NNF BOOKS

ESSENTIAL CODING

Basic 6

Facilitator's Guide

NaCCA APPROVED

Essential Coding

Basic 6

Facilitator's Guide

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ISBN: 978-9988-4251-5-9

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Introduction

Overview of the Essential Coding Series and Facilitator's Guide

The books in the ***Essential Coding*** series introduce young learners to the foundations of computational thinking and early coding skills through engaging visual activities and problem-solving tasks. These activities encourage learners to observe carefully, think logically, recognise patterns, and solve challenges step by step.

The content is organised into four progressive levels that gradually develop learners' thinking abilities—from basic reasoning to algorithmic thinking. Each level focuses on important skills such as counting, comparison, classification, pattern recognition, logical reasoning, and step-by-step problem solving.

Every activity includes a **"Completed in ____ Min."** section to help teachers manage classroom time effectively and encourage learners to develop focus and time awareness. The book also includes **QR codes** linked to educative videos that support better understanding of concepts through visual learning and guided explanation.

At the end of each level, learners complete a **Coding Challenge** activity to apply the skills learned through observation, reasoning, and logical thinking.

The book also includes a **Progress Report** section to help teachers evaluate learners' development in four key computational thinking areas:

- Reasoning
- Critical Thinking & Analysis
- Data Processing
- Algorithmic Intelligence

Teachers can use this section to record progress, provide feedback, and identify areas where additional support may be needed.

Using This Facilitator's Guide Effectively

This Facilitator's Guide is designed to help teachers conduct lessons in a structured and meaningful manner. Before teaching, teachers are encouraged to read the "Overview Section", "How This Book Teaches Coding Without Computers", and "Structure of Learning Levels" sections to understand the learning approach and progression.

For every concept, teachers should follow the sequence provided in the guide:

- **Diagnostic Assessment:** (includes Diagnostic Check, Remediation Support, and Extension Activities)
- **Facilitator's Page-wise Teaching Instructions:** (includes Teacher Instructions, Teacher–Learner Interaction, Teacher Guidance, Reinforcement, Coding Link, and Review Exercise)
- **Level Completion Components:** (includes Review Exercise, Differentiated Learning, and Teacher Closure)

This structured flow helps teachers introduce concepts clearly, observe learner understanding, provide support where needed, and connect activities with computational thinking and early coding skills.

How This Book Teaches Coding Without Computers

Building Foundations for Coding

- Coding starts with thinking, not typing
- Every activity builds a coding skill
- Learners are developing computational thinking
- These skills prepare learners for real programming

Teaching Philosophy

Coding does not begin with computers. It begins with thinking.

This book develops computational thinking skills, which are the foundation of coding:

- Observation
- Logical reasoning
- Pattern recognition
- Sequencing
- Decision-making

Every activity in this book is intentionally designed to build a coding skill.

What Teachers Must Understand

Coding = Giving clear instructions to solve a problem

Learners are already "coding" when they:

- Count
- Follow steps
- Identify patterns
- Make decisions

Your role is to help learners see the connection.

Coding Link 

Whenever you see this icon, explain to learners how the activity relates to coding.

Teaching Strategy

Every lesson should follow this flow:

- Introduce concept (real-life example)
- Demonstrate activity

- Guide learners step-by-step
- Ask questions
- Reinforce learning
- Explain Coding Link

Classroom Strategy

- Encourage learners to think aloud
- Allow trial and error
- Use real objects when possible
- Keep lessons interactive

Professional Positioning

Teachers should communicate clearly:

"This is not just an activity. This is coding thinking."

Final Note for Teachers

By teaching this book well, you are not just teaching activities.

You are:

- Building problem solvers
- Developing logical thinkers
- Preparing future programmers

Every activity is a step into coding

Inclusive Learning Statement

This Facilitator's Guide promotes inclusive and learner-centred education by encouraging teachers to support learners with diverse learning needs through differentiated instruction, peer collaboration, visual aids, oral participation, hands-on activities, movement-based learning, and flexible assessment strategies. Teachers should ensure that all learners, including learners requiring additional learning support, are actively involved in classroom activities, discussions, problem-solving tasks, and coding-related experiences in a respectful and supportive learning environment.

Structure of Learning Levels

Level 1: Reasoning

This level strengthens learners' logical reasoning, number sense, and pattern recognition skills. Through puzzles and reasoning activities, learners practise analysing relationships between numbers, shapes, and words.

1.1 Arithmagons

Learners solve number puzzles where the value on each side of a shape is obtained by adding the numbers at the adjacent vertices. This activity develops logical reasoning and number relationships.

1.2 Number Puzzle

Learners complete mathematical puzzles by filling in missing numbers using arithmetic operations such as addition, subtraction, multiplication, and division. These activities strengthen problem-solving and calculation skills.

1.3 Patterns

Learners observe visual and numerical patterns and determine what comes next in the sequence. This activity improves observation skills and logical thinking.

1.4 Reason Wisdom

Learners analyse diagrams, number relationships, and logical patterns to identify missing values. These activities enhance analytical reasoning and problem-solving abilities.

1.5 Verbal Reasoning

Learners solve word-based reasoning problems that involve completing words, recognising relationships, and identifying patterns in language.

1.6 Palindrome

Learners explore palindromes—words or numbers that read the same forward and backward—and practise identifying and creating such patterns.

Coding Challenge - 1: Math Squares

Learners complete number grids using mathematical operations and logical reasoning, ensuring each row and column forms a correct equation.

Level 2: Critical Thinking & Analysis

This level develops learners' analytical thinking, observation skills, and logical reasoning abilities through visual puzzles and reasoning challenges.

2.1 Tricky Way Out

Learners solve maze-like puzzles by identifying the correct path to reach a goal, improving spatial reasoning and problem-solving skills.

2.2 Analogy

Learners identify relationships between words or objects and apply similar relationships to complete analogies.

2.3 Logical Analysis

Learners solve mathematical and logical problems involving symbols, coded operations, and reasoning patterns.

2.4 Line of Symmetry

Learners explore symmetry by identifying lines that divide shapes into equal halves and by completing symmetrical figures.

2.5 Sudoku

Learners solve Sudoku puzzles by arranging numbers so that each row, column, and grid contains unique numbers.

2.6 Coded Riddles

Learners decode riddles using number and letter codes, strengthening logical thinking and pattern recognition.

Coding Challenge - 2: Fun with Rebus

Learners interpret picture puzzles where symbols and images represent words or phrases.

Level 3: Data Processing

This level introduces learners to organising, interpreting, and analysing data, which are important skills in computational thinking.

3.1 Venn Diagram

Learners classify objects into groups using Venn diagrams and understand how sets can intersect or overlap.

