumasi	989568	284487	689881		
12	Tema	488979	288772	139382		
13	Obuasi	93456	107254	692258		
14	Koforidua	54730	242909	783150		

Activity 2.23: Individual/Pairs

Purpose:

Demonstrate how to adjust margins and set page orientation.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Show the ability to visualise alternatives, see possibilities and identify problems and challenges. (Core competencies DL5.1 and CI5.4)

Resources:

- Learner's Book pages 126–130
- *Activity 2.23_Excel pages.xlsx*

Teacher:

Guide the learners through the HOW TO? features on adjusting margins and page sizes. Give the learners time to practise the skills themselves. Walk around and offer assistance where needed.

LOW RESOURCES SCHOOLS

1. State the default settings for the following features in Excel:
 - a. Page orientation
 - b. Displaying worksheet in different views.
2. Sketch the page orientation setting for Excel on a piece of paper.
3. What does it mean to adjust the margins of a worksheet?

ANSWERS

1.
 - a. Portrait
 - b. Normal
2. Learners should sketch a landscape page.
3. You can adjust the margins to add space around your worksheet data.

Assessment:

Move around while the learners are completing the activity and informally assess how they explain the process to their peers. Review the spreadsheets to assess the learners' ability to interpret and organise information and consider options to successfully carry out instructions.

Plenary:

Ask the class to explain the difference between portrait and landscape layouts. Ask them how they can find out a spreadsheet's page orientation and margin settings.

LEARNERS

You are going to work individually to adjust the margins and change page orientation ready for printing, then demonstrate to your partner how you did it. Read through the questions in the Learner's Book. Ask your teacher if anything is unclear. During the feedback session, check that your answers are accurate. Make corrections if necessary.

ANSWERS

In Portrait orientation with Narrow margins, the printer margin will appear as a dotted line after Column H.

Activity 2.24: Individual

Purpose:

Demonstrate how to set up a header and a footer.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 130–131
- Learners' saved versions of *Activity 2.23.xlsx*

Teacher:

Use the steps in the Learner's Book to guide the learners through adding headers and footers to a worksheet. Give them time to explore the various options themselves.

LOW RESOURCES SCHOOLS

Name two features where the elements of a header and footer are displayed or made visible to the user.

ANSWERS

Headers and footers are only displayed when you are in Page Layout view or Print Preview.

Assessment:

While learners show their work to their peers, informally assess if they were able to apply the information learnt to successfully carry out instructions.

Plenary:

Ask learners to suggest a reason for using headers and/or footers. (If you intend printing a spreadsheet, headers and footers are useful.) Ask them what header/footer they would suggest for a summary of a school club's budget.

LEARNERS

Recall the file you saved from Activity 2.23. Follow the steps in the Learner's Book. Ask your teacher if anything is unclear. During the feedback session, check that your answers are accurate. Make corrections if necessary.

Learner's name
Activity 2.24

2021/06/01 14:13

1

Activity 2.25: Individual

Purpose:

Demonstrate the use of the AutoFill function.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 132–134
- *Activity 2.25_Autofill.xlsx*

Links:

Video: How to use the Autofill function (3:45 minutes)

https://www.youtube.com/watch?v=DvtBEL5_Skw

Teacher:

If possible, use the link to show a video of how to use the AutoFill function. Guide the learners through the HOW TO? box; give them time to practise each type of AutoFill before moving on to the next type. Walk around while the learners complete the activity. Note which learners are struggling and offer assistance.

LOW RESOURCES SCHOOLS

1. Explain the AutoFill function in Excel.
2. State two advantages associated with using AutoFill function.
3. Outline the steps for using the AutoFill function using a specific example.

ANSWERS

1. AutoFill can save you time by automatically filling a series of cells once you have entered the first two numbers in the series.
2. AutoFill saves you time. You can use it to automatically fill series of numbers such as dates, days, months or headings.
3. To AutoFill dates, enter a date into cell A1. In A2, enter the date of the following day. Select A1 and A2 and drag the fill handle down to A10. The dates of the consecutive days will appear in the cells.

Assessment:

Review the learners' spreadsheets, particularly of those learners who you noticed struggled to complete the task. Informally assess the learners' abilities to interpret and organise information and use it to solve problems.

Plenary:

Ask a few key questions related to AutoFill, such as:

- Identify the fill handle.
- If you want to AutoFill a range of numbers, how many numbers must you enter?
- How can AutoFill help a shop owner save time when creating a spreadsheet to record his daily sales?

LEARNERS

Open the spreadsheet *Activity 2.25_Autofil.xlsx*. Read through the questions in the Learner's Book. Ask your teacher if anything is unclear. During the feedback session, check that your answers are accurate. Make corrections if necessary.

ANSWERS

Note: The answer does not include the correct day for January 1 of any particular year. The unused cells in the calendar have not been shaded out.

Learner's name							Activity 2.25						
	January	February	March	April	May	June		July	August	September	October	November	December
Monday	1		1							1			
Tuesday	2		2			1				2			
Wednesday	3		3			2				3			
Thursday	4	1	4	1		3				4			
Friday	5	2	5	2		4				5			
Saturday	6	3	6	3	1	5				6			
Sunday	7	4	7	4	2	6			1	7			
Monday	8	5	8	5	3	7			2	8			
Tuesday	9	6	9	6	4	8			3	9			
Wednesday	10	7	10	7	5	9			4	10			
Thursday	11	8	11	8	6	10			5	11			
Friday	12	9	12	9	7	11			6	12			
Saturday	13	10	13	10	8	12			7	13			
Sunday	14	11	14	11	9	13			8	14			
Monday	15	12	15	12	10	14			9	15			
Tuesday	16	13	16	13	11	15			10	16			
Wednesday	17	14	17	14	12	16			11	17			
Thursday	18	15	18	15	13	17			12	18			
Friday	19	16	19	16	14	18			13	19			
Saturday	20	17	20	17	15	19			14	20			
Sunday	21	18	21	18	16	20			15	21			
Monday	22	19	22	19	17	21			16	22			
Tuesday	23	20	23	20	18	22			17	23			
Wednesday	24	21	24	21	19	23			18	24			
Thursday	25	22	25	22	20	24			19	25			
Friday	26	23	26	23	21	25			20	26			
Saturday	27	24	27	24	22	26			21	27			
Sunday	28	25	28	25	23	27			22	28			
Monday	29	26	29	26	24	28			23	29			
Tuesday	30	27	30	27	25	29			24	30			
Wednesday	31	28	31	28	26	30			25	31			
Thursday				29	27				26				
Friday				30	28				27				
Saturday					29				28				
Sunday					30				29				
Monday					31				30				
Tuesday									31				

Activity 2.26: Individual

Purpose:

Demonstrate how to create formulas.

Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Show the ability to combine information and ideas from several sources to reach a conclusion. (Core competencies DL5.1 and CP5.1)

Resources:

- Learner's Book pages 134–137
- Activity 2.26_Formula.xlsx*

Teacher:

Use the steps in the Learner's Book to explain how to do simple calculations in Excel. If you think the class needs more practice, give them the class list and ask them to calculate the number of boys, number of girls, number of learners whose surnames begin with N, etc.

LOW RESOURCES SCHOOLS

The spreadsheet below is an invoice prepared by VEHARO Computers for the supply of computers and accessories to your school. Study the worksheet carefully and use it to answer the questions that follow:

ITEM DESCRIPTION	QUANTITY	UNIT PRICE (GH¢)	TOTAL COST
Digital camera	2	800.00	1,600.00
SD cards	4	80.00	
Pen drives	10	60.00	600.00
Desktop computers	5	2,500.00	12,500.00
Laptops	6	1,450.00	
Projectors	3	960.00	2,880.00
HDMI cable	35	160.00	
External hard drives	2	300.00	600.00
Multimedia speaker	1	600.00	600.00
TOTAL			33,400.00
VAT (3%)			
	Transport		500.00
GRAND TOTAL			

- State the Excel formula to calculate the total cost of the following items:
 - SD cards
 - Laptops
 - HDMI cable.
- Generate an Excel formula to determine the value for the VAT.
- Generate an Excel formula to calculate the Grand Total of the invoice.

ANSWERS

- `=B3*C3`
 - `=B6*C6`
 - `=B8*C8`
- `=D11*103/100`
- `=D11+D13*103/100 ?`

Assessment:

Move around and informally assess the learners' confidence working with formulas. Review the spreadsheets to assess learners' ability to interpret and organise information and combine information from several sources to successfully carry out instructions.

Plenary:

Ask the learners to name the keyboard symbols used for add, subtract, multiply and divide.

LEARNERS

Open the file called *Activity 2.26_Formula.xlsx*. Read through the questions in the Learner's Book. Ask your teacher to explain if anything is unclear. During the feedback session, check that your answers are accurate. Make corrections if necessary.

ANSWERS

	A	B	C	D	E	F	G	H	I
2	Animal species in Ghana								
3		Different Species	27,88						
4	Amphibians and reptiles	221							
5	Mammals	225	3	222					
6	Total	446							
7									
8									
9									
10									
11	Protected Areas								
12	National parks	7							
13	Resource reserves	6							
14	Wildlife sanctuaries	2							
15	Nature reserve	1							
16	Total	16							
17									
18	Elephants in Mole National Park		401						
19	Sq kilometres for each elephant		0,08						
20			32,08						
21									

	A	B	C	D
2	Animal species in Ghana			
3		Different Species	=B6/B16	
4	Amphibians and reptiles	226		
5	Mammals	225	3	=B5-C5
6	Total	=B4+B5		
7				
8				
9				
10				
11	Protected Areas			
12	National parks	7		
13	Resource reserves	6		
14	Wildlife sanctuaries	2		
15	Nature reserve	1		
16	Total	=B12+B13+B14+B15		
17				
18	Elephants in Mole National Park		401	
19	Sq kilometres for each elephant		0,08	
20			=C18*C19	
21				

Remedial activities

The following activities are suitable for learners who need more practice with some of the skills.

1. Open the Strand 2 Extra activity 1_Mount Kilimanjaro word processing file.

a. Format the heading text 'Mount Kilimanjaro, Tanzania' as follows:

- Increase the font size to 16.
- Remove the shading.
- Centre the heading.

- b. Change the bulleted list below the image to a numbered list.
 - c. Indent the first paragraph 2 cm from the left.
 - d. Use a word processing feature to replace the word 'attempt' with another appropriate word.
 - e. Find the paragraph starting with 'People who ...' and ending with '... and headaches.' Apply a paragraph border of your choice to the paragraph.
 - f. Insert the number of words that the document contains at the end of the document.
2. Open the word processing document Strand 2 Extra activity 2_Serengeti National Park. Use the document to create a presentation as follows:
- Create a planning document.
 - Select an appropriate theme for your presentation.
 - Use at least two different slide layouts.
 - Use a text box.
 - Use at least two images.
 - Use a table.
 - Use a WordArt.
 - Use a special character.
 - Use borders and shading.
- Save the presentation as Strand 2 Extra activity 2 Serengeti.
3. Open the Clients spreadsheet document.
- a. Format row 1 as follows:
 - Merge cells A1:K1.
 - Apply a thick blue border.
 - Apply a light green shading.
 - Align the data in the cells both horizontally and vertically
 - b. The client booking reference numbers (column A) will appear as X1238, X1239, X1240, etc. Use a spreadsheet to complete the client booking reference number in column A.
 - c. Remove the shading from cell E4.
 - d. Insert a formula in cell F5 to calculate the cost of the stay using the number of days the client will stay (column E) and the rate per day (column J).
 - e. Format column F to display as currency. Display the currency symbol.
 - f. The total cost (column L) for each client is calculated by adding the accommodation cost and the tourism levy. Insert a formula in column L to determine the total cost for each client.
 - g. Change the page orientation to landscape.
 - h. Add your name to the worksheet header.

ANSWERS

1. Word processing:
 - a. Format heading: 'Mount Kilimanjaro, Tanzania':
 - Font size: 16
 - Shading: Removed
 - Alignment: Centre
 - b. Bulleted list changed to Numbered list
 - c. Paragraph: Indent: left: 2 cm
 - d. Synonym: 'attempt' – accept: challenge, try or effort
 - e. Paragraph: Border added
 - f. Total words added to end of document using the word count on the status bar

2. Presentation:

- Planning document created
- Appropriate theme selected
- At least two different layouts selected
- A text box is used appropriately
- At least two images added
- A table created
- WordArt used
- Special characters used
- Borders and shading used

3. Spreadsheet:

a. Format Row 1:

- Cells A1:K1 merged
- Thick blue border applied
- Light green shading applied
- Data aligned vertically and horizontally

b. Autofill cells A6:A54 using cells A4:A5

c. Shading removed from cell E4

d. Cell F5:=E5*J5

e. Format Column F:

- Currency
- Currency symbol inserted

f. Column L:

- Cell L4: =F4+G4
- Formula copied to rest of cells

g. Page orientation changed to landscape

h. Name inserted in worksheet header

ANSWERS

1. a. WordArt applied to heading 'Victoria Falls'
- b. Find and Replace: Zimbabwe:
Find: Zimbabwe.
Replace: Zimbabwe in red font and in italics
- c. Paragraph formatting:
Alignment: Justify
Line Spacing: 1.15 cm
- d. Table:
Merge: Cells in row 1
Text 'Summary of Facts' moved to row 1
Inner gridlines: width of 1.5 pt
2. Assess the presentation with the aid of the checklist below.

Action	✓	✗
The presentation has seven slides.		
Content is accurate.		
A theme is applied.		
The presentation has introductory and conclusion slides.		
At least two different slide layouts are used.		
WordArt text is used.		
There is a footer with an automatically updated date and slide numbers.		
A special character is included.		
A text box is used.		
At least two images are used.		
A table is used.		
A word is translated into another language.		
The presentation is free of spelling errors.		