3.2 Data Compression

Learners explore how information can be shortened using abbreviations and compressed forms of data.

3.3 Data and Information

Learners understand the difference between raw data and processed information and how data can be organised to create meaningful insights.

3.4 Decode the Code

Learners analyse coded messages and patterns to identify hidden meanings or correct answers.

3.5 Binary Representation of Information

Learners explore the binary number system used by computers, where information is represented using only two digits: 0 and 1.

Coding Challenge - 3: Venn Diagrams

Learners place objects or people into appropriate sections of a Venn diagram based on different characteristics.

Level 4: Algorithmic Intelligence

This level introduces learners to algorithmic thinking and simple programming concepts, which form the foundation of coding.

4.1 Algorithm

Learners understand that an algorithm is a step-by-step set of instructions used to solve a problem or complete a task.

4.2 Programs: Conditions

Learners explore If–Then–Else statements, which allow computers to make decisions based on specific conditions.

4.3 Programs: Loops

Learners learn how loops repeat a set of instructions multiple times to complete tasks efficiently.

Coding Challenge - 4: Where is Esi?

Learners follow directional instructions and logical steps to determine the final location in a map-based puzzle.

Fun with Coding – Scratch

The book introduces learners to Scratch, a beginner-friendly block-based programming language designed for children.

Learners discover how to:

- Create animations and simple projects
- Control characters called sprites
- Use visual programming blocks to build scripts
- Manage movement, actions, and events

Scratch uses colourful drag-and-drop blocks that fit together like puzzle pieces, making it easier for learners to understand programming logic while developing creativity and computational thinking skills.

Coding Links

Level 1: Reasoning

Concept 1.1: Arithmagons

Activity A: Solve the Arithmagons

Coding Link: In coding, computers follow clear rules to calculate answers. In this activity, learners use the rule "two numbers add to make a third number." This is similar to how a computer follows instructions step-by-step to find missing values. Learners are thinking like a computer by applying rules and checking if their answers are correct.

Concept 1.2: Number Puzzle

Activity A: Fill the Boxes and Complete the Number Puzzle

Coding Link: Computers solve problems by breaking them into smaller steps. When learners solve each row or column step-by-step, they are using the same approach as coding, where problems are solved one instruction at a time.

Activity B: Complete the Number Puzzle Using Arithmetic Operations

Coding Link: In coding, every step affects the next step. When learners fill one number and check it with other equations, they are learning how computers process connected instructions where one result influences another.

Activity C: Solve the Extended Number Puzzle

Coding Link: Computers test different possibilities until the correct answer is found. When learners try different numbers and verify them, they are using trial-and-error thinking, which is an important coding strategy.

Concept 1.3: Patterns

Activity A: Identify the Next Picture in the Pattern

Coding Link: Coding often uses repeating patterns. When learners identify what comes next in a sequence, they are understanding how computers recognise patterns and continue them logically.

Activity B: Draw and Complete the Pattern

Coding Link: In programming, patterns help in creating designs and repeated actions. When learners draw the next part of a pattern, they are practising how computers repeat instructions to form patterns.

Activity C: Complete the Colour Pattern

🔗 **Coding Link:** Computers store and use patterns of colours and data. When learners follow a colour sequence, they are learning how computers process repeated data patterns step-by-step.

Activity D: Complete the Number Patterns

🔗 **Coding Link:** Number patterns follow rules, just like coding instructions. When learners identify rules like "add 2" or "subtract 5," they are thinking like a programmer who writes rules for a computer to follow.

Concept 1.4: Reason Wisdom

Activity A: Find the Missing Number

🔗 **Coding Link:** Computers analyse relationships between numbers to solve problems. When learners find missing numbers using logic, they are doing the same kind of analysis used in coding.

Activity B: Choose the Correct Option

🔗 **Coding Link:** In coding, decisions are made by comparing options. When learners choose the correct figure based on patterns, they are practising decision-making like a computer program.

Activity C: Count the Number of Triangles

🔗 **Coding Link:** Computers break complex problems into smaller parts. When learners count triangles by dividing the figure into smaller shapes, they are using decomposition, an important coding skill.

Concept 1.5: Verbal Reasoning

Activity A: Fill in the Missing Letter

🔗 **Coding Link:** Computers recognise patterns in letters and words. When learners find a letter that completes two words, they are applying pattern recognition, which is widely used in coding and data processing.

Activity B: Identify the Correct Word Pair Sequence

🔗 **Coding Link:** In coding, sequences must follow a specific order. When learners arrange word pairs correctly, they are understanding sequencing, which is essential in writing programs.

Activity C: Identify the Word that Comes Last Alphabetically

🔗 **Coding Link:** Computers sort data in order. When learners arrange words alphabetically, they are learning sorting, which is a basic concept used in programming and databases.

Concept 1.6: Palindrome

Activity A: Identify Palindrome Words

Coding Link: Computers check patterns in data from both directions. When learners identify words that read the same forward and backward, they are using logic similar to how programs check patterns.

Activity B: Find Palindromes in the Word Grid

Coding Link: Searching for patterns in different directions is a key coding skill. When learners find palindromes in a grid, they are practising how computers search data in multiple directions.

Activity C: Convert Numbers into Palindromes

Coding Link: Computers repeat steps until a condition is met. When learners reverse numbers and add repeatedly to get a palindrome, they are using iteration (repetition), just like loops in coding.

Coding Challenge - 1: Math Squares

Activity: Complete the Math Squares

Coding Link: In coding, rules and logic must be followed carefully. This activity requires learners to use numbers without repeating and follow mathematical rules step-by-step. This is similar to how computers follow strict instructions and logical conditions to solve problems accurately.

Level 2: Critical Thinking & Analysis

Concept 2.1: Tricky Way Out

Activity A: Find Your Way Out

Coding Link: In coding, computers follow step-by-step paths to reach a goal. When learners trace the correct path in a maze, they are thinking like a computer that follows instructions and avoids wrong paths (dead ends) to reach the correct result.

Activity B: Help Mimbo Reach Nimbo

Coding Link: Computers often try different paths and go back if a path is wrong. When learners change direction and try another route in the maze, they are using backtracking, a common method used in coding to solve problems.

Concept 2.2: Analogy

Activity A: Complete Each Analogy

Coding Link: Computers identify relationships between data. When learners understand how one pair of words is related and apply the same logic to another pair, they are using pattern matching, which is important in coding and AI systems.

Activity B: Choose the Correct Word

Coding Link: In coding, programs compare options and select the correct one based on logic. When learners choose the correct word, they are practising decision-making, similar to how a computer selects outputs.