3. a.
 - Column A: number
 - Column D: text
 - Column H: number
 - Column I: number
 - Column J: formula
 - Column K: text
 - Column B: number
- b. The border style may vary, but other changes to cells A1:L1 are shown on the next page.
- c. The shading may vary, but other changes to cells A1:L1 are shown on the next page.
- d. The border style may vary but must be applied to cells A3:L23.
- e. Refer to the example on the next page.

Check your progress

	A	B	C	D	E	F	G	H	I	J	K	L
1	Employees Details for Star Company											
2												
3	Pay Code	Region Code	Employee No.	Name	Job Title / Grade	Grade	Region	Salary	Increase %	Total	Birth Date	Start Date
4	163016	13	3016	Esi	RECEIVING MANAGER BL	BL	Central Region	R 5 500,00	0,6876074	3781,84	01/07/55	1973/01/15
5	123012	10	3012	Dodzi	RECEIVING MANAGER BL	BL	Volta	R 7 172,00	0,0813756	583,63	17/08/57	1984/09/24
6	123010	11	3010	Aku	ALLOCATOR-CLOTHING BU	BU	Accra	R 7 500,00	0,2003281	1502,46	22/12/70	1994/01/17
7	113002	12	3002	Akoto	SENIOR RECEIVING MANAGER BU	BU	Ashanti	R 8 000,00	0,1671345	1337,08	02/04/44	1977/09/26
8	153020	12	3020	Abena	SENIOR RECEIVING MANAGER BU	BU	Ashanti	R 8 500,00	0,8806738	7485,73	27/09/67	1971/01/21
9	133005	14	3005	Kareem	MANAGER-PERISHABLES CL	CL	Northern	R 7 500,00	0,5127895	3845,92	07/09/59	1993/05/10
10	103003	12	3003	Ntim	MANAGER-PERISHABLES CL	CL	Ashanti	R 7 600,00	0,0404072	307,09	28/04/57	1978/02/01
11	113014	10	3014	Fafali	MANAGER-PERISHABLES CL	CL	Volta	R 7 750,00	0,3624039	2808,63	06/08/52	1977/03/09
12	103006	13	3006	Araba	MANAGER-FRUIT&VEG CL	CL	Central Region	R 8 500,00	0,9294049	7899,94	13/12/72	1993/05/10
13	103001	13	3001	Yoofo	MANAGER-BAKERY CL	CL	Central Region	R 8 650,00	0,8134015	7035,92	22/06/50	1977/04/01
14	113009	12	3009	Asare	MANAGER-BAKERY CL	CL	Ashanti	R 8 860,00	0,1516226	1343,38	05/04/70	1990/12/01
15	133019	13	3019	Essiam	OFFICE SUPERVISOR CL	CL	Central Region	R 9 500,00	0,9192142	8732,53	26/10/49	1988/02/01
16	133011	12	3011	Serwaa	SUPERVISOR CREDITORS CL	CL	Ashanti	R 9 600,00	0,6887705	6612,20	11/02/60	1984/02/06
17	123004	10	3004	Selorm	CO-ORDINATOR-DELI CU	CU	Volta	R 11 700,00	0,9520931	11139,49	12/03/45	1978/10/01
18	103013	12	3013	Afia	ASSISTANT STORE MANAGER CU	CU	Ashanti	R 12 000,00	0,2608976	3130,77	31/12/56	1985/08/01
19	153007	13	3007	Efua	ASSISTANT STORE MANAGER CU	CU	Central Region	R 12 500,00	0,6493397	8116,75	05/11/53	1981/01/02
20	163008	12	3008	Nimo	CO-ORDINATOR-FRUIT&VEG CU	CU	Ashanti	R 14 500,00	0,3696314	5359,66	12/01/67	1993/05/10
21	123018	10	3018	Setor	STORE MANAGER DL	DL	Volta	R 16 500,00	0,0417929	689,58	26/05/54	1975/04/04
22	163015	11	3015	Adjaley	STORE MANAGER DL	DL	Accra	R 18 500,00	0,9640890	17835,65	22/05/70	1993/10/01
23	103017	10	3017	Yayra	REGIONAL MANAGER DU	DU	Volta	R 29 500,00	0,8183159	24140,32	28/05/59	1976/12/01

Strand 3: Communication Networks

THIS RESOURCE WILL PROVIDE INFORMATION FOR THE TEACHER SURROUNDING EACH OF THE ACTIVITIES IN THE LEARNER'S BOOK.

For each activity, there will be:

- The number of the activity, its purpose, and how it benefits the learners
- A list of resources
- links to websites and videos needed for the activity, including the length of each video
- Explanation for the teacher on how the activity could be altered or further developed
- and some notes on how to carry out some of the steps requested of the learners
- Notes about how the activity can be assessed as well as suggestions for a plenary when the activity is complete
- The contents of the activity for the learners
- The answers or expected outcome for the activity.

Sub-strand 1: Computer networks

Activity 3.1: Group

Purpose:

Recognise the different hardware components of a computer network and analyse different points of view during the group work session.

Exhibit strong memory, intuitive thinking and respond appropriately. Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CI6.1 and DL5.1)

Resources:

- Learner's Book pages 141–144
- Examples of the various network hardware components (these can be old components that no longer work)
- Visible examples of network components around the school

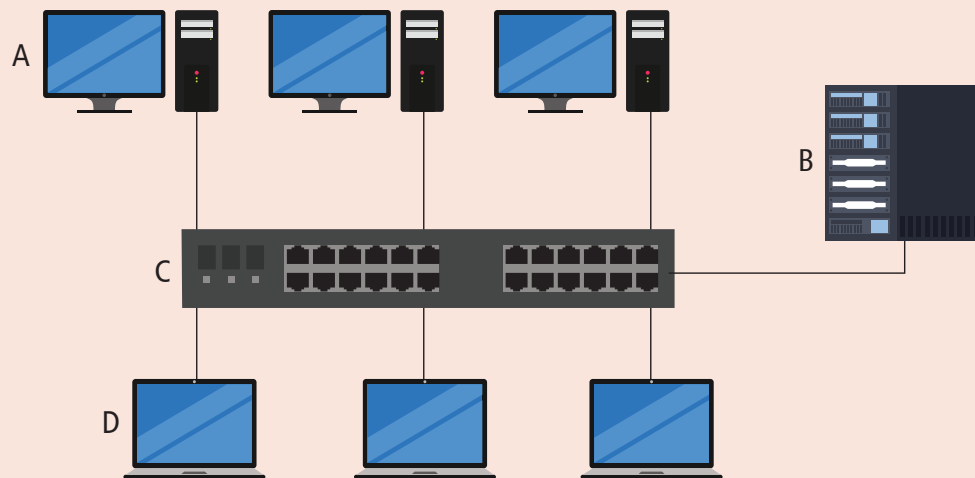
Teacher:

It is always better for a learner to see, and preferably handle, actual examples of computer components. Learners are more likely to retain knowledge when they are able to visualise objects. The network components are most likely completely unfamiliar to many of the learners, so be sure to take the necessary time so that they can become familiar with each of the items and their function in a network. The learners should make brief notes to identify the components to help them remember each one.

During group work sessions, it may be necessary to encourage some learners to put forward their ideas, and to discourage others from coming up with all the ideas. Each group must answer the questions posed in this activity. Remember that this is an introduction to the components and the facilities available at school.

LOW RESOURCES SCHOOLS

St. Michael Junior High School in Donkorkrom has a network with the setup shown in the diagram below. Join your group and study the network setup as you prepare to answer the questions that follow.



1. Identify the hardware components in the network labelled A, B, C and D.
2. Discuss the functions of the hardware components labelled B and C in the network setup.
3. Present your responses to the class for assessment.

ANSWERS

- A. Desktop computer
- B. Network server: provides network services such as security, file sharing, and communication services, such as email and internet access to the client computers.
- C. Network switch: Network cables from the computers in the network connect to the switch. The switch, in turn, connects to the server.
- D. Laptop computer

Assessment:

Move around during the group work session to make sure that all learners are engaged. Check in with random learners to see if they can identify specific network components.

Plenary:

Keep examples of the network components visible – you can put out large card labels to identify each one. Give the learners two minutes to memorise them in groups or pairs. Remove the label cards and then check to see which group can identify the most components and remember their functions correctly.

LEARNERS

View examples of the main hardware components used in a computer network. Have a group discussion about each component and the role it plays in the network. You need to be observant to see how many of the components listed in the Learner's Book are visible in your classroom or in other places around the school.

ANSWERS

Each group may produce different answers, depending on what they are able to observe. The correct answers depend on the setup at your particular school.

1. The answer depends on whether the computers at your school are connected to a network.
2. The answer can be either a client-server network or a peer-to-peer network or none, depending on the setup at your school.
3. If the school has a client-server network, the location of the server will differ. It could be in the classroom or in a separate room or office.
4. Learners must correctly identify a switch or hub and a network cable (note that hubs are old technology and are probably not in use anymore with switches being the preferred technology).

Activity 3.2: Group

Purpose:

Recognise the different hardware components of a computer network and analyse different points of view during the group work session.

Exhibit strong memory, intuitive thinking and respond appropriately. Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CI6.1 and DL5.1)

Resources:

- Learner's Book pages 141–144
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Link:

Video: Computer network components (3:47 minutes)

<https://www.youtube.com/watch?v=6YBDZmLuRLA>

Teacher:

This activity highlights the differences between a hub, switch and router. Note that hubs are fairly old technology and are not likely to be found in a modern computer network. Allow the learners to watch the video in the link above.

Assessment:

Each learner should understand the difference between the roles played by a hub, switch and router.

Plenary:

Ask learners to explain the difference between the roles played by a hub, switch and router in a computer network. Start by asking what role each device plays, and then explore the differences between their roles in the network.

LEARNERS

- Watch the video and make notes about the different roles played by a hub, a switch and a router in a computer network.
- Compare your answers with those of other members in the group and decide on the most correct answers.

ANSWERS

- A hub provides a connecting point for the cables from all the devices on a network and transmits data between all devices connected to it.
- A switch is a device that the network cables from the computers in a network connect to. The switch can strengthen network signals and is capable of directing signals to the correct device to some degree.
- A router can allow communication between different types of networks and is used to connect a network to the internet.

Activity 3.3: Individual

Purpose:

Explain network topologies, discuss the features of each network topology, and be able to present in groups diagrams of well-elaborated network topologies.

Exhibit strong memory, intuitive thinking and respond appropriately. Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CI6.1 and DL5.1)

Resources:

- Learner's Book pages 144–147
- Sheets of A4 paper for each learner to draw the different network topologies
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Link:

Video: Network topologies (8:57 minutes)

<https://www.youtube.com/watch?v=zbqrNg4C98U&t=92s>

Teacher:

Learners will need time to watch the video clip and make notes as they watch. The first 6.5 minutes are the most important to watch. If time is limited, you can stop the video at this point.

Assessment:

Move around the class while the learners are busy and check that every individual understands the layout and main benefits of each of the four main network topologies. Check the diagrams as the learners are drawing and give guidance where necessary.

Plenary:

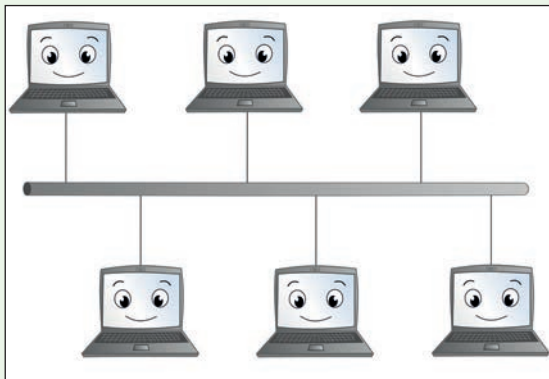
Put up examples of each of the topologies or draw them on the board. Have each learner check that their drawings are correct.

LEARNERS

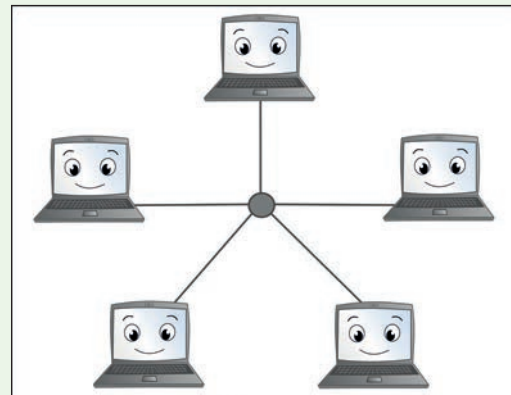
- Watch the video.
- Draw and clearly label each of the four main network topologies – bus, star, ring and mesh – without looking in the Learner's Book.
- Check that your drawings are correct by comparing them with those in the Learner's Book.

ANSWERS

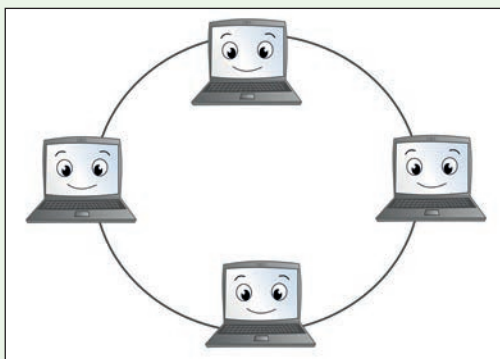
Drawings may vary, but they should look similar to the ones shown below.



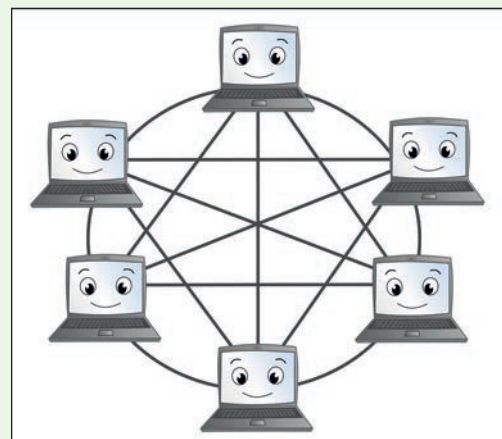
Bus topology



Star topology



Ring topology



Mesh topology

Activity 3.4: Group

Purpose:

Explain network topologies, discuss the features of each network topology, and be able to present in groups diagrams of well-elaborated network topologies.

Exhibit strong memory, intuitive thinking and respond appropriately. Show the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CI6.1 and DL5.1)

Resources:

- Learner's Book pages 144–147

Teacher:

The learners need to think critically about the statement and clearly distinguish between the features and advantages of a star topology. Allow sufficient time for them to discuss the statement in their groups and to make their own notes.

Assessment:

Walk around during the group discussions and ensure that all learners are participating and giving their input. Encourage those who are holding back to participate.

Plenary:

Get feedback from each of the groups. Explain any misunderstandings to ensure that each learner has a comprehensive understanding of the star topology and why it is such a popular choice for most networks.

LOW RESOURCES SCHOOLS

Work in groups.

1. Select any one of the network topologies discussed.
2. Draw the diagram of the topology chosen on a manila card.
3. Discuss the strengths and weaknesses of your topology.
4. Present your responses to the class while your diagram is posted on the board.

ANSWERS

Diagrams will vary, but should resemble those on pages 144–146 of the Learner's Book.

Bus topology advantages:

- Uses only a small number of network cables, so it is relatively cheap to set up.
- It is easy to set up.
- It is easy to add more computers or other network devices to the network.

Bus topology disadvantages:

- If the backbone cable is damaged, the whole network stops working.
- It is difficult to troubleshoot when there is a physical error on the network.
- Because all the network signals and data travel through the same cable, the network slows down when there is a lot of network traffic.
- There is a limit to how long the backbone cable can be. This limits the size of the network and the number of computers that can be connected to it.

Star topology advantages:

- Each computer has its own cable running to the switch, so it is easy to troubleshoot.
- If one cable is damaged, only the computer connected to that cable is affected.
- It is relatively easy to set up.
- It is easy to add another computer or device, as long as there is space on the switch.
- It is easy to troubleshoot.

Star topology disadvantages:

- If the switch is damaged or stops working, all communication between the computers stops.
- The performance of the network depends on the speed of the switch.

- It uses more cable than a ring or bus topology, so is more expensive to set up. The cost of the switch also adds to the setup costs.

Ring topology advantages:

- It is relatively easy to install.
- It is easy to add another computer or device.
- It is relatively cheap to install as no switch is required and only a small amount of cable is needed.

Ring topology disadvantages:

- If the main cable is damaged, the whole network will stop working.
- The network will be disrupted when a new device needs to be added as the ring will be broken.
- The network could slow down if there is a lot of traffic as all signals and data travel along a single cable and are sent to every computer on the network.

Mesh topology advantages:

- The dedicated connection between two devices leads to greater security when communication takes place.
- There is no issue with network traffic volume as communication takes place directly between two devices.
- The network is reliable and robust.
- It easy to troubleshoot this kind of network.

Mesh topology disadvantages:

- It requires a large amount of cabling and so can be costly.
- Laying the cabling is complex.
- Planning the network is complex.
- Each computer or device needs multiple network ports so that it can connect to every other device.
- The size of the network is limited by the number of connections that will be required between all the computers.

LEARNERS

- In your group, discuss the features of a star topology. Make notes for yourself.
- Appoint someone in the group to give feedback in a class discussion.
- Improve your notes by adding relevant points from other groups' feedback.

ANSWERS

1. The star topology is one of the most commonly used network topologies, so there is a big knowledge base to draw from.
It is relatively easy to set up.
2. Each computer has its own cable running to the switch, so it is easy to troubleshoot.
If one cable is damaged, only the computer connected to that cable is affected.
It is relatively easy to set up.
It is easy to add another computer or device, as long as there is space on the switch.
It is easy to troubleshoot.
3. If the switch is damaged or stops working, all communication between the computers stops.

Activity 3.5: Group

Purpose:

Describe types of networks – Personal Area Network (PAN), Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Network (WAN).

Be open-minded, adapt and modify ideas to achieve creative results. Demonstrate the ability to construct knowledge from a non-linear hypertextual navigation. (Core competencies CI6.6 and DL5.4)

Resources:

- Learner's Book pages 147–149
- A large piece of paper, such as an A3 sheet of newsprint, and a marker pen per group
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Link:

Video: Network types (4:55 minutes)

https://www.youtube.com/watch?v=4_zSIXb7tLQ&t=75s

Teacher:

The learners will work in groups to watch the video clip and make notes on each network type. It should be noted that some of the network types named in this clip are not part of this syllabus, but are interesting to note for enrichment – for example, Campus Area Network (CAN) and Storage Area Network (SAN).

Assessment:

Walk around and check that each learner is engaged in watching the video and making their own notes about each network type. Ensure that all learners are equally involved in the group discussion. Assessment is informal, through observation of learner involvement in the group discussions and informal questioning during the session.

Plenary:

Get a description of each of the different network types from each of the groups and write them on the board (or get a member of each group to write the description on the board or a sheet of newsprint). Assign a network type per group to write up and display. Discuss and note any improvements that are needed on the board or poster. Ensure that all learners have taken down the correct summary.

LEARNERS

- In groups of four or five, watch the video clip provided and make individual notes on each network type. The CAN and SAN discussed in the video are for enrichment purposes only. Hold a group discussion on each of the network types and agree, as a group, on a definition of each network type. Ensure that you have the definitions written down.
- The teacher will allocate a specific network type to your group. Choose one member to write the definition for this network type on the board or sheet of newsprint.
- Take part in the final discussion and ensure that you have the correct definitions written down.

ANSWERS

- LAN: A local area network or LAN is a network limited to a particular building or campus, such as a school, college or university.
- PAN: A personal area network or PAN is created when a person connects all their devices to each other to form a small network for their personal use.
- MAN: A metropolitan area network or MAN is a network that extends across a city or town. It often consists of a number of LANS that are connected to each other using a secure internet connection.
- WAN: A wide area network or WAN is a network that extends over a large geographical area, such as several cities or towns, a country or even across several companies. The parts of a WAN are often connected to each other using a secure internet or satellite connection.
- WLAN: A wireless local area network or WLAN is a LAN where the devices are linked wirelessly to the network.

Activity 3.6: Individual

Purpose:

Describe types of networks – Personal Area Network (PAN), Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Network (WAN).

Be open-minded, adapt and modify ideas to achieve creative results. Demonstrate the ability to construct knowledge from a non-linear hypertextual navigation. (Core competencies CI6.6 and DL5.4)

Resource:

- Learner's Book pages 147–149

Teacher:

The learners work on their own to complete the questions, based on their knowledge from the previous activity and the content in the Learner's Book.

Assessment:

Each learner's answers need to be checked for correctness.

Plenary:

Make sure that you identify anything that is not clear to the learners by asking for reasons for their choice of answer. Explain where they are unsure.

LEARNERS

Work on your own, using your knowledge from the previous activity and the video clip you watched in Activity 3.5, as well as the content in the Learner's Book.

ANSWERS

1. LAN: small network limited to a single building. OR WLAN: if these devices are all wirelessly connected, then this would be a wireless LAN.
2. WAN: the offices are spread across the globe and not limited to a single building.
3. LAN: small network limited to a single building.

Activity 3.7: Individual

Purpose:

Describe types of networks – Personal Area Network (PAN), Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Network (WAN).

Be open-minded, adapt and modify ideas to achieve creative results. Demonstrate the ability to construct knowledge from a non-linear hypertextual navigation. (Core competencies CI6.6 and DL5.4)

Resources:

- Learner's Book pages 147–150

Teacher:

The learners work on their own to complete the questions based on their knowledge from the previous activity and the content in the Learner's Book.

Assessment:

Each learner's answers must be checked for correctness.

Plenary:

Make sure that you identify anything that is not clear to the learners by asking for reasons for their choice of answer. Explain where they are unsure.

LEARNERS

Work on your own using your knowledge from the previous activity and the video clip you watched in Activity 3.5 as well as the content in the Learner's Book.

ANSWERS

1. This is not a peer-to-peer network. It is a server-based network. The server is clearly labelled in the diagram.
2. LAN – limited in size and does not consist of a network of personal devices.
3. Switch: all the network devices are connected to it.
4. Router or modem: it connects the network to the internet.

Remedial activity:

Ask learners to review the content in this section and write definitions of the different types of networks in order to consolidate their understanding of the terminology.

Activity 3.8: Group

Purpose:

Discuss the entrepreneurial opportunities in networking computing devices.

Demonstrate the ability to construct knowledge from a non-linear hypertextual navigation. (Core competency DL5.4)

Resources:

- Learner's Book pages 150–152

Teacher:

Discuss the benefits of having a network, especially in the school context. Share the challenges that can come with the use of a network as well. Let the learners work in small groups to discuss the benefits that a network holds for a school.

Assessment:

Walk around the class, checking that all group members are involved. Encourage those who are holding back to participate and give their ideas. Informal assessment will take place through the feedback from each group.

Plenary:

Write the ideas from each group on the board. Use a class discussion to arrive at a final list of benefits. Ensure that each learner has taken down a summary of the correct list of benefits.

LEARNERS

Take part in a group discussion about computer networks at school.

ANSWERS

Answers will vary, but could include the following:

- Teachers can easily access computerised learner records if they are captured on a centralised system.
- Teachers can easily share lesson plans and worksheets with each other.
- Teachers can email each other internally to send and receive tasks and reminders.
- If the network is connected to the internet, teachers and the support staff can:
 - Use email to communicate with parents.
 - Use email to communicate with teachers at other schools to share ideas, subject notes and worksheets.
 - Use email to communicate with education officials.
 - Do research on the internet for lesson material.
 - Do online professional development courses.
- Learners can:
 - Easily take computing as a subject and access files required for various activities.
 - Use a shared internet connection to do research for projects and assignments.

Activity 3.9: Group

Purpose:

Discuss the benefits and challenges of networking in different environments (school, business, health). Identify different environments where the various types of networks can be applied. Demonstrate the ability to construct knowledge from a non-linear hypertextual navigation. (Core competency DL5.4)

Resources:

- Learner's Book pages 152–153

Teacher:

Discuss the benefits of having a network in business and health environments. Share the challenges that can come with the use of a network as well.

Let the learners work in small groups to discuss the benefits that a network holds for various environments other than a school, business or health facility.

Assessment:

Walk around the class, checking that all group members are involved. Encourage those who are holding back to participate and give their ideas. Informal assessment will take place through the feedback from each group.

Plenary:

Write the ideas from each group on the board. Use a class discussion to arrive at a final list of environments and benefits. Ensure that each learner has taken down a summary of the correct list of benefits in a variety of environments.

LEARNERS

- Work in your group to discuss other environments where various types of networks could be used. Name two or three benefits that a network would have in each of the environments you identify. Arrive at a final list of environments and the benefits of a network in that environment in your group.
- Make sure that you have made notes of the final list after the class discussion.

ANSWERS

The answers will vary, and must be evaluated and improved if necessary. Use input from the entire class to make any modifications to the answers provided. Possible examples:

- Computer network in a government department:
 - Easy central access to records, leading to better service delivery
 - Records can be updated in real time by more than one employee at a time.
- Computer network used by an airport:
 - Centralised access to real-time information on flights, their estimated arrival times and departure times
 - Access to information on all aeroplanes in the airspace of the airport to ensure their flight safety by the control tower
 - Access to weather information to help manage flights and safe landings.

- Computer network on a modern farm:
 - Access to crop information
 - Control over automated irrigation systems to ensure the effective use of water without wastage
 - Access to advance weather information to ensure the best planting times and to help protect the harvest for maximum yield.

Activity 3.10: Group

Purpose:

Identify the business aspect of networking and how networks can be turned into a lucrative business. Demonstrate the ability to construct knowledge from a non-linear hypertextual navigation. (Core competency DL5.4)

Resources:

- Learner's Book page 154

Teacher:

Discuss the business opportunities presented by a network.

Let the learners work in small groups to discuss the business opportunities presented by the use of a network and instruct them to identify a business opportunity, other than the ones presented in the Learner's Book.

Assessment:

Walk around the class, checking that all group members are involved. Encourage those who are holding back to participate and give their ideas. Informal assessment will take place through the feedback from each group.

Plenary:

Write the ideas from each group on the board. Use a class discussion to arrive at a final list of entrepreneurial opportunities. Ensure that each learner has taken down a summary of the final list.

LEARNERS

- Brainstorm in your group and identify and explain at least one other business opportunity where a computer network would be used. Arrive at a proposed entrepreneurial opportunity.
- Make sure that you have made notes of the final list after the class discussion.

ANSWERS

The answers will vary and must be evaluated and improved if necessary. Use input from the entire class to make any modifications to the answers provided. Possible examples:

- Use a computer network to start an online business selling local crafts.
- With the increased popularity of online shopping, start a courier service to deliver purchases. Control the division of work and tracking of parcels by using a computer network that will be able to expand as the business grows.

Sub-strand 2: Internet and social media

Activity 3.11: Group

Purpose:

Identify the various types and uses of social media sites such as those for social networking (Facebook, LinkedIn, WhatsApp). Illustrate the use of social networking sites such as Facebook, LinkedIn, WhatsApp, etc. Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Use digital tools to create novel things. (Core competencies CI6.3 and DL6.3)

Resources:

- Learner’s Book pages 155–156
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage

Teacher:

If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Set up a Facebook account that is not your own private one, but one used for academic purposes. The learners will benefit from being taken through the setup process.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners what the social media platform looks like and how it works. Make the screenshots by using the snipping tool or by holding down the ALT key and pressing the PrtScn key (Print screen).