Activity C: Picture Analogy

Coding Link: Computers also work with images and recognise relationships between objects. When learners match pictures based on relationships, they are learning visual reasoning, similar to how image-recognition systems work.

Concept 2.3: Logical Analysis

Activity A: Solve the Logical Equations

Coding Link: In coding, symbols can represent different operations. When learners replace symbols with correct operations and solve equations, they are understanding how programming uses symbols and rules to perform calculations.

Activity B: Identify the Shape Transformation

Coding Link: Computers use rules to transform shapes and images (like rotate, flip, resize). When learners identify how a shape changes, they are learning transformations, which are used in graphics and animations in coding.

Concept 2.4: Line of Symmetry

Activity A: Identify the Number of Lines of Symmetry

Coding Link: Computers recognise symmetry in images and designs. When learners find lines of symmetry, they are learning how computers detect balanced patterns in graphics and design applications.

Activity B: Create Patterns with One Line of Symmetry

Coding Link: In coding, designs must follow rules. When learners create symmetrical patterns, they are applying rules just like a computer program that generates balanced designs.

Activity C: Complete the Symmetrical Figure

🔗 **Coding Link:** Computers mirror images to complete designs. When learners draw the missing half of a figure, they are using mirroring logic, which is used in computer graphics and editing tools.

Concept 2.5: Sudoku

Activity A: Solve the Given Sudokus

🔗 **Coding Link:** Computers solve puzzles using logical rules and elimination. When learners fill Sudoku grids without repeating numbers, they are using constraint-based logic, just like computers solving complex problems.

Activity B: Picture Sudoku

🔗 **Coding Link:** Computers can solve problems using symbols instead of numbers. When learners use fruits or pictures in Sudoku, they are understanding that coding works with different types of data, not just numbers.

Concept 2.6: Coded Riddles

Activity A: Solve the Coded Riddles

🔗 **Coding Link:** Computers encode and decode information using codes. When learners convert numbers into letters to solve riddles, they are learning how coding systems store and interpret information.

Coding Challenge - 2: Fun with Rebus

Activity: Solve the Rebus Puzzles

🔗 **Coding Link:** In coding, symbols and icons often represent meanings (like buttons or commands). When learners solve rebus puzzles by combining pictures and words, they are practising how computers interpret symbols and combine information to form meaning.

Level 3: Data Processing

Concept 3.1: Venn Diagram

Activity A: Place Numbers in the Correct Venn Diagram

🔗 **Coding Link:** Computers organise data into groups based on conditions. When learners place numbers into different sections of a Venn diagram, they are doing classification, just like computers sort and group data based on given rules.

Concept 3.2: Data Compression

Activity A: Rewrite the Compressed Story

Coding Link: Computers store information in a shorter form to save space. When learners expand short forms into full sentences, they are understanding compression and decompression, which is how computers store and retrieve data efficiently.

Activity B: Decode the Story (Using Symbols)

Coding Link: Computers use symbols and images as codes. When learners replace pictures with words to complete a story, they are practising decoding, similar to how computers convert coded data into meaningful information.

Concept 3.3: Data and Information

Activity A: Transportation Hierarchy

Coding Link: Computers organise data into categories and subcategories. When learners classify transport into land, water, and air, they are using data organisation, similar to how databases structure information.

Activity B: Bar Graph Interpretation

Coding Link: Computers display data using graphs to make it easy to understand. When learners read and compare bar graphs, they are learning data visualization, which helps computers present information clearly.

Activity C: Line Graph – Time Spent Playing Basketball

Coding Link: Computers track changes over time using graphs. When learners plot points and draw a line graph, they are understanding how computers analyse trends and patterns in data.

Activity D: Line Graph – Spelling Test Scores

Coding Link: Computers analyse large data to find patterns like highest or most common values. When learners interpret the graph, they are using data analysis, which helps computers make decisions based on data.

Concept 3.4: Decode the Code

Activity A: Decode and Choose the Correct Option

Coding Link: Coding works on rules and patterns. When learners identify coding rules (letters, numbers, symbols) and apply them, they are doing the same process as computers that encode and decode information using algorithms.

Concept 3.5: Binary Representation of Information

Activity A: Complete the Binary Grid

Coding Link: Computers use only 0 and 1 to store information. When learners fill the grid using binary values, they are understanding how computers represent and process all types of data using binary code.

Activity B: Binary Numbers and Problem Solving

Coding Link: Computers perform calculations using binary numbers. When learners solve problems and relate them to binary, they are learning how computers calculate and process data internally.

Coding Challenge - 3: Venn Diagrams

Activity: Place the Names in the Correct Venn Diagram

Coding Link: Computers analyse multiple conditions before placing data correctly. When learners sort people based on different conditions (age, gender, preferences), they are using multi-condition logic, similar to how programs filter and organise data.

Level 4: Algorithmic Intelligence

Concept 4.1: Algorithm

Activity A: Algorithm – Organising a Birthday Party

Coding Link: In coding, an algorithm is a step-by-step plan to complete a task. When learners arrange steps for organising a birthday party, they are thinking like programmers who write clear instructions for a computer to follow in the correct order.

Activity B: Algorithm to Find Area of Rectangle

Coding Link: Computers solve problems using step-by-step calculations. When learners write steps to calculate area, they are creating a simple program where each instruction is followed in sequence to get the final result.

Activity C: Algorithm to Find Perimeter of Square

Coding Link: In coding, problems are broken into simple steps. When learners write steps to find perimeter, they are using sequential thinking, which is the foundation of all computer programs.

Concept 4.2: Programs: Conditions (If–Then–Else)

Activity A: Real-Life Conditions

🔗 **Coding Link:** Computers make decisions based on conditions. When learners write "If–Then" statements for real-life situations, they are learning how programs decide what action to take depending on whether a condition is true or false.

Activity B: Apply Multiple Conditions

🔗 **Coding Link:** In coding, decisions can depend on more than one condition. When learners use AND/OR logic, they are understanding how computers handle complex decisions by checking multiple conditions at the same time.

Activity C: Examine Programs and Predict Output

🔗 **Coding Link:** Computers follow instructions and produce outputs based on given values. When learners predict outputs, they are simulating how a program runs step-by-step to give results.

Activity D–F: Writing Conditional Statements

🔗 **Coding Link:** Writing conditions is like giving instructions to a computer. When learners create their own If–Then–Else statements, they are learning how programmers control actions in a program.

Activity G: Evaluate Conditions and Write Output

🔗 **Coding Link:** Computers evaluate conditions and then choose the correct output. When learners check values and decide results, they are practising logical evaluation, just like a program executes decisions.