LOW RESOURCES SCHOOLS

1. Discuss the main features of social media platforms.
2. Identify the potential benefits of the use of social media to:
 - an individual
 - a business
 - a school.

ANSWERS

1. Answers will vary. Some suggestions include:
 - An easy way to connect with people all over the world
 - An effective way to stay in touch with news from all over the world
 - Privacy and security must be maintained: users can lose personal information to people with wrong motives.
2. Answers will vary. Some suggestions include:
 - Individual: communication, information sharing
 - Business: communication with customers (advertising)
 - School: communication with learners, staff, parents, the community.

Assessment:

Informally assess each learner’s knowledge of the social media platform through asking informal questions in the class. Where the learners are working in groups to create a login and investigate the social media platform, move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the process.

Plenary:

Check the answers to the activity. Discuss questions and observations that the learners might have about Facebook as a social media platform.

LEARNERS

- You will either observe a demonstration of how to create a login and use Facebook, or you will be working in a group to complete this activity.
- Once you have completed the task of creating a login, answer the activity questions in your groups.

ANSWERS

1. A white lowercase letter f on a blue background
2. Each group will probably have different examples: a text post, a picture post and a video post. Check for correctness.
3. Click or tap on the Like icon that shows a hand with the thumbs-up sign.
4. Type the person's name in the Search Facebook box.
 - Click on their profile.
 - Click on the Add Friend button below their profile photo. Note that some profiles will not show this button as it depends on the person's privacy settings.
 - Many public personality profiles may not have this option, but you can choose to follow them and so see their posts.

Activity 3.12: Group

Purpose:

Identify the various types and uses of social media sites such as those for social networking (Facebook, LinkedIn, WhatsApp). Illustrate the use of social networking sites such as Facebook, LinkedIn, WhatsApp, etc. Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Use digital tools to create novel things. (Core competencies CI6.3 and DL6.3)

Resources:

- Learner's Book pages 156–157
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage
- The link below

Link:

Video: What is LinkedIn and how does it work (4:03 minutes)

<https://www.youtube.com/watch?v=Q3bQN4AaM0g>

Teacher:

If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration. Set up a LinkedIn account that is not your own private one, but one used for academic purposes. The learners will benefit from being taken through the setup process.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners what the social media platform looks like and how it works.

Have the learners watch the video clip in their groups and then answer the questions asked in the activity.

Assessment:

Informally assess each learner's knowledge of the social media platform through asking informal questions in the class. Where the learners are working in groups, move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the process.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about LinkedIn as a social media platform.

LEARNERS

- You will either observe a demonstration of a LinkedIn account or watch the video.
- Once you have watched the demonstration or video, answer the activity questions in your groups.

ANSWERS

1. Job hunting, recruiting staff, making business connections
2. If people are viewing your profile as a possible employee, they need to see you in a professional setting. A casual photograph of you at a party will not create a good first impression.

Activity 3.13: Group

Purpose:

Identify the various types and uses of social media sites such as those for social networking (Facebook, LinkedIn, WhatsApp). Illustrate the use of social networking sites such as Facebook, LinkedIn, WhatsApp, etc. Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Use digital tools to create novel things. (Core competencies CI6.3 and DL6.3)

Resources:

- Learner's Book page 157
- Access to at least two mobile devices with the WhatsApp app installed

Teacher:

If there are not sufficient mobile phones available, this activity can be done as a demonstration.

Should access to at least two mobile phones with WhatsApp installed not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners what WhatsApp looks like and how it works. Taking screenshots on a mobile phone will differ between devices, but it is often done through swiping the side of the hand across the screen. The screen shot is then stored on the phone and you will be able to copy it off the device.

Have the learners watch the demonstration in their groups and then answer the questions asked in the activity.

LOW RESOURCES SCHOOLS

In your various groups, discuss the main forms of communication that are supported by WhatsApp.

1. What are the key differences in features between WhatsApp and the traditional text messaging app on a mobile phone?
2. What are the potential benefits of WhatsApp to learners who are on a group with their teacher?

ANSWERS

1. WhatsApp uses the internet to send messages, while traditional text messages are sent via the cell phone provider. It is therefore much cheaper than other text messaging apps.
2. The teacher can send information via the group, including educational documents and videos. Learners can also ask the teacher questions about work they do not understand.

Assessment:

Informally assess each learner's knowledge of the use of WhatsApp through asking informal questions in the class. Where the learners are working in groups to investigate the social media platform, move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the process. Observe that each learner is able to perform the actions as set out in the activity. You can record this informal assessment on a class list with six columns – one for each of the actions required.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about WhatsApp as a social media platform.

LEARNERS

Practise using WhatsApp to send and receive text messages, voice messages and images.

ANSWERS

All learners should successfully send and receive:

- text messages
- voice messages
- an image.

Activity 3.14: Group

Purpose:

Demonstrate the use of microblogging platforms such as Twitter, Tumblr, etc.

Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Use digital tools to create novel things. (Core competencies CI6.3 and DL6.3)

Resources:

- Learner's Book page 158
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage

Teacher:

If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Set up an X account that is not your own private one, but one used for academic purposes. The learners will benefit from being taken through the setup process.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners what the platform looks like and how it works.

Assessment:

Informally assess each learner's knowledge of the social media platform through asking informal questions in the class. Where the learners are working in groups to create a login and investigate the social media platform, move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the process.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about this microblogging platform.

LEARNERS

You will either observe a demonstration of how to create a login and use the X platform (previously known as Twitter), or you will be working in a group to complete this activity. Once you have completed the task of creating a login, answer the questions in your groups as posed in the activity.

1. What does the X logo look like?
2. Search for an X user – choose a well-known personality such as a sport star.
3. What does the Like button look like?
4. What does the Comment button look like?

ANSWERS

1. It is a black and white capital letter X.
2. Use the search bar to look for the personality.
3. A heart shape
4. A speech bubble

Activity 3.15: Group

Purpose:

Demonstrate the use of microblogging platforms such as Twitter, Tumblr, etc.

Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Use digital tools to create novel things. (Core competencies CI6.3 and DL6.3).

Resources:

- Learner's Book pages 158–159
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage

Teacher:

If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Set up a Tumblr account that is not your own private one, but one used for academic purposes. The learners will benefit from being taken through the setup process.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners what the social media platform looks like and how it works.

Assessment:

Informally assess each learner's knowledge of the social media platform through asking informal questions in the class. Where the learners are working in groups to create a login and investigate the social media platform, move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the process.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about Tumblr as a microblogging platform.

LEARNERS

- You will either observe a demonstration of how to create a login and use Tumblr, or you will be working in a group to complete this activity.
- Once you have completed the task of creating a login, take part in a group discussion of the questions.

ANSWERS

1. A white lowercase letter t on a blue background or the whole name all in lowercase
2. Check to see that each learner is able to search for a profile in Tumblr.
3. A heart shape
4. A speech bubble
5. Two arrows arranged in a square shape

Activity 3.16: Individual

Purpose:

Demonstrate the use of the following features of electronic mail: creating, sending and receiving an email. Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Create and use digital content. (Core competencies CI6.3 and DL6.3).

Resources:

- Learner's Book pages 159–161
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage
- An email account for each learner. These can be set up by the learners themselves using a webmail service, such as Gmail.

Teacher:

If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners what an email application and email message editor looks like.

Assessment:

Informally assess each learner's knowledge of using email by asking informal questions in the class. It is important that every learner masters the skill of using email correctly and efficiently in the process of becoming digitally literate. Check each learner's labelled diagram for correctness.

Plenary:

Go through the correct labels to the diagram of an email message.

LEARNERS

- You will either observe a demonstration of how to use email or you will be working on your own to complete this activity.
- Create an email of your own.
- Draw an email and label its parts.

ANSWERS

- To field: Enter the email address of the recipient.
- Subject field: Enter a short description of what the email message is about.
- Email body: Type the content of the email message here.
- Cc field: Enter the email address of recipients that you want to see the message, but who are not required to act on it or respond. The other recipients will see all email addresses entered in this field.
- Bcc field: Enter the email address of recipients that you want to see the message, but who are not required to act on it or respond. The other recipients will not see any email addresses entered in this field.
- Send button: Sends the email message to the recipients via the internet.
- Attach button: Used to attach files, such as documents and images, to the email message.
- Discard or trash button: Used to delete a message you no longer wish to send or to delete a message once you have read it.

Activity 3.17: Pairs

Purpose:

Demonstrate the use of the following features of electronic mail: creating, sending and receiving an email. Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Create and use digital content. (Core competencies CI6.3 and DL6.3).

Resources:

- Learner's Book pages 162–164
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage
- An email account for each learner. These can be set up by the learners themselves using a webmail service, such as Gmail.

Teacher:

Let the learners work in pairs for this activity so that they can send each other email messages. If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners the steps in sending and receiving an email message.

Assessment:

Informally assess each learner's knowledge through asking informal questions in the class. Check that you have received an email message from each learner in the class. Use the checklist provided to check that each learner has mastered the skills in sending and receiving an email message.

Plenary:

Ask learners in turn to describe the process of sending an email. Let a different learner give you the next step in the process.

LEARNERS

- Work in pairs to send each other an email message.
- Open and read the email you receive.

ANSWERS

Use the following checklist to assess each learner's progress with this activity.

Action	✓	✗
Email address of recipient is entered in the To field.		
Email address of teacher is entered in the Cc field.		
Suitable descriptive subject is added to the email.		
Body of message typed.		
Message has a suitable greeting.		
Message has a suitable ending.		
Message sent successfully.		
Message from partner opened from the inbox.		

Activity 3.18: Pairs

Purpose:

Demonstrate the use of the following features of electronic mail: replying to and forwarding an email. Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Use digital tools to create novel things. (Core competencies CI6.3 and DL6.3)

Resources:

- Learner’s Book pages 164–165
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage
- An email account for each learner. These can be set up by the learners themselves using a webmail service, such as Gmail.

Teacher:

Let the learners work in pairs for this activity so that they can send each other email messages. If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners the steps in replying to and forwarding an email message.

Assessment:

Informally assess each learner’s knowledge through asking informal questions in the class. Check that you have received an email message from each learner in the class. Use the checklist provided to check that each learner has mastered the skills in replying to and forwarding an email message.

Plenary:

Ask learners to describe the difference between ‘Reply’ and ‘Reply to all’, as well as how you will know that an email has been forwarded to you.

LEARNERS

Work in the same pairs as for the previous activity. Practise using the ‘Reply to all’ and ‘Forward’ options.

ANSWERS

Use the following checklist to assess each learner’s progress with this activity.

Action	✓	✗
Able to use the ‘Reply to all’ option to reply to an email message.		
Able to type an email in reply to a message that has been received.		
Knows that the subject line of a reply to an email message starts with Re:.		
Able to use the Forward option to forward an email message to another recipient.		
Knows that the subject line of a forwarded email message starts with Fwd:.		

Activity 3.19: Pairs

Purpose:

Demonstrate working with email attachments.

Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice. Create and use digital content. (Core competencies CI6.3 and DL6.3)

Resources:

- Learner's Book pages 165–167
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage
- An email account for each learner

Teacher:

Let the learners work in pairs for this activity so that they can send each other email messages. If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners the steps in attaching a file to an email message.

Assessment:

Informally assess each learner's knowledge through asking informal questions in the class. Check that you have received an email message from each learner in the class. Use the checklist provided to check that each learner has mastered the skills in using attachments.

Plenary:

Ask learners to give pointers on the best practices when working with email attachments.

LEARNERS

Work in the same pairs as for the previous activity. Practise adding attachments to an email.

ANSWERS

Use the following checklist to assess each learner's progress with this activity.

Action	✓	✗
Able to attach a document to an email message.		
Able to attach an image to an email message.		
Able to send an email with attachments.		
Able to preview an attachment to an email message.		
Able to download an attachment.		

Remedial activity:

Ask learners who encountered problems in working with attachments to discuss the problems they encountered and the solution, then redo the activity.

Activity 3.20: Group

Purpose:

Demonstrate working with an email address book.

Demonstrate the ability to select the most effective creative tools for work, and give reasons for the choice.

Create and use digital content. (Core competencies CI6.3 and DL6.3)

Resources:

- Learner's Book pages 167–168
- Internet access and a computer or mobile device capable of connecting to the internet
- A data projector to display the social media example to the whole class would be an advantage
- An email account for each learner

Teacher:

Let the learners work in groups for this activity so that they can send each other email messages. If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Should access to the internet not be possible during the actual lesson, a series of screenshots can be made and put into a slide presentation to show the learners the steps in creating and using an address book.

LOW RESOURCES SCHOOLS

1. Discuss the main features of an email.
2. What are the advantages of email over the traditional postal system of communication?
3. Discuss the benefits of the address book to the email user.
4. Discuss factors to be considered in attaching a file to an email.

ANSWERS

1. Emails are sent via the internet, so they can be sent and read almost instantly anywhere in the world.
2. Speed and reliability of delivery
3. You do not have to remember the email addresses of the people you regularly email.
4. If the file is too big, downloading the attachment will use up the recipient's data. Excessively big files are not allowed by some email servers.

Assessment:

Informally assess each learner's knowledge through asking informal questions in the class. Use the checklist provided to check that each learner has mastered the skills in using an email address book.

Plenary:

Ask learners what the minimum items of information are that you should enter when making entries in an email address book.

LEARNERS

Work in a group of at least four. Practise using the email address book.

ANSWERS

Use the following checklist to assess each learner's progress with this activity.

Action	✓	✗
Able to locate and open the address book.		
Able to create a new contact in the address book.		
Able to use an email address from the address book to send an email message.		

Sub-strand 3: Information security

Activity 3.21: Pairs

Purpose:

Discuss the key principles of information security.

Recognise societal issues emanating from the use of digital technologies. Speak clearly and explain ideas.