Activity H: Nested Conditions (If–Else If–Else)

🔗 **Coding Link:** Sometimes computers check multiple conditions in order. When learners solve nested conditions, they are understanding how programs handle multiple choices step-by-step until the correct condition is found.

Concept 4.3: Programs: Loops

Activity A: Program Using Loop

🔗 **Coding Link:** Loops are used in coding to repeat instructions. When learners identify repeated steps and rewrite them using loops, they are learning how computers save time by repeating actions automatically.

Activity B: Output of Loop Programs

🔗 **Coding Link:** Computers repeat instructions multiple times and produce outputs each time. When learners write outputs for loops, they are understanding how repeated execution works in programming.

Activity C: Perform Loop Instructions

🔗 **Coding Link:** Loops help create patterns and repeated actions. When learners follow loop instructions to draw or write patterns, they are experiencing how computers generate patterns through repetition.

Coding Challenge - 4: Where is Esi?

Activity: Trace Esi's Path

🔗 **Coding Link:** In coding, directions are given step-by-step to reach a goal. When learners follow directions (left, right, forward), they are using sequencing and algorithmic thinking, just like a computer follows instructions in a program to reach the correct output.

Diagnostic Assessment

Level 1: Reasoning

Concept 1.1: Arithmagons

(LB Pages 8–9)

Activity A: Solve the Arithmagons

Diagnostic Check

(Work in Pairs)

Before the activity, ask learners to:

- Add and subtract numbers accurately.
- Recognise relationships between side and corner values.
- Observe numerical patterns carefully.
- Identify missing values logically.

Observe learners who:

- Cannot apply the addition rule correctly.
- Need repeated teacher guidance.
- Struggle to identify number relationships.
- Guess answers without checking calculations.

Remediation Support

For learners struggling with arithmagons:

- Explain the rule using simple examples first.
- Show how two adjacent vertex numbers form the side value.
- Solve one side at a time together.
- Encourage learners to check answers using addition and subtraction.

For learners needing additional support:

- Use smaller arithmagon puzzles first.
- Highlight connected numbers using colours.
- Allow learners to use rough calculations for support.

Extension Activity

(Work Individually / in Groups)

Ask fast learners to:

- Create their own arithmagon puzzle.
- Use decimal or larger numbers independently.
- Challenge classmates with missing-number puzzles.
- Explain how the arithmagon rule works logically.

Concept 1.2: Number Puzzle (LB Pages 10–12)

⇨ Activity A: Fill the Boxes and Complete the Number Puzzle

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Solve simple arithmetic equations correctly.
- Recognise relationships between intersecting equations.
- Apply addition and subtraction logically.
- Check equations horizontally and vertically.

Observe learners who:

- Make repeated arithmetic errors.
- Cannot identify missing values correctly.
- Need repeated support with intersecting equations.
- Struggle to verify answers logically.

Remediation Support

For learners struggling with equations:

- Solve one equation at a time together.
- Use rough work for calculations.
- Highlight intersecting boxes clearly.
- Encourage learners to check both row and column equations.

For learners needing additional support:

- Start with smaller number puzzles first.
- Use colour coding for connected equations.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own number puzzle.
- Use larger values and operations independently.
- Challenge classmates with intersecting equations.
- Explain strategies used to solve the puzzle.

⇨ Activity B: Complete the Number Puzzle Using Arithmetic Operations

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise arithmetic operations correctly.
- Solve equations involving multiplication and division.

- Follow intersecting equations logically.
- Apply operations step by step.

Observe learners who:

- Confuse arithmetic operations.
- Need repeated support solving equations.
- Struggle with multiplication or division.
- Forget to verify intersecting values.

Remediation Support

For learners struggling with operations:

- Review operation symbols and meanings.
- Solve one equation step by step together.
- Use multiplication tables or division aids if needed.
- Encourage learners to check answers carefully.

For learners needing additional support:

- Start with simpler arithmetic operations first.
- Use visual examples for multiplication and division.
- Allow partner discussion during solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create operation-based number puzzles.
- Use multiple operations independently.
- Challenge classmates with arithmetic grids.
- Explain how intersecting equations help solve the puzzle.

➪ Activity C: Solve the Extended Number Puzzle

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Apply arithmetic operations accurately.
- Recognise patterns between connected equations.
- Analyse puzzle relationships logically.
- Verify answers in multiple directions.

Observe learners who:

- Make errors in multi-step calculations.
- Need repeated teacher guidance.

- Struggle to connect horizontal and vertical equations.
- Guess values without checking.

Remediation Support

For learners struggling with extended puzzles:

- Solve simpler equations first before moving to complex ones.
- Highlight intersecting values clearly.
- Encourage learners to use rough calculations.
- Guide learners to verify answers after each step.

For learners needing additional support:

- Use guided examples before independent solving.
- Provide operation charts for support.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create advanced number puzzles independently.
- Use mixed operations and larger numbers.
- Challenge classmates with multi-step puzzles.
- Explain how logical sequencing solves connected equations.

Concept 1.3: Patterns (LB Pages 13–15)

⇨ Activity A: Identify the Next Picture in the Pattern

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe visual sequences carefully.
- Identify repeated shapes and rotations.
- Recognise changes in direction or orientation.
- Predict the next image logically.

Observe learners who:

- Cannot recognise the pattern rule.
- Guess answers randomly.
- Need repeated visual guidance.
- Struggle to compare sequence changes.

Remediation Support

For learners struggling with visual patterns:

- Discuss one pattern at a time.
- Highlight how the shapes rotate or repeat.
- Use arrows or coloured markers for direction changes.
- Encourage learners to explain the pattern aloud.

For learners needing additional support:

- Start with simpler repeating patterns first.
- Provide guided examples before independent work.
- Allow learners to work with partners.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own picture patterns.
- Use rotation and colour changes independently.
- Challenge classmates with visual-sequence puzzles.
- Explain how the pattern changes each step.

➪ Activity B: Draw and Complete the Pattern

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe repeating designs carefully.
- Identify how patterns repeat or change.
- Draw shapes accurately in sequence.
- Predict missing parts in a pattern.

Observe learners who:

- Cannot continue the pattern correctly.
- Need repeated visual support.
- Struggle to identify repeating cycles.
- Make drawing-placement errors.

Remediation Support

For learners struggling with drawing patterns:

- Complete one sequence together first.
- Highlight repeating units clearly.
- Encourage learners to trace the pattern visually.
- Use simple shape repetition before complex patterns.

For learners needing additional support:

- Provide partially completed examples.
- Use colour coding for repeated elements.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Design their own pattern sequence.
- Create more complex visual repetitions.
- Challenge classmates with pattern-drawing tasks.
- Explain the rule behind the sequence.