Share a narrative or extended answer while speaking to a group. (Core competencies DL6.5 and CC8.1)

Resources:

- Learner's Book pages 169–171
- Internet access and a computer or mobile device capable of connecting to the internet

Teacher:

The learners need to do research on the key principles of information security. They will need to do research on the internet and should use the content in the Learner's Book if they cannot access the internet.

Assessment:

Assessment can take place through discussion during the plenary.

Plenary:

Write a definition of each of the three key principles of information security on the board, based on the results of a class discussion.

LEARNERS

With a partner, research and define the three key principles of information security.

ANSWERS

1. Confidentiality of information: When a person, business or organisation collects personal information, they have a duty to protect that data. This means that only necessary information should be collected and then it must be kept safe.
2. Integrity of information: The integrity of data is about how accurate, up to date and trustworthy the data is.
3. Availability of information: The information stored on a computer system must be available all the time to the people who need to work with it. This means that there must be a stable and reliable computer system to store and process the information.

Activity 3.22: Individual/Group

Purpose:

Discuss the key principles of information security.

Recognise societal issues emanating from the use of digital technologies. Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. (Core competencies DL6.5 and CC8.1)

Resources:

- Learner's Book pages 169–171
- Internet access and a computer or mobile device capable of connecting to the internet

Teacher:

The learners must provide examples to illustrate each of the three key principles. They will need to do research on the internet and should use the content in the Learner's Book if they cannot access the internet.

Assessment:

Assessment can take place through discussion during the plenary.

Plenary:

Let each group present their best practical example to illustrate the three principles to the class. Allow for discussion around each of the examples.

LEARNERS

Working in a group, think of practical scenarios that illustrate the three key principles of information security.

ANSWERS

The examples will differ for each group. Check that their examples do clearly illustrate each of the principles and use a class discussion to correct any possible issues with the answers.

Activity 3.23: Pairs

Purpose:

Discuss issues pertaining to copyright (e.g. freeware, shareware, crippleware).

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Anticipate different responses from the participants and plan for them. (Core competencies DL5.1 and CC8.4)

Resources:

- Learner's Book pages 171–173
- Internet access and a computer or mobile device capable of connecting to the internet

Teacher:

The learners must do research on the internet to provide examples of each type of software copyright. If they cannot access the internet, they should use the content in the Learner's Book as well as their personal knowledge.

Assessment:

Assessment can take place through discussion during the plenary.

Plenary:

Let each pair present an example for each of the types of software copyright.

LEARNERS

With a partner, give examples of the different types of computer software copyright.

ANSWERS

Suggested examples below. Check any other examples for correctness.

1. Proprietary software: CorelDRAW, Adobe® Photoshop
2. Freeware: 7-Zip
3. Shareware: WinRAR
4. Crippleware: Video editing software where you can only save a small section of the file until you pay for the full version.

Activity 3.24: Individual

Purpose:

Explore the legal issues regarding intellectual property rights (e.g. copyright, patent, trademark, piracy, copyright infringement).

Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Anticipate different responses from the participants and plan for them. (Core competencies DL5.1 and CC8.4)

Resources:

- Learner's Book pages 173–174
- Internet access and a computer or mobile device capable of connecting to the internet

Teacher:

The learners need to provide examples to explain the difference between the concepts: copyright, trademark and patent. They can do research on the internet, but the content in the Learner's Book will suffice.

Assessment:

Assessment can take place through discussion during the plenary.

Plenary:

Use a class discussion to write the best definitions of each of the concepts to illustrate the differences between the three concepts on the board.

LEARNERS

Distinguish between the concepts of copyright, patent and trademark.

ANSWERS

- Copyright: When someone creates something using their original thoughts, they automatically own the intellectual property. The right to determine how their work may be copied and distributed to others is known as the copyright.
- Patent: A patent can be registered on an invention, a process or a design. A patent is usually issued by a legal body such as a government department. This gives the inventor the sole rights to use the process or to produce and sell their invention.
- Trademark: Symbols, such as company logos, product logos and the names of products, can be trademarked. Trademarks are a form of intellectual property and need to be legally registered. Trademarks are indicated by using the TM superscript after a name or, for a registered trademark, the letter R in a circle ®.

Activity 3.25: Individual

Purpose:

Differentiate between legal issues regarding intellectual property rights (e.g. copyright, patent, trademark, piracy, copyright infringement). Discuss the consequences associated with breaking legal laws. Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. Anticipate different responses from the participants and plan for them. (Core competencies DL5.1 and CC8.4)

Resources:

- Learner's Book pages 174–175
- Internet access and a computer or mobile device capable of connecting to the internet

Teacher:

The learners must understand the implications of breaking the law in terms of piracy and copyright infringements. They can do research on the internet, but the content in the Learner's Book will suffice.

Assessment:

Assessment can take place through discussion during the plenary.

Plenary:

Use a class discussion to decide on the best answers for the questions posed. It is important for the learners to realise the effect that piracy and copyright infringement has for the owners of the intellectual property.

LEARNERS

- Read through the activity in the Learner's Book and make sure you understand what is required.
- Use the questions to summarise what you have learnt about piracy.

ANSWERS

1. Software programmers and musicians earn their living from people paying for these items. If a person uses them without paying, they are stealing from the owner of the intellectual property.
2.
 - a. The owner loses income and may have to increase prices to cover the losses.
 - b. The person committing piracy is guilty of a crime and will end up with a criminal record if caught. The criminal could be imprisoned or made to pay a fine.

Activity 3.26: Group

Purpose:

Evaluate information security, forensic auditing and criminal laws against offenders.

Demonstrate knowledge and recognition of the ethical use of information. Appreciate the importance of including all team members in discussions and actively encourage contributions from them. (Core competencies DL6.6 and CC9.5)

Resources:

- Learner's Book pages 175–178
- Internet access and a computer or mobile device capable of connecting to the internet
- The links below

Links:

1. Video: How the FBI Caught the World's Most Wanted Hacker (10:04 minutes)
<https://www.youtube.com/watch?v=zUKcg6Kwsvk>
2. Video: How did these insanely smart hackers get caught and arrested (9:16 minutes)
<https://www.youtube.com/watch?v=ZZBnXgiwaR0>

Teacher:

The learners need to understand how offenders are able to hack into systems and how they can get caught, by watching videos such as the ones in the links.

Assessment:

Assessment can take place through discussion during the plenary.

Plenary:

Use a class discussion to list the ways in which hackers can be caught.

LEARNERS

- Watch the two video clips on how cybercriminals causing security breaches can be caught.
- Write down three ways in which a cybercriminal could be caught.

ANSWERS

Some possible ways in which hackers can be caught include:

- Sophisticated security software that reports any breaches
- Security experts, who are themselves skilled hackers, are able to catch the criminal hackers
- Photographs of suspected hackers posted in newspapers and social media
- Emails and instant messaging evidence.

Remedial activity:

Ask the learners to review the section and answer the following questions:

- Give two examples of accidental data security breaches. (Any two of: leaving a computer logged on in a public place; losing a storage disk; throwing printed documents in a waste bin; shoulder surfing)
- Who typically carries out deliberate security breaches, and what tools do they use to gain access to computer systems? (Hackers and cybercriminals carry out deliberate security breaches using malware and a tool called a rootkit.)

Activity 3.27: Pairs

Purpose:

Evaluate information security, forensic auditing and criminal laws against offenders.

Demonstrate knowledge and recognition of the ethical use of information. Appreciate the importance of including all team members in discussions and actively encourage contributions from them. (Core competencies DL6.6 and CC9.5)

Resources:

- Learner's Book pages 175–178

Teacher:

The learners will investigate the laws that exist in Ghana regarding data security and data protection.

Assessment:

Learners' answers should be evaluated for correctness.

Plenary:

Use a class discussion to clarify the learners' understanding of the relevant cyber laws.

LEARNERS

Working with a partner, investigate Ghana's laws and policies aimed at protecting our information.

ANSWERS

- The Electronic Transactions Act of 2008 aims to provide a safe and secure environment for everyone in Ghana to be able to perform electronic transactions. It contains measures to combat cybercrime.
- The Data Protection Act of 2012 protects personal information, but it also balances the need for government to access certain information when criminal activity is suspected in order to protect individuals.
- The Cyber Security Policy and Strategy seeks to create awareness of the cyber risks that exist, both in Ghana and globally.

Sub-strand 4: Web technologies

Activity 3.28: Pairs

Purpose:

Demonstrate the use of a web browser and a search engine.

Exhibit strong memory and intuitive thinking; and respond appropriately. Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CC6.1 and DL5.1)

Resources:

- Learner's Book pages 179–181
- Internet access and a computer or mobile device capable of connecting to the internet

Teacher:

The learners will investigate performing effective internet searches using a search engine. The activity should preferably be done by the learners using a search engine on a computer with internet access, but can be done as a demonstration by the teacher, using suggestions from the learners. It can also be done as a paper exercise if necessary.

Assessment:

Assessment can take place through discussion during the plenary and an evaluation of the search terms provided by the learners.

Plenary:

Use a class discussion to get examples of the search terms used by the various pairs of learners and list the best options on the board after discussing why these are the best options.

LEARNERS

With a partner, think of keywords that will produce information about:

- Places to stay in Accra when on holiday, using only Airbnb
- The cheapest flight from Accra to Johannesburg, South Africa
- Places in Africa where one can still see the ruins of buildings built by ancient African civilisations.

ANSWERS

The following are suggested effective search phrases:

- holiday accommodation + Accra + Airbnb
- cheap flights OR budget flights Accra to Johannesburg
- ancient civilisations visible ruins + Africa

Activity 3.29: Group

Purpose:

Identify the importance of the web in learning – virtual learning environments (VLEs).

Exhibit strong memory and intuitive thinking; and respond appropriately. Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CC6.1 and DL5.1)

Resources:

- Learner's Book pages 181–183
- Internet access and a computer or mobile device capable of connecting to the internet
- The link below

Link:

Video: Student Guide to Google® Classroom (8:01 minutes)

<https://www.youtube.com/watch?v=qSxNLaWm74g>

Teacher:

The learners watch the video on the use of Google® Classroom as a VLE. This is very useful if the learners do not have actual access to a VLE.

Assessment:

Assessment can take place through discussion during the plenary.

Plenary:

Use a class discussion to talk about the features of Google® Classroom that appeal to the learners.

LEARNERS

Watch a video clip that shows how a VLE can be used in teaching.

ANSWERS

This is not a formal activity with specific answers. The idea is for the learners to view the video clip to experience what a typical VLE experience is like.

Activity 3.30: Individual

Purpose:

Identify the importance of the web in learning – virtual learning environments (VLEs).

Exhibit strong memory and intuitive thinking and respond appropriately. Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competencies CC6.1 and DL5.1)

Resources:

- Learner's Book pages 181–183

Teacher:

This is a straightforward activity where the learners will answer some questions based on the content provided.

Assessment:

Check the learners' answers for correctness. Explain any misunderstandings.

Plenary:

Use a class discussion to discuss the answers to the questions.

LEARNERS

Use the content in the Learner's Book to explain the advantages and uses of VLE.

ANSWERS

1. Virtual learning environment
2. A virtual learning environment (VLE) is an online system that is used to manage the delivery of course content to students or learners.
3. Accept any three of the following:
 - Online quizzes that can be used as self-marking tests
 - Notes, summaries, assignments uploaded using various document formats
 - Multimedia material, such as video clips, sound clips and animations
 - Completed assignments can be uploaded in the form of documents, slideshows, video recordings or voice recordings.
4. Accept any four of the following:
 - Students or learners can work at their own pace but can be monitored to see that they do not fall behind.
 - The content can be differentiated according to each learner's needs or level of competence.
 - Students and learners can access the course from anywhere, provided they have internet access and a suitable device to work on.

- A VLE is a cloud-based system that can also allow for online collaboration. This means that a group can work together on completing an assignment, using a shared document or presentation file. Each member of the group can complete their contribution and other members of the group can view and even edit what they have done. In this way, the members of the group evaluate each other's work so that they can hand in the best possible result.
- Some VLEs also offer integration with video-conferencing platforms that allow for a teacher or lecturer to teach a section of work live to their class or course group.
- Assignments can be posted with due dates for submission. The teacher or lecturer can easily see whose work has not been submitted by the due date and who has submitted their work late.

Activity 3.31: Individual/Group

Purpose:

Explore the use of open learning websites in the classroom.

Demonstrate the ability to visualise alternatives, see possibilities and identify problems and challenges. Use digital tools to create novel things. (Core competencies CI5.4 and DL6.3)

Resources:

- Learner's Book pages 183–184
- Internet access and a computer or mobile device capable of connecting to the internet (one per group)

Teacher:

Each group will need access to at least one computer or mobile device with internet access to complete this activity. Ideally each learner should have their own device to work on, but they can also take turns. First demonstrate the features of the various open learning websites to the learners and then let them explore the sites on their own.

Assessment:

Assessment can take place through discussion during the plenary.

Plenary:

Use a class discussion to discuss the various open learning websites and the courses they offer.

LEARNERS

Each member of the group must explore one of the open learning websites listed. Each person must report back to the group on:

- The name of the website they explored
- Some of the courses provided on the website
- Explain what you must do to sign up for one of the courses.

ANSWERS

The websites concerned are dynamic in nature and so the list of courses offered will change over time. Access the websites to check the correctness of the learners' answers.

Activity 3.32: Individual/Pairs

Purpose:

Demonstrate the techniques for evaluating web pages (accuracy, credibility, content, current, functionality). Demonstrate the ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. (Core competency DL5.1)

Resources:

- Learner's Book pages 185–186
- Internet access and a computer or mobile device capable of connecting to the internet (one per pair)
- A data projector to display a selected website to the learners for evaluation

Teacher:

Each pair will need access to at least one computer or mobile device with internet access to complete this activity. First cover the content as provided in the Learner's Book. Visit a sample website and explain each of the criteria used to evaluate a website before dividing the learners into their pairs and letting them complete the activity.