➪ Activity C: Complete the Colour Pattern

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise repeating colour sequences.
- Observe rows and columns carefully.
- Identify colour arrangements logically.
- Predict missing colours in a pattern.

Observe learners who:

- Confuse colour order.
- Need repeated teacher support.
- Struggle to identify repeating units.
- Skip sections while colouring.

Remediation Support

For learners struggling with colour patterns:

- Highlight one repeating row at a time.
- Use coloured counters or blocks for demonstration.
- Encourage learners to say the colour sequence aloud.
- Guide learners to check rows and columns carefully.

For learners needing additional support:

- Start with shorter colour sequences first.
- Provide guided colouring examples.
- Allow learners to work with partners.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own colour-grid pattern.
- Design advanced repeating sequences.
- Challenge classmates with colour puzzles.
- Explain how the colour pattern repeats.

⇨ Activity D: Complete the Number Patterns

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise increasing and decreasing sequences.
- Identify addition and subtraction rules.
- Compare number differences carefully.
- Predict the next number logically.

Observe learners who:

- Cannot identify the rule in the sequence.
- Need repeated counting support.
- Confuse increasing and decreasing patterns.
- Make errors while extending the sequence.

Remediation Support

For learners struggling with number patterns:

- Use number lines for demonstration.
- Show the change between consecutive numbers clearly.
- Practise skip-counting regularly.
- Encourage learners to calculate aloud step by step.

For learners needing additional support:

- Start with simpler number sequences first.
- Use colour coding to highlight differences.
- Provide guided examples before independent work.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own number patterns.
- Use larger values and mixed operations independently.
- Challenge classmates with pattern puzzles.
- Explain how the rule changes the sequence.

Concept 1.4: Reason Wisdom (LB Pages 16–19)

⇨ Activity A: Find the Missing Number

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe relationships between numbers carefully.
- Recognise numerical patterns and operations.
- Apply logical reasoning step by step.
- Compare neighbouring values in diagrams.

Observe learners who:

- Cannot identify the relationship between numbers.
- Need repeated support with reasoning.
- Guess answers randomly.
- Struggle to explain how the answer is formed.

Remediation Support

For learners struggling with number reasoning:

- Discuss one diagram at a time.
- Highlight relationships between outer and centre numbers.
- Use simple addition or multiplication examples first.
- Encourage learners to verbalise their logic.

For learners needing additional support:

- Use smaller numerical patterns first.
- Provide guided reasoning examples.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own missing-number puzzle.
- Use larger or mixed operations independently.
- Challenge classmates with reasoning tasks.
- Explain how the pattern works logically.

⇨ Activity B: Choose the Correct Option

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe visual sequences carefully.

- Identify changes in shape, direction, or orientation.
- Compare answer options logically.
- Predict the next figure in a pattern.

Observe learners who:

- Cannot identify visual transformations.
- Need repeated visual support.
- Guess answers without analysis.
- Struggle to eliminate incorrect options.

Remediation Support

For learners struggling with visual reasoning:

- Discuss one sequence at a time.
- Highlight the changing feature clearly.
- Compare the first and second figures step by step.
- Encourage learners to explain their reasoning aloud.

For learners needing additional support:

- Use simpler visual sequences first.
- Provide guided examples before independent solving.
- Allow learners to work in pairs.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own visual reasoning puzzle.
- Use rotations and reflections independently.
- Challenge classmates with pattern-analysis tasks.
- Explain why one option is correct logically.

⇨ Activity C: Count the Number of Triangles

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Identify small and large triangles in figures.
- Observe overlapping shapes carefully.
- Count shapes systematically.
- Recognise hidden triangles in complex diagrams.

Observe learners who:

- Miss larger or hidden triangles.
- Double-count shapes.

- Need repeated visual guidance.
- Struggle to count systematically.

Remediation Support

For learners struggling with counting triangles:

- Count one triangle size at a time.
- Use coloured markers to highlight counted shapes.
- Break the figure into smaller sections.
- Encourage learners to verify totals carefully.

For learners needing additional support:

- Start with simpler triangle-count puzzles first.
- Use finger tracing during counting.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own triangle-count puzzle.
- Design complex geometric figures independently.
- Challenge classmates with hidden-shape activities.
- Explain counting strategies logically.

Concept 1.5: Verbal Reasoning (LB Pages 20–22)

➪ Activity A: Fill in the Missing Letter

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read incomplete words carefully.
- Recognise spelling patterns in words.
- Identify meaningful word combinations.
- Compare beginning and ending sounds logically.

Observe learners who:

- Cannot identify the correct missing letter.
- Need repeated spelling support.
- Struggle to form meaningful words.
- Guess letters without checking both words.

Remediation Support

For learners struggling with word completion:

- Read both incomplete words aloud together.
- Highlight beginning and ending sounds.
- Use picture-word flashcards for support.
- Encourage learners to test one letter at a time.

For learners needing additional support:

- Start with simpler word pairs first.
- Provide guided examples before independent work.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own missing-letter puzzles.
- Write more word pairs independently.
- Challenge classmates with verbal-reasoning tasks.
- Explain how one letter completes two words.

➪ Activity B: Identify the Correct Word Pair Sequence

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise patterns in word rearrangements.
- Compare letter order logically.
- Identify sequences in word transformations.
- Read word pairs carefully.

Observe learners who:

- Cannot identify the transformation pattern.
- Need repeated support with sequencing.
- Struggle to compare letter positions.
- Guess answers without analysis.

Remediation Support

For learners struggling with word patterns:

- Highlight letter positions clearly.
- Compare one word pair at a time.
- Use arrows to show sequence changes.
- Encourage learners to verbalise the transformation.

For learners needing additional support:

- Start with shorter words first.
- Provide guided examples before independent solving.
- Allow learners to work in pairs.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own word-sequence puzzle.
- Design advanced word transformations independently.
- Challenge classmates with verbal logic tasks.
- Explain how the sequence rule works.

➪ Activity C: Identify the Word that Comes Last Alphabetically

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Arrange words alphabetically.
- Compare letters step by step.
- Identify which word comes later in the alphabet.
- Use dictionary-order logic correctly.

Observe learners who:

- Confuse alphabetical order.
- Need repeated support comparing letters.
- Struggle when words begin with the same letters.
- Guess answers without systematic comparison.

Remediation Support

For learners struggling with alphabetical order:

- Compare words one letter at a time.
- Use alphabet charts for support.
- Highlight differing letters clearly.
- Encourage learners to read words aloud slowly.

For learners needing additional support:

- Start with shorter word sets first.
- Provide guided alphabetical examples.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own alphabetical-order challenge.
- Use longer and more complex words independently.
- Challenge classmates with sorting activities.
- Explain how dictionary order works logically.

Concept 1.6: Palindrome (LB Pages 23–25)

➪ Activity A: Identify Palindrome Words

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read words forwards and backwards.
- Recognise symmetrical word patterns.
- Compare letter sequences carefully.
- Identify words that remain unchanged when reversed.

Observe learners who:

- Cannot identify palindrome words correctly.
- Need repeated support with reverse reading.
- Struggle to compare letter order.
- Confuse similar-looking non-palindromes.

Remediation Support

For learners struggling with palindromes:

- Read words aloud forwards and backwards together.
- Highlight matching letters from both ends.
- Use shorter palindrome examples first.
- Encourage learners to check words step by step.

For learners needing additional support:

- Use flashcards with palindrome examples.
- Provide guided demonstrations before independent work.
- Allow learners to work with partners.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own palindrome words or phrases.
- Find palindrome numbers independently.

- Challenge classmates with palindrome games.
- Explain why a word is a palindrome logically.

➪ Activity B: Find Palindromes in the Word Grid

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Search for hidden words systematically.
- Read words in multiple directions.
- Recognise palindrome patterns visually.
- Compare words forwards and backwards.

Observe learners who:

- Cannot locate hidden palindromes correctly.
- Need repeated support scanning the grid.
- Struggle to identify words in different directions.
- Miss palindrome patterns while searching.

Remediation Support

For learners struggling with word searching:

- Highlight beginning letters of target words.
- Use finger tracing while scanning rows and columns.
- Search one word at a time together.
- Encourage learners to reverse-read identified words.

For learners needing additional support:

- Start with smaller grids first.
- Provide guided examples before independent searching.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own palindrome word-search puzzle.
- Hide words diagonally or vertically.
- Challenge classmates with hidden-word activities.
- Explain search strategies logically.

⇨ Activity C: Convert Numbers into Palindromes

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Reverse numbers correctly.
- Add numbers accurately.
- Recognise palindrome numbers.
- Follow repeated calculation steps logically.

Observe learners who:

- Make errors while reversing digits.
- Need repeated support with addition.
- Cannot recognise palindrome results.
- Struggle to follow multi-step processes.

Remediation Support

For learners struggling with number palindromes:

- Show one reverse-and-add example step by step.
- Use place-value explanation for reversing numbers.
- Encourage learners to check each addition carefully.
- Highlight palindrome results visually.

For learners needing additional support:

- Start with smaller numbers first.
- Provide guided examples before independent work.
- Allow learners to use rough calculations.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own palindrome-number challenge.
- Use larger numbers independently.
- Challenge classmates with reverse-and-add puzzles.
- Explain how repetition creates palindromes logically.

Coding Challenge – 1: Math Squares (LB Page 26)

⇨ Activity: Complete the Math Squares

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Perform arithmetic operations correctly.
- Follow BODMAS rules carefully.
- Recognise relationships between rows and columns.
- Use numbers logically without repetition.

Observe learners who:

- Ignore order of operations.
- Repeat numbers incorrectly.
- Need repeated support with equations.
- Struggle to analyse intersecting rows and columns.

Remediation Support

For learners struggling with math squares:

- Review BODMAS using simple examples.
- Solve one row or column at a time together.
- Highlight already-used numbers clearly.
- Encourage learners to verify equations step by step.

For learners needing additional support:

- Start with smaller arithmetic grids first.
- Provide guided examples before independent solving.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own math-square puzzle.
- Use mixed operations and larger values independently.
- Challenge classmates with logical arithmetic grids.
- Explain how logical sequencing solves the puzzle.

Concept 2.1: Tricky Way Out

(LB Pages 28–29)

➪ Activity A: Find Your Way Out

Diagnostic Check

(Work in Pairs)

Before the activity, ask learners to:

- Trace simple maze paths carefully.
- Identify starting and ending points in a maze.
- Recognise blocked paths and dead ends.
- Follow directional movement step by step.

Observe learners who:

- Lose track while tracing paths.
- Cross maze walls incorrectly.
- Need repeated teacher guidance.
- Struggle to identify the correct route logically.

Remediation Support

For learners struggling with maze navigation:

- Encourage finger tracing before drawing.
- Guide learners through one path at a time.
- Highlight dead ends clearly.
- Use arrows to demonstrate movement directions.

For learners needing additional support:

- Start with simpler maze activities first.
- Practise directional games regularly.
- Allow learners to work collaboratively.

Extension Activity

(Work Individually / in Groups)

Ask fast learners to:

- Create their own maze puzzle.
- Design multiple pathways independently.
- Challenge classmates with timed maze-solving tasks.
- Explain the strategy used to reach the exit.

⇨ Activity B: Help Mimbo Reach Nimbo

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe complex pathways carefully.
- Recognise alternative routes in a maze.
- Identify directions such as left, right, up, and down.
- Follow step-by-step movement logically.

Observe learners who:

- Choose incorrect paths repeatedly.
- Need repeated support with directions.
- Struggle to analyse the maze systematically.
- Cross blocked routes carelessly.

Remediation Support

For learners struggling with complex mazes:

- Use finger tracing before marking the path.
- Discuss one section of the maze at a time.
- Encourage learners to stop and check directions.
- Use colour markers to trace possible paths.

For learners needing additional support:

- Use simpler route puzzles first.
- Provide guided examples before independent solving.
- Allow learners to solve collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Design their own multi-path maze.
- Create dead-end challenges for classmates.
- Challenge classmates with route-solving games.
- Explain how backtracking helps solve mazes.

Concept 2.2: Analogy (LB Pages 30–31)

⇨ Activity A: Complete Each Analogy

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Identify relationships between word pairs.
- Recognise similarities in function or meaning.
- Read analogy statements carefully.
- Compare objects logically.

Observe learners who:

- Cannot identify the relationship correctly.
- Need repeated support understanding analogies.
- Guess answers randomly.
- Struggle to explain why a word fits.

Remediation Support

For learners struggling with analogies:

- Discuss one word pair at a time.
- Explain the relationship clearly using examples.
- Use real-life objects to demonstrate meaning.
- Encourage learners to explain the connection aloud.

For learners needing additional support:

- Start with simple object-function analogies first.
- Use picture cards for comparison activities.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own analogy pairs.
- Write analogy puzzles for classmates.
- Challenge classmates with relationship games.
- Explain how the analogy relationship works logically.

⇨ Activity B: Choose the Correct Word

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise object-function relationships.
- Compare professions and tools logically.
- Identify action-based word connections.
- Read analogy statements carefully.