LOW RESOURCES SCHOOLS

Join your groups. Pick each of the techniques to evaluate web pages, discuss and give practical (real-life) examples where each can be applicable.

ANSWERS

Answers will vary. Learners should choose one of the criteria for evaluation:

1. Currency: Is the information up to date?
2. Relevance of content: Is the information what you need?
3. Credibility of the person or organisation who uploaded the information: The name and credentials or qualifications should be clearly stated. Look for sections like 'About us' or 'Background'. Decide whether the author is qualified to write about the subject of the site.
4. Accuracy: the reliability, truthfulness, and correctness of the content: Beware of the type of language used. A site's purpose should be clear in the language used, namely, to inform, entertain, persuade, educate or sell.
5. Functionality of the website: Do all the links work? Are the spelling and grammar of a high standard? Are the pictures helpful and relevant?

Assessment:

Assessment can take place through discussion during the plenary. Informal assessment of each learner's involvement can be done by walking through the classroom while the learners are busy with the activity.

Plenary:

Use a class discussion to discuss some of the websites that have been evaluated by the pairs.

LEARNERS

- Find a website about one of your school subjects.
- Evaluate the website, using the criteria you have learnt about.

ANSWERS

The answers will depend on the website chosen by each learner.

Should they use the screenshot provided in the Learner's Book, the answers should be as follows:

1. www.cambridge.org/za/academic/subjects/computer-science
2. Accuracy: This is the website from a publishing company containing information on their own publications and the content can thus be assumed to be accurate.

Credibility: Linked to the previous point, the content would be credible as it is about the company's own products.

Content: If you are looking for Computer Science publications, then this content would be suitable.

Current: The screenshot shown here has a link to a blog. The date of the latest post shown there will give an indication of how up to date the site is. Bear in mind that this is a screenshot taken at the time of writing the book and so the date may not appear to be current although it was at the time of writing. There is a link to a 2016 Computer Science Catalogue, which would be out of date.

Functionality: It is difficult to judge functionality from a screenshot, but there do not appear to be broken links and the menu items look to be straightforward to follow.

Remedial activity:

Check learners' understanding of the importance of the website evaluation criteria by asking:

- Why is accuracy important?
- Why is credibility important?
- Why is relevant content important?
- Why is up-to-date information important?
- Why is functionality important?

Check your progress

ANSWERS

1. Client-server: The server provides all network services and controls the network while the client computers are used as workstations that access the network services from the server.
Peer-to-peer: All computers have equal importance and no one computer controls the network.
2.
 - a. A switch is a device that the network cables from the computers in a network connect to. The switch can strengthen network signals and can direct signals to the correct device to some degree.
 - b. A UTP cable is used to connect devices to the switch/network and serves as a communication channel on the network.
3.
 - a. Network topology refers to the physical layout of computers in a network.
 - b. X = bus topology
Y = star topology
 - c. Y
 - d. Accept any two of the following:
 - Each computer has its own cable running to the switch and so it is easy to troubleshoot.
 - If one cable is damaged, only the computer connected to that cable is affected.
 - It is relatively easy to set up.
 - It is easy to add another computer or device as long as there is space on the switch.
 - It is easy to troubleshoot as there is an indicator light on the switch for each cable connected to it. The light could show an error or could be off if the cable is damaged.
4. WAN: Wide Area Network is a network that covers a large geographical area, such as several cities or towns, a country or even across several companies
WLAN: Wireless Local Area Network is a LAN where the devices are linked wirelessly to the network.
5.
 - a. LinkedIn: job seekers; recruitment; business connections (networking)
 - b. WhatsApp: instant messaging
 - c. Facebook: sharing text, images and video posts with Facebook Friends
6.
 - a. The subject line starts with FWD.
 - b. The subject line starts with RE.
7. To store the email address and other contact details of people who you email often so that you do not have to remember their email addresses.
8. Confidentiality: When a person, business or organisation collects personal information, they have a duty to protect that data.
Integrity: The integrity of data is about how accurate, up to date and trustworthy data is. Humans can make mistakes when capturing data on a computer system. The system must have all possible measures in place to help prevent mistakes and data must be checked for accuracy once it has been captured.
Availability: The information stored on a computer system must be available all the time to the people who need to work with it. This means that there needs to be a stable and reliable computer system in place to store and process the information.

- 9.** Freeware is software that does not cost anything to use.
Shareware is software that you are allowed to share freely with anyone else. It is often free to use for a limited time after which you must pay to continue using it.
- 10.** Crippleware
- 11.** When a person creates something using their own original thoughts, they automatically own the intellectual property. The right to determine how their work may be copied and distributed to others is known as the copyright.
A patent can be registered on an invention, a process or a design. A patent is usually issued by a legal body such as a government department. This gives the inventor the sole rights to use the process, or to produce and sell their invention.
- 12.** Piracy breaks copyright laws and deprives the owner of the copyright from their rightful income and thus is equivalent to theft.
- 13.** Accept any three of the following:
- Never share usernames and passwords.
 - Choose strong passwords that cannot easily be guessed. Strong passwords are long, are not recognisable words, and consist of a random combination of upper and lowercase letters, numbers and special symbols.
 - Use a different password for every login you have.
 - Install up-to-date anti-virus and anti-spyware software on your devices.
 - Make sure that all online activity involving personal information is encrypted. For example, when doing online banking or shopping make sure that the website is secure. The web address will start with https and there will be a closed padlock on the address bar.
 - Do not perform personal transactions, such as internet banking and online shopping, using public computers or by connecting to public Wi-Fi hotspots.
 - Do not work on confidential material on a computer where your screen is visible to other people who should not have access to it.
 - Never open attachments on email messages that you are not expecting.
 - Never click on links in email messages to change usernames and passwords, especially if an email message pretends to come from your bank or one of your social media accounts. These institutions will never ask you to do something like this.
- 14. a.** A VLE can be used to deliver a complete online course, or to support the traditional classroom by using blended learning.
- b.** Accept any three of the following:
- Students or learners can work at their own pace but can be monitored to see that they do not fall behind.
 - The content can be differentiated according to each learner's needs or level of competence.
 - Students and learners can access the course from anywhere, provided that they have internet access and a suitable device to work on.
 - A VLE is a cloud-based system that can also allow for online collaboration. This means that a group can work together on completing an assignment using a shared document or presentation file. Each member of the group can complete their contribution and other members of the group can view and even edit what they have done. In this way, the members of the group evaluate each other's work so that they can hand in the best possible result.

- Some VLEs also offer integration with video-conferencing platforms that allow for a teacher or lecturer to teach a section of work live to their class or course group.
- Assignments can be posted with due dates for submission. The teacher or lecturer can easily see whose work has not been submitted by the due date and who has submitted their work late.

15. Accept any two of the following along with the relevant description.

- Accuracy: You need to decide whether what you are seeing and reading on a website is factually correct.
- Credibility: Check the credits to see who created the website. Is the author a recognised expert on the topic?
- Content: Does the website deal with the topic you are looking for information on?
- Current: You need to check that the content on a website is up to date.
- Functionality: A website needs to be easy to use and all the links need to work. Websites also need to load quickly and give the user the content that it promises. Websites where the viewer must click through several links or advertisements before they can get to the content are difficult to use.

16. You should not share your passwords for any login even with a friend or family member. Public computers are not secure so it is not a good idea to log into sensitive applications such as online banking as there could be spyware to steal your login details. Using your name and sequential numbers as a password is too easy to guess.

Strand 4: Computational Thinking

THIS RESOURCE WILL PROVIDE INFORMATION FOR THE TEACHER SURROUNDING EACH OF THE ACTIVITIES IN THE LEARNER'S BOOK.

For each activity, there will be:

- The number of the activity, its purpose, and how it benefits the learners
- A list of resources
- Links to websites and videos needed for the activity, including the length of each video, where appropriate
- Explanation for the teacher on how the activity could be altered or further developed and some notes on how to carry out some of the steps requested of the learners
- Notes about how the activity can be assessed as well as suggestions for a plenary when the activity is complete
- The contents of the activity for the learners
- The answers or expected outcome for the activity.

Sub-strand 1: Introduction to programming

Activity 4.1: Individual

Purpose:

Demonstrate understanding in the use of data types (e.g. float, integer, string, char, etc.).
Demonstrate the ability to combine information and ideas from several sources to reach a conclusion.
Recognise societal issues emanating from the use of digital technologies. (Core competencies CP5.1 and DL6.5)

Resources:

- Learner's Book pages 189–192

Teacher:

It is important that the learners master an understanding of the basic data types on an individual basis. Discuss the various data types and give suitable examples. Give the learners a variety of examples and ask them to select a suitable data type and to support their choice of data type.

Assessment:

The activity will be assessed by checking the learners' answers to the questions.

Plenary:

As you mark the answers to the questions, give the learners turns to provide their answers with reasons for their choices. Allow for any class discussion that may arise around the answers given by the learners. Ensure that each learner has the correct answers and understands the reason for each answer.

LEARNERS

Reread the information on page 191 of the Learner's Book. Answer questions about data types to use in computer programs. Read the questions in the Learner's Book.

ANSWERS

- | | | |
|--------------|------------|------------|
| 1. a. string | b. integer | c. float |
| d. char | e. Boolean | f. string |
| g. float | h. char | i. float |
| j. string | | |
| 2. a. string | b. integer | c. float |
| d. float | e. float | f. Boolean |

Activity 4.2: Pairs

Purpose:

Demonstrate the use of constants and variables used in programming.

Explain ideas in a clear order with relevant detail, using correct construction and structure of speech.

(Core competency CC8.2)

Resources:

- Learner's Book pages 192–195
- A computer with the Scratch programming environment installed (download from the link below)
- A data projector to demonstrate the use of Scratch and to introduce the learners to the use of variables

Link:

Scratch programming environment

<https://scratch.mit.edu/download>

Teacher:

Use the Scratch programming environment to support your explanation of the role that variables play in programming. Ensure that the learners clearly understand the difference between the use of variables and constants in programming. Indicate that variables are generally used more often than constants.

Assessment:

Use informal questions to check that the learners have grasped the concepts of variables and constants and the roles that they play in programming. Check the learners' answers to the questions for correctness.

Plenary:

Ask learners to explain what a variable is and what a constant is, and how their uses differ in a computer program. Go through the answers to the questions and ensure that the learners make any necessary corrections.

LEARNERS

Work with a partner to answer questions about constants and variables.

ANSWERS

1. A variable is a temporary named space in the RAM of a computer that has been told what type of data it can hold.
2. The value stored in a constant cannot be changed by the program while a variable's content can be changed at any time.
3. A variable allows the value that it stores to be changed by the program as needed.
4. The answers will vary. Accept any correct options given by the learners. Here are some examples:
 - The price of any item
 - A person's age
 - The current date.
5. The answers will vary. Accept any correct options given by the learners. Here are some examples:
 - A person's normal body temperature
 - The discount rate given to a pensioner or a scholar for a meal or for entry to an event.

Remedial activity:

Ask learners to work in pairs to explain the meaning of each term listed for Revision in the Learner's Book.

Activity 4.3: Individual

Purpose:

Demonstrate the correct use of programming terminologies.

Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. Evaluate the quality and validity of information (Core competencies CC8.1 and DL5.5)

Resources:

- Learner's Book pages 192–195

Teacher:

Use the content in the Learner's Book as well as the Scratch programming environment (or similar) to illustrate the various programming concepts.

Assessment:

Use informal questions to check that the learners have grasped the programming concepts. Check the learners' answers to the questions for correctness. Explain any misunderstandings.

Plenary:

Ask learners questions, possibly in the form of a quick quiz, to check that they remember and understand each of the programming terminologies. Go through the answers to the questions and ensure that the learners make any necessary corrections.

LEARNERS

Answer questions to help you understand programming terminology.

ANSWERS

1. Assignment: storing a value in variable
 - Boolean: data type that can only represent True or False
 - Char: data type that can only represent a single character such as a number, letter or symbol
 - Constant: a named structure in the RAM of the computer that holds a value that cannot be changed by the program
 - Convention: an agreed way of doing things and naming items to make a common understanding easier
 - Float: a data type that can represent any positive or negative real number
 - Integer: a data type that can represent any positive or negative integer number
 - String: a data type that can represent any text value
 - Variable: a temporary named space in the RAM of a computer that has been told what type of data it can hold and where the program can change the value stored in it
2.
 - a. Data types: integer, float, string, char, Boolean
 - b. General programming terms: variable, constant, convention, assignment

Sub-strand 2: Algorithms

Activity 4.4: Individual

Purpose:

Describe the meanings of the terms algorithm, decomposition and abstraction.

Demonstrate the ability to effectively define goals towards solving a problem. Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. (Core competencies CP6.1 and CC8.2)

Resources:

- Learner's Book pages 196–199

Teacher:

It is important that the learners individually master the terms and skills covered in this section of work. First work through the examples given in the Learner's Book. Use a class discussion to add even more detail to the algorithms, such as the one on making a cup of instant coffee. You can use any other examples from daily life. Be sure to mention that, although everyday examples are being used to make the concepts easier to relate to, eventually the writing of algorithms will be used to plan actual computer programs where the simplest steps are important with nothing left open for interpretation, as a standard computer cannot do that.

Assessment:

Use informal questions to check that the learners have mastered the programming terms and skills covered. Check the learners' answers to the questions for correctness. Explain any misunderstandings.

Plenary:

Ask learners some quick questions to check that they remember and understand each of the terms. Go through the answers to the questions and ensure that the learners make any necessary corrections.

LEARNERS

- Explain what is meant by the terms 'algorithm', 'abstraction' and 'decomposition'.
- Read the scenarios and use abstraction and decomposition to write down the steps needed to do each of the tasks.