Observe learners who:

- Cannot identify the correct relationship.
- Need repeated support with comparisons.
- Confuse object-purpose relationships.
- Struggle to eliminate incorrect options.

Remediation Support

For learners struggling with relationships:

- Discuss one analogy at a time.
- Compare objects and their functions visually.
- Use examples from real-life professions.
- Encourage learners to explain their reasoning aloud.

For learners needing additional support:

- Use picture-word flashcards for support.
- Provide guided analogy examples.
- Allow learners to work in pairs.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create advanced analogy puzzles.
- Write analogy relationships independently.
- Challenge classmates with comparison games.
- Explain how analogies show logical relationships.

⇨ Activity C: Picture Analogy

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe picture relationships carefully.
- Identify how objects are connected.
- Compare visual patterns logically.

- Recognise object-function relationships.

Observe learners who:

- Cannot identify picture relationships correctly.
- Need repeated visual support.
- Guess answers without analysis.
- Struggle to compare picture pairs logically.

Remediation Support

For learners struggling with picture analogies:

- Discuss the first pair of pictures step by step.
- Explain how the objects are related.
- Compare one answer option at a time.
- Encourage learners to verbalise the relationship.

For learners needing additional support:

- Use simpler picture analogies first.
- Provide guided examples before independent solving.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own picture analogies.
- Draw related picture pairs independently.
- Challenge classmates with visual analogy games.
- Explain the relationship between picture sets logically.

Concept 2.3: Logical Analysis (LB Pages 32–33)

➪ Activity A: Solve the Logical Equations

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise arithmetic operations correctly.
- Interpret symbolic equations carefully.
- Apply operations step by step.
- Compare numerical relationships logically.

Observe learners who:

- Confuse operation symbols.
- Need repeated support with calculations.

- Struggle to interpret coded equations.
- Guess answers without checking operations.

Remediation Support

For learners struggling with coded equations:

- Explain symbol meanings clearly.
- Replace one symbol at a time with the operation.
- Solve calculations step by step together.
- Encourage learners to verify answers carefully.

For learners needing additional support:

- Use smaller equations first.
- Provide operation charts for support.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own coded equations.
- Use mixed operations independently.
- Challenge classmates with logic-based calculations.
- Explain how symbols represent operations.

⇨ Activity B: Identify the Shape Transformation

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe shape transformations carefully.
- Recognise rotation, reflection, and movement patterns.
- Compare visual sequences logically.
- Predict the next transformed figure.

Observe learners who:

- Cannot identify transformation rules.
- Need repeated visual support.
- Guess answers without analysis.
- Struggle to compare shape changes systematically.

Remediation Support

For learners struggling with transformations:

- Discuss one transformation at a time.
- Highlight the changing feature clearly.

- Use arrows or overlays to show movement.
- Encourage learners to explain transformations aloud.

For learners needing additional support:

- Start with simple rotations first.
- Provide guided visual examples.
- Allow learners to work in pairs.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own transformation puzzle.
- Use reflections and rotations independently.
- Challenge classmates with visual reasoning games.
- Explain how the transformation rule works logically.

Concept 2.4: Line of Symmetry (LB Pages 34–35)

⇨ Activity A: Identify the Number of Lines of Symmetry

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise symmetrical shapes.
- Identify equal halves in figures.
- Visualise mirror-image folding.
- Compare balanced and unbalanced shapes.

Observe learners who:

- Cannot identify symmetry lines correctly.
- Need repeated visual support.
- Confuse symmetrical and non-symmetrical figures.
- Struggle to count multiple symmetry lines.

Remediation Support

For learners struggling with symmetry:

- Use folded paper shapes for demonstration.
- Show mirror reflections using reflective surfaces.
- Highlight symmetry lines using colours.
- Compare one shape at a time.

For learners needing additional support:

- Start with simple symmetrical shapes first.

- Provide guided examples before independent work.
- Allow learners to trace symmetry lines with fingers.

Extension Activity

(Work Individually / in Groups)

Ask fast learners to:

- Draw shapes with multiple symmetry lines.
- Create symmetrical patterns independently.
- Challenge classmates with symmetry puzzles.
- Explain why certain shapes have more symmetry lines.

➪ Activity B: Create Patterns with One Line of Symmetry

Diagnostic Check

(Work in Pairs)

Before the activity, ask learners to:

- Recognise patterns with symmetry.
- Observe equal coloured arrangements carefully.
- Identify a single line of symmetry logically.
- Compare balanced patterns visually.

Observe learners who:

- Cannot maintain symmetry while colouring.
- Need repeated support identifying symmetry lines.
- Colour boxes randomly.
- Struggle to create balanced designs.

Remediation Support

For learners struggling with symmetrical patterns:

- Use grid folding demonstrations.
- Highlight matching boxes across the symmetry line.
- Colour one side first, then mirror it.
- Encourage learners to compare both halves carefully.

For learners needing additional support:

- Start with simpler symmetrical grids first.
- Provide guided colouring examples.
- Allow collaborative pattern creation.

Extension Activity

(Work Individually / in Groups)

Ask fast learners to:

- Create complex symmetrical colour designs.
- Use multiple shapes and colours independently.

- Challenge classmates with symmetry activities.
- Explain how the pattern maintains balance.

➪ Activity C: Complete the Symmetrical Figure

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe half-figures carefully.
- Recognise mirror-image placement.
- Count grid distances accurately.
- Draw matching lines and curves.

Observe learners who:

- Cannot complete the missing half correctly.
- Need repeated guidance while drawing.
- Struggle with spatial placement.
- Forget matching distances across the line.

Remediation Support

For learners struggling with mirror drawing:

- Use grid counting for each point.
- Draw guide dots across the symmetry line.
- Compare both halves continuously.
- Encourage learners to draw lightly first.

For learners needing additional support:

- Use simpler half-shapes first.
- Provide guided tracing examples.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own symmetrical figures.
- Draw advanced mirror-image designs independently.
- Challenge classmates with symmetry tasks.
- Explain how symmetry creates balance visually.

Concept 2.5: Sudoku (LB Pages 36–38)

⇨ Activity A: Solve the Given Sudokus

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise numbers 1 to 9 correctly.
- Identify repeated numbers in rows and columns.
- Follow Sudoku rules carefully.
- Compare rows, columns, and boxes logically.

Observe learners who:

- Repeat numbers incorrectly.
- Need repeated guidance with Sudoku rules.
- Guess answers randomly.
- Struggle to check rows and columns systematically.

Remediation Support

For learners struggling with Sudoku:

- Explain Sudoku rules step by step.
- Check one row or column at a time together.
- Use elimination to remove impossible numbers.
- Encourage learners to verify each entry carefully.