ANSWERS

- Algorithm: the set of steps that are needed to solve a problem
 - Abstraction: the process of stating a problem in its simplest form by removing all irrelevant information and focussing only on the relevant details
 - Decomposition: involves breaking down a complex problem into its simplest steps.
- The answers will vary but ensure that each has included sufficient detail.
 - Main problem: List the activities on Kwame's itinerary or programme for the day.
(Abstraction: all irrelevant information removed)
Get out of bed.
Wash face.
Get dressed in school uniform.
Eat breakfast.
Brush teeth.
Travel or walk to school.
Attend school.
Eat lunch at midday break.
Change into soccer kit after school.
Go to soccer field.
Participate in soccer practice.
Travel or walk back home.
(Decomposition: breaking up the day's activities into a simple list in a logical order)
 - Main problem: The chair needs to be stripped and sanded and then painted red.
(Abstraction: all irrelevant information removed)
Collect sandpaper and a putty knife.
Take the chair outside.
Chip off all loose paint with the putty knife.
Sand the chair until all surfaces are smooth.
Collect paint brushes and paint.
Paint with undercoat if necessary.
Clean the brush.
Wait for the undercoat to dry.
Paint the chair with red paint.
Clean the brush.
Wait for the first coat of paint to dry.
Paint the chair with a second coat of red paint.
Clean the brush.
Wait for the second coat of paint to dry.
Check that chair is evenly painted in red and paint with another coat if necessary.
(Decomposition: breaking up the steps required to paint the chair into a simple list in a logical order)

Remedial activity:

If learners struggle with ideas for the steps of 2.b., write some ideas in a random sequence on the board for them to use.

Activity 4.5: Individual

Purpose:

Understand the use of sequence, selection and iteration in writing a program.

Demonstrate the ability to effectively define goals towards solving a problem. Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. (Core competencies CP6.1 and CC8.2)

Resources:

- Learner's Book pages 199–200
- The Scratch programming environment, or mBlock or Blockly – online or installed on each workstation (see links below)
- A data projector to demonstrate the use of the programming environment to the learners (if possible) or screensharing software so that the learners can view the teacher's computer screen
- *Activity 4.5_Cat square pattern.sb3*
- *Activity 4.5_Cat zigzag pattern.sb3*

Links:

1. Scratch
<https://scratch.mit.edu/download>
2. mBlock
<https://mblock.makeblock.com/en-us/download/>
3. Blockly
<https://developers.google.com/blockly>

Teacher:

Demonstrate how to use the programming environment before letting the learners attempt the activity. It is important that the learners work individually to master the skill of creating simple linear programs. Let the learners take turns at working on the available computers, making sure everyone gets a turn. Should there not be sufficient computers, do a demonstration and let the learners write the algorithms on paper. Printouts of Scratch programming blocks can also be made and cut out so that the learners can arrange the paper or card blocks to form the program.

LOW RESOURCES SCHOOLS

Ibrahim has been given an assignment by the teacher. The assignment is for him to calculate the perimeter and area of a rectangle given its length and width. One way to assist Ibrahim is to provide him with the procedure for performing the assignment. Write an algorithm that Ibrahim can use as a guide to find the area and perimeter of the rectangle given.

ANSWER

If length = 2 and width = 3
then area = 2×3
and perimeter = $2(2+3)$

Assessment:

Walk around and check that each learner is engaged with creating the programs. Assist any learners who are struggling to use the software. For learners completing the task faster than their peers, encourage them to experiment and add features to their programs.

Self-assessment will take place as the learners test their algorithms and programs.

Plenary:

Use the example answer files so that the learners can check their programs against these model solutions or code the solutions step by step so that the learners can ask questions about any aspect that they do not understand. Encourage experimentation and inquisitiveness as this is the best way for learners to become confident problem solvers and improve their programming skills. Ensure that learners first complete the required task before experimenting and do not allow the inquisitive learners to take away from the main focus of the activity.

LEARNERS

- Create your own Scratch program to let the cat sprite move in a square path as shown in the example in the Learner's Book. Save your Scratch program as *<your name>_Activity 4.5_Cat square pattern.sb3*.
- Plan a sequential algorithm to let the cat sprite create the pattern as shown in the Learner's Book. Write the steps down or type them out in a word processing document. When you are happy that you have the correct steps, create the Scratch program to test the code. Make any corrections to the algorithm and code that may be needed. Save your Scratch program as *<your name>_Activity 4.5_Cat zigzag pattern.sb3*.
- Note that you will need to add the following block at the beginning of your code to move the sprite towards the left of the stage so that there is enough space to draw the pattern. Scratch uses a set of X and Y coordinates to position the sprite with 0, 0 in the centre of the stage.

ANSWERS

1. The model solution is provided in the file named *Activity 4.5_Cat square pattern.sb3*.
2. The model solution is provided in the file named *Activity 4.5_Cat zigzag pattern.sb3*.
Algorithm:
Erase all previous lines
Lift the pen
Move to the left of the screen
Point to the right
Move 50 steps
Turn left by 90°
Move 50 steps
Turn right by 90°
Move 50 steps
Turn right by 90°
Move 50 steps
Turn left by 90°
Move 50 steps
Turn left by 90°
Move 50 steps
Turn right by 90°

Move 50 steps
Turn right by 90°
Move 50 steps
Turn left by 90°
Move 50 steps
Turn left by 90°
Move 50 steps
Turn right by 90°
Move 50 steps
Turn right by 90°
Move 50 steps
Turn left by 90°

Activity 4.6: Individual

Purpose:

Understand the use of selection statements in writing a program.

Demonstrate the ability to effectively define goals towards solving a problem. Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. (Core competencies CP6.1 and CC8.2)

Resources:

- Learner's Book pages 201–203
- The Scratch programming environment or equivalent
- A data projector to demonstrate the use of the programming environment to the learners (if possible) or screen sharing software so that the learners can view the teacher's computer screen
- *Activity 4.6_Cat react to key press 1.sb3*
- *Activity 4.6_Cat react to mouse pointer.sb3*

Teacher:

Demonstrate how to use key elements in the programming environment before letting the learners attempt the activity. It is important that the learners work individually to master the skill of creating simple linear programs. Let the learners take turns at working on the available computers, making sure everyone gets a turn. Should there not be sufficient computers, do a demonstration and let the learners write the algorithms on paper. Printouts of Scratch programming blocks can also be made and cut out so that the learners can arrange the paper or card blocks to form the program.

Assessment:

Walk around and check that each learner is engaged with creating the programs. Assist any learners who are struggling to use the software. For learners completing the task faster than their peers, encourage them to experiment and add features to their programs.

Self-assessment will take place as the learners test their algorithms and programs.

Plenary:

Use the example answer files so that the learners can check their programs against these model solutions or code the solutions step by step so that the learners can ask questions about any aspect that they do not understand. Encourage experimentation and inquisitiveness as this is the best way for learners to become confident problem solvers and improve their programming skills.

LEARNERS

- Work on your own using your knowledge from the previous activity.
- Create the two example programs and save them as <your name>_Activity 4.6_Cat react to key press 1 and <your name>_Activity 4.6_Cat react to key press 2.
- Test each program and check to see that you understand how selection works in an algorithm.

ANSWERS

1. Suggested solutions are provided in the files named *Activity 4.6_Cat react to key press 1.sb3* and *Activity 4.6_Cat react to key press 2.sb3*.
2. A suggested solution is provided in the file named *Activity 4.6_Cat react to mouse pointer.sb3*.

Activity 4.7: Individual

Purpose:

Understand the use of iteration in writing a program.

Demonstrate the ability to effectively define goals towards solving a problem. Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. (Core competencies CP6.1 and CC8.2)

Resources:

- Learner's Book pages 203–206
- The Scratch programming environment or equivalent
- A data projector to demonstrate the use of the programming environment to the learners (if possible) or screen sharing software so that the learners can view the teacher's computer screen
- *Activity 4.7_Cat hexagon repetition.sb3*

Teacher:

Demonstrate how to use key elements in the programming environment used for iteration before letting the learners attempt the activity. It is important that the learners work individually to master the skill of creating simple linear programs. Let the learners take turns at working on the available computers making sure everyone gets a turn. Should there not be sufficient computers, do a demonstration and let the learners write the algorithms on paper. Printouts of Scratch programming blocks can also be made and cut out so that the learners can arrange the paper or card blocks to form the program.

Assessment:

Walk around and check that each learner is engaged with creating the programs. Assist any learners who are struggling to use the software. For learners completing the task faster than their peers, encourage them to experiment and add features to their programs.

Self-assessment will take place as the learners test their algorithms and programs.

Plenary:

Use the example answer files so that the learners can check their programs against these model solutions or code the solutions step by step so that the learners can ask questions about any aspect that they do not understand. Encourage experimentation and inquisitiveness as this is the best way for learners to become confident problem solvers and improve their programming skills.

LEARNERS

Work on your own using your knowledge from the previous activities.

Write down the steps for an algorithm using repetition (iteration) to do each of the following:

- Display the five-times table, starting at 1×5 and ending at 10×5 .
- A Scratch program where the sprite draws a hexagonal shape with 6 sides each 100 pixels (steps) long, using repetition. Code the Scratch program to check that your algorithm is correct.
- Consider the algorithm to draw a square and the one that you have just completed to draw a hexagon. What is the relationship between the number of sides of the shape and the number of degrees that the sprite must turn at every corner? Use this information to design an algorithm where the user can enter how many sides the shape must have with three sides as the minimum.
- Challenge: Code a Scratch program to test the algorithm.
- Note: Use the Ask block to get input from the user. The Ask block saves the input into a default variable named Answer. Calculations can be done with blocks found in the Operators palette.

ANSWERS

1. Set counter to 0
REPEAT 10 times
Increase value in counter by 1
Set answer to the value of counter * 5
Display: counter + " x 5 = " + answer
END REPEAT
2. Clear all previous lines
Set the pen down
Point the sprite to the right
REPEAT 6 times
Move 100 pixels or steps
Turn right by 60°
Wait 1 second
END REPEAT

The suggested solution can be found in the file named *Activity 4.7_Cat hexagon repetition.sb3*.

3. The angle to turn is determined by dividing 360° by the number of sides.
Clear all previous lines
Set the pen down
Point the sprite to the right
Ask the user to enter how many sides the shape should have (must be 3 or more)
Store the answer in numberOfSides
REPEAT numberOfSides times
Move 100 pixels or steps
Turn right by $(360/\text{numberOfSides})^\circ$
Wait 1 second
END REPEAT

The suggested solution can be found in the file named *Activity 4.7_Cat user input repetition.sb3*.

Activity 4.8: Individual

Purpose:

Perform a linear search to locate a given value position out of listed values and to arrange some given values or data in increasing and decreasing order.

Demonstrate the ability to effectively define goals towards solving a problem. (Core competency CP6.1)

Resources:

- Learner's Book pages 206–209
- *Activity 4.8_List of words.docx*
- *Activity 4.8_Lists.xls*
- *Activity 4.8a_answer1.docx*
- *Activity 4.8a_answer2.docx*
- *Activity 4.8b_answer.docx*

Teacher:

The learners will work on their own to complete the questions based on their knowledge from the previous activities and the content from the Learner's Book.

Assessment:

The answers of each learner need to be checked for correctness.

Plenary:

Make sure that you explain anything that is not clear to the learners by giving reasons for the choice of answer where they are unsure. Reasons are given with each of the answers below.

LEARNERS

Work on your own using your knowledge from the previous activities as well as the content from the Learner's Book to answer the questions in the Learner's Book.

ANSWERS

1. Found set to False
Enter name to search for
Store in searchName
Set counter to 0
WHILE there is still another name in list AND Found equals False DO
 Increase counter by 1
 IF searchName equals name in list THEN
 Found set to True
 END IF
 Move to next name in list
END WHILE

IF Found is False

Display searchName is not in the list

ELSE

Display searchName was found at position counter in the list

END IF ELSE

2. Answers will vary. Learners should use manual sorting processes to sort the items into ascending order.
3.
 - a. When sorted into ascending order, the first word in the list is 'account'. Refer to the file *Activity 4.8a_answer1.docx*.
 - b. When sorted into descending order, the first word in the list is 'work'. Refer to the file *Activity 4.8a_answer2.docx*
4.
 - a. Refer to the file *Activity 4.8_Lists.xls*.
 - b. Refer to the file *Activity 4.8_Lists.xls*.
 - c. The word 'chance' is in row 69 of the sheet.

Sub-strand 3: Robotics

Activity 4.9: Group

Purpose:

Review the various applications of robotic machines in society (e.g. manufacturing, health, education, assembling and packing, transport, surgery, laboratory research, mass production of consumer and industrial goods, taking pictures, etc.) and explore the prospects and challenges of using robots in various operations. Recognise societal issues emanating from the use of digital technologies. Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. (Core competencies DL6.5 and CC8.2)

Resources:

- Learner's Book pages 210–213
- Internet access and a computer or mobile device capable of connecting to the internet
- In the case where the teacher is doing this activity as a demonstration, a data projector to display the video clip to the whole class, would be an advantage
- The link below

Link:

Video: The use of robots in Amazon's warehouses (3:17 minutes)

<https://www.youtube.com/watch?v=TUx-ljgB-5Q>

Teacher:

If the learners do not have access to computers or mobile devices that have access to the internet, this activity can be done as a demonstration.

Present the content of the book on the use of robotics and their effect on society. Allow for ad hoc discussions to take place as this topic is bound to evoke the learners' interest. Allow them to watch the video clip on the link provided and, if time and resources allow, let them explore other videos on this topic.

Assessment:

Informal assessment to establish each learner's knowledge of robots and their effect on society. Where the learners are working in groups, move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the activity.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about robotics.

LEARNERS

- Watch the video clip on the use of robots in Amazon's massive warehouses. You can also search YouTube for other examples of this amazing technology in action.
- Discuss the questions in the Learner's Book in your groups.

ANSWERS

1. The learners may well have other options than the ones given here. Accept these answers if they make sense.
 - Faster and more efficient as the shelves move to the workers thus no time wasted walking through the vast warehouses to find items that have been ordered.
 - Workers can pack more than one order at a time.
 - Robots with shelves containing popular items hover near the dispatch area in case they are required again.
2.
 - a. Manual jobs are done more efficiently and thus could result in the loss of jobs. Probably not as humans are still required to barcode new stock and to place them on the shelf units. Humans also still pack the orders and send them to dispatch.
 - b. A person must go into the warehouses to collect items that have fallen off the shelves so that there are no objects in the way of the robots and to retrieve the lost stock so that it can be returned to the system.

Activity 4.10: Group

Purpose:

Review the various applications of robotic machines in society to be able to state the applications and uses of robots in society (e.g. manufacturing, health, education, assembling and packing, transport, surgery, laboratory research, mass production of consumer and industrial goods, taking pictures, etc.) and explore the prospects and challenges of using robots in various operations.

Recognise societal issues emanating from the use of digital technologies. Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. (Core competencies DL6.5 and CC8.2)

Resources:

- Learner's Book pages 213–214
- Internet access and a computer or mobile device capable of connecting to the internet
- In the case where the teacher is doing this activity as a demonstration, a data projector to display the video clip to the whole class, would be an advantage

Teacher:

Present the content of the book on the use of robotics in areas such as health, laboratory research, photography and dangerous tasks, and their effect on society in these spheres. Allow for ad hoc discussions to take place as this topic is bound to evoke the learners' interest. If time and resources allow, let them search for and share interesting videos on this topic.

Assessment:

Informal assessment to establish each learner's knowledge of robots and their effect on society. Move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the activity.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about robotics.

LEARNERS

- Working as a group, use the questions in the Learner's Book to research robots and robotics.
- If possible, search for interesting video clips on these topics on YouTube.

ANSWERS

The following are some suggested answers. The learners will also come up with other options as a result of their research.

1. Surgery, medical research, training of medical staff in delicate procedures
2. Drones can be used to fly over disaster scenes to evaluate the situation and help pinpoint the location of possible survivors.
3. Work in a research laboratory involving dangerous substances such as explosives and radioactive materials. Mopping up of hazardous chemical spills. Bomb disposal and investigation of suspicious potentially dangerous items.

Activity 4.11: Individual

Purpose:

Review the various applications of robotic machines in society to be able to state the applications and uses of robots in society (e.g. manufacturing, health, education, assembling and packing, transport, surgery, laboratory research, mass production of consumer and industrial goods, taking pictures, etc.) and to explore the prospects and challenges of using robots in various operations.

Recognise societal issues emanating from the use of digital technologies. Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. (Core competencies DL6.5 and CC8.2)

Resources:

- Learner's Book pages 214–215
- Internet access and a computer or mobile device capable of connecting to the internet
- In the case where the teacher is doing this activity as a demonstration, a data projector to display the video clip to the whole class, would be an advantage

Teacher:

Present the content of the book on the use of robotics in areas, such as manufacturing, health, education, assembling and packing, transport, surgery, laboratory research, mass production of consumer and industrial goods, taking pictures, etc., and their effect on society in these spheres. Allow for ad hoc discussions to take place as this topic is bound to evoke the learners' interest. If time and resources allow, let them search for and share interesting videos on this topic. Discuss the advantages and disadvantages of using robots in various operations.

Assessment:

Informal assessment to establish each learner's knowledge of robots and the advantages and disadvantages of using robots in various operations. Move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the activity.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about robotics.

LEARNERS

Research the use of robots in various fields, as listed in the Learner's Book.

ANSWERS

The following are some suggested answers. The learners will also come up with other options as a result of their research.

1.
 - a. To perform delicate surgical operations
 - b. The use of drones to take aerial photographs of inaccessible places for investigation purposes
 - c. Self-driving cars, trains and buses
 - d. Motor vehicle assembly plants
 - e. Bomb disposal in wars and terrorist attacks
2. Accept any three of the following:
 - The potential job losses
 - The expense involved in developing robots for specific tasks
 - The long development and testing time required to ensure that the robot works perfectly and efficiently without breaking down or making mistakes
 - The need to train people to operate the robots
 - A possible lack of the human touch in certain situations such as the medical field where a human would be able to help ease the concerns and anxiety of patients
 - Robots are made of moving mechanical parts and so are not immune to breakdowns. Repairs can be costly and can waste time if parts are not readily available.
 - Resistance from employees to working with unfamiliar technology
 - Reliable power sources, especially in the case of mobile robots that must carry their own batteries where battery life could be an issue. These robots will also have downtime while their batteries are being charged, unless they are interchangeable.

3. Accept any five of the following as well as any other relevant answers not in this list.
 - Robots do not grow tired or need feeding and so, unlike humans, they are able to work around the clock without taking lunch and tea breaks. Thus productivity is increased.
 - Robots do not make mistakes as humans do when they get distracted or become tired. This leads to increased productivity and an end product of higher quality.
 - Robots can not only work longer hours than humans, but they generally also work faster.
 - Robots are particularly good at doing repetitive jobs, delivering identical end results each time, thousands of times over. This leads to a very consistent end product of the same quality each time.
 - Robots can operate in situations that could be dangerous for humans, thus protecting human health and safety.
 - Robots can be programmed to do very precise and intricate work that a human might not be able to do as well. Examples are precision laser cutting of items required in the production lines and delicate surgical operations.
 - The use of robots creates new and interesting job opportunities. For example, people are needed to run and monitor them, engineers and computer programmers are required to develop the robots and robotic systems.
 - The use of robots can also lead to happier employees where the robots are able to do boring or unpleasant tasks leaving the employees to do more interesting work. Having happier employees leads to better productivity and company loyalty.

Remedial activity:

If learners struggle to identify challenges and benefits, list some ideas on the board and ask learners to classify them into either challenges or benefits.

Sub-strand 4: Artificial intelligence

Activity 4.12: Individual/Group

Purpose:

Discuss the application of various areas of artificial intelligence (machine learning, artificial neural networks, virtual reality, augmented reality, mixed reality). Discuss the uses and importance of artificial intelligence (AI) to society.

Recognise societal issues emanating from the use of digital technologies. Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. (Core competencies DL6.5 and CC8.1)

Resources:

- Learner's Book pages 216–219
- Internet access and a computer or mobile device capable of connecting to the internet
- In the case where the teacher is doing this activity as a demonstration, a data projector to display the video clip to the whole class, would be an advantage
- The links below

Links:

1. Video: The use of robots and artificial intelligence in the Amazon warehouses (3:17 minutes)
<https://www.youtube.com/watch?v=TUx-ljgB-5Q>

2. Video: A virtual reality experience using a cardboard holder, a smartphone and an app (4:40 minutes)
<https://www.youtube.com/watch?v=-Kovxf6g0mo>
3. Video: How virtual reality content is made (8:16 minutes)
<https://www.youtube.com/watch?v=DkebfftBCro>
4. Video: The use of the HoloLens headset (10:59 minutes)
<https://www.youtube.com/watch?v=ulHPPtPBgHk>

Teacher:

Present the content on this topic. Let the learners watch the suggested video clips either as a class or in their groups, depending on the resources available. Allow for discussions to take place as this topic is bound to evoke the learners' interest. If time and resources allow, let them search for and share interesting videos on this topic.

Assessment:

Informal assessment to establish each learner's knowledge of the various areas of artificial intelligence. Where the learners are working in groups, move around the class and provide assistance and reinforcement where learners are struggling with any aspect of the activity.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about the various aspects and areas of artificial intelligence.

LEARNERS

Watch the suggested video clips and then discuss virtual reality in your group.

ANSWERS

1. Google® Cardboard and a smartphone with the relevant app installed
2. Expensive specialised cameras are required. Coping with the fact that humans use free will to look in any direction and so the person filming must be hidden, and all angles must be filmed.
3. Virtual reality (VR): takes you into a virtual world out of your current surroundings
Augmented reality (AR): places a computer-generated item into real surroundings such as a photograph of your home as an overlay
Mixed reality: created by combining virtual reality and augmented reality and places a computer-generated holographic object into the real world in such a way that you can interact with the object

Remedial activity:

Consolidate learners' understanding of the concepts by reviewing the material.

Activity 4.13: Individual

Purpose:

Discuss the application of various areas of artificial intelligence (machine learning, gamification, deep learning, artificial data mining and analytics). Discuss the uses and importance of artificial intelligence (AI) to society.

Recognise societal issues emanating from the use of digital technologies. Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. (Core competencies DL6.5 and CC8.1)

Resources:

- Learner's Book pages 219–220
- Internet access and a computer or mobile device capable of connecting to the internet

Teacher:

Present the content on this topic. Allow for discussions to take place as this topic is bound to evoke the learners' interest. If time and resources allow, let the learners search for and share interesting videos on these topics.

Assessment:

Informal assessment to establish each learner's knowledge of the various areas of artificial intelligence. Check that each learner has the correct answers to the questions to support their understanding of the concepts.

Plenary:

Check the answers to the activity. Discuss any questions and observations that the learners might have about the various aspects and areas of artificial intelligence.

LEARNERS

- Work on your own to explain the difference between each of the following concepts.
 - Machine learning and deep learning
 - Data mining and machine learning.
- Give an example of how each can be used.

ANSWERS

The learners may give different examples. Accept any suitable alternative examples in each case.

1. Machine learning is when a computer system learns and improves based on experience, without being specifically reprogrammed. For example, any speech recognition system is a common example found on many smartphones and built into modern computer operating systems. The speech recognition system is trained to understand your speech patterns and accent and to be able to respond accurately to your voice input.
Deep learning takes machine learning further where neural networks learn using algorithms that recreate how the human brain learns. It is able to analyse huge amounts of unstructured data and learn from experience, just as we humans do, to create a better set of results each time it encounters a similar pattern in the data. For example, the way in which a self-driving car learns to navigate the world safely.
2. Data mining is the analysis of massive amounts of data collected from our activities to find patterns that could indicate a commercial or marketing opportunity for a company. Data mining uses computer algorithms to uncover patterns that we did not know existed. This knowledge is then used to create opportunities for developing new products and marketing strategies.
This is different from machine learning, where the data is used to learn from and to develop more accurate responses to similar data in the future. Machine learning uses the existing data and what has been learnt to make predictions when new data is received. Machine learning also happens without further human intervention while data mining needs human input and humans make the decisions based on what is discovered in the data.

Check your progress

ANSWERS

1.
 - string
 - float
 - Boolean
 - char.
 - integer
2. The string data type is used for text values consisting of one or more characters. Examples: can be a name ("John"), a word ("Total") or a sentence ("A discount of 10% has been applied to the total amount owing.").
The float data type is used for any positive or negative real number with decimals, as well as integer values. Examples: 5.31, -53.2, 53.3
The Boolean data type is used for one of two values, such as yes or no, true or false, on or off.
The char data type is used for single characters only, such as a letter, digit or special character. Examples: g, 3, &
The integer data type is used for positive or negative values, but does not include a decimal. Examples: 6, -91, 876, -10
3. The value stored in a constant cannot be changed by the program while a variable's content can be changed at any time. A variable allows the value that it stores to be changed by the program as needed.
4.
 - a. Algorithm: the set of steps that are needed to solve a problem
 - b. Decomposition: breaking down a complex problem into its simplest steps
 - c. Abstraction: the process of stating a problem in its simplest form by removing all irrelevant information and focussing only on the relevant details
5. IF-THEN and IF-ELSE
6. REPEAT UNTIL, WHILE and FOR
7. When arranged in alphabetical or numerical order, a linear search of the list of items is faster than it would be if the items were in random order.
8.
 - a. Robots can work tirelessly around the clock without making mistakes and producing items of the exact quality over and over again, for example the assembly of motor vehicles or appliances.
 - b. Robots can be manipulated with great accuracy and thus help make delicate operations such as laser eye surgery and brain surgery safer for humans.
 - c. Self-braking systems linked to collision-detection systems help keep humans safe and prevent motor vehicle accidents from happening.
9.
 - a. The use of robotics can cause the loss of jobs for humans as they are more efficient and increase productivity. This is especially true of manual jobs such as those performed in manufacturing and on assembly lines.
 - b. The implementation of new robotic systems means that the humans operating them must learn new technical and computer skills. This is essential so the robotic systems function correctly and efficiently. There may be a steep learning curve for employees and this could lead to job stress for them.

- 10. a.** Machine learning is when a computer system learns from experience and adapts how it reacts to inputs without being reprogrammed.
- b.** Virtual reality brings an artificial world to life or allows you to experience real-world settings as if you were physically there.
- c.** Data mining is the analysis of high volumes of data to find patterns and trends that indicated opportunities for business.
- d.** Gamification uses the way computer games work in other situations, such as teaching and fitness apps.
- 11.** Answers will vary. Accept any reasonable and practical answer.
Examples:
Machine learning: speech recognition, image recognition, security systems
Virtual reality: gaming, virtual tours
Data mining: discover opportunities for new products and services
Gamification: games that are based on scores (levelling up) to motivate learners; fitness apps that track a person's health goals.
- 12.** Augmented reality adds artificial computer-generated elements to real-life scenes. In contrast, virtual reality (VR) brings a completely artificial world to life or allows you to experience real-world settings far from where you are as if you were actually there.
- 13.** Repeat until: instructions inside the loop will always run at least once. While: the instruction inside the loop may never run.
- 14.** It means repetition of a process or statement.
- 15. a.** float
b. string
c. Boolean

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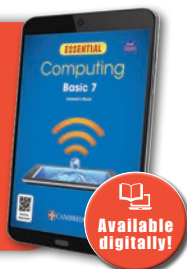
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