For learners needing additional support:

- Start with partially completed Sudoku grids first.
- Highlight rows and columns visually.
- Allow collaborative solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own Sudoku puzzle.
- Solve advanced Sudoku grids independently.
- Challenge classmates with number puzzles.
- Explain Sudoku-solving strategies logically.

⇨ Activity B: Picture Sudoku

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise picture symbols correctly.
- Follow Sudoku rules using images.

- Compare rows and columns logically.
- Identify missing pictures systematically.

Observe learners who:

- Repeat picture symbols incorrectly.
- Need repeated support with Sudoku logic.
- Confuse image placement.
- Struggle to analyse rows and columns carefully.

Remediation Support

For learners struggling with picture Sudoku:

- Explain that Sudoku rules remain the same with pictures.
- Check one row and one column at a time together.
- Use elimination strategies for missing images.
- Encourage learners to verify entries carefully.

For learners needing additional support:

- Start with smaller picture Sudoku examples.
- Highlight rows and columns visually.
- Allow learners to solve collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own picture Sudoku puzzle.
- Use different objects or symbols independently.
- Challenge classmates with visual Sudoku games.
- Explain how logic solves Sudoku puzzles.

Concept 2.6: Coded Riddles (LB Page 39)

➪ Activity A: Solve the Coded Riddles

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise letter-number codes correctly.
- Decode simple sequences logically.
- Read hidden words carefully.
- Identify clues in riddles.

Observe learners who:

- Cannot match numbers with letters correctly.
- Need repeated support with decoding.
- Struggle to form meaningful words.
- Guess answers without checking clues.

Remediation Support

For learners struggling with coded riddles:

- Use the code chart step by step.
- Decode one letter at a time together.
- Encourage learners to read decoded words aloud.
- Discuss how the decoded word answers the riddle.

For learners needing additional support:

- Start with shorter coded words first.
- Use guided decoding examples.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own coded riddles.
- Write coded messages for classmates.
- Challenge classmates with decoding tasks.
- Explain how coding and decoding work logically.

Coding Challenge – 2: Fun with Rebus (LB Page 38)

⇨ Activity: Solve the Rebus Puzzles

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Observe pictures and symbols carefully.
- Recognise hidden meanings in visual clues.
- Combine words and images logically.
- Interpret picture-based patterns.

Observe learners who:

- Cannot identify rebus meanings correctly.
- Need repeated support with picture interpretation.

- Guess answers randomly.
- Struggle to combine clues into meaningful phrases.

Remediation Support

For learners struggling with rebus puzzles:

- Discuss one clue at a time.
- Break the rebus into smaller visual parts.
- Explain how pictures and words combine.
- Encourage learners to explain their reasoning aloud.

For learners needing additional support:

- Use simpler rebus examples first.
- Provide guided demonstrations before independent work.
- Allow learners to solve collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own rebus puzzle.
- Use symbols and pictures creatively.
- Challenge classmates with visual word games.
- Explain how the rebus clue forms the final answer.

Concept 3.1: Venn Diagram

(LB Pages 42–43)

➪ Activity A: Place Numbers in the Correct Venn Diagram

Diagnostic Check

(Work in Pairs)

Before the activity, ask learners to:

- Classify numbers based on conditions.
- Recognise even numbers, multiples, and comparison values.
- Identify similarities and differences between sets.
- Read conditions carefully before placing values.

Observe learners who:

- Cannot identify overlapping conditions correctly.
- Need repeated support with classification.
- Place numbers randomly without checking rules.
- Struggle to understand set intersections.

Remediation Support

For learners struggling with Venn diagrams:

- Explain one set condition at a time.
- Use coloured circles to show overlaps visually.
- Compare one number against both conditions step by step.
- Use real-life examples of overlapping groups.

For learners needing additional support:

- Start with simple two-condition diagrams first.
- Use number cards for sorting practice.
- Allow collaborative problem solving.

Extension Activity

(Work Individually / in Groups)

Ask fast learners to:

- Create their own Venn diagram puzzle.
- Use larger numbers and multiple conditions independently.
- Challenge classmates with classification tasks.
- Explain why numbers belong to intersections logically.

Concept 3.2: Data Compression (LB Pages 44–46)

⇨ Activity A: Rewrite the Compressed Story

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise common abbreviations correctly.
- Read compressed sentences carefully.
- Expand short forms into complete words.
- Understand the meaning of abbreviated text.

Observe learners who:

- Cannot identify abbreviation meanings correctly.
- Need repeated vocabulary support.
- Struggle to rewrite complete sentences.
- Forget the meaning while expanding the text.

Remediation Support

For learners struggling with abbreviations:

- Read abbreviations and full forms aloud together.
- Use flashcards for abbreviation practice.
- Highlight abbreviations clearly in the story.
- Expand one sentence at a time together.

For learners needing additional support:

- Start with shorter compressed passages first.
- Provide guided examples before independent rewriting.
- Allow collaborative decoding.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own compressed paragraph.
- Write and exchange abbreviation puzzles.
- Challenge classmates with decoding tasks.
- Explain how data compression saves time and space.

⇨ Activity B: Decode the Story (Using Symbols)

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise picture symbols and their meanings.

- Replace symbols with correct words logically.
- Read story sentences carefully.
- Interpret visual clues step by step.

Observe learners who:

- Cannot identify picture meanings correctly.
- Need repeated support with decoding.
- Struggle to form meaningful sentences.
- Forget story sequence while rewriting.

Remediation Support

For learners struggling with decoding:

- Discuss one picture symbol at a time.
- Read the story aloud together slowly.
- Replace images with words step by step.
- Encourage learners to verify sentence meaning.

For learners needing additional support:

- Use simpler picture stories first.
- Provide guided examples before independent work.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own symbol-based story.
- Write compressed stories for classmates.
- Challenge classmates with decoding activities.
- Explain how symbols represent information efficiently.

Concept 3.3: Data and Information (LB Pages 47–51)

➪ Activity A: Transportation Hierarchy

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Identify categories of transportation.
- Classify vehicles into land, water, and air transport.
- Observe hierarchical diagrams carefully.
- Recognise parent and subcategories logically.

Observe learners who:

- Cannot classify transportation correctly.
- Need repeated support understanding hierarchy.
- Confuse vehicle categories.
- Struggle to complete missing labels logically.

Remediation Support

For learners struggling with classification:

- Discuss one transport category at a time.
- Use picture cards of vehicles for sorting practice.
- Compare transport examples visually.
- Encourage learners to explain category choices aloud.

For learners needing additional support:

- Use simplified hierarchy charts first.
- Provide guided examples before independent work.
- Allow collaborative classification.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own transportation hierarchy chart.
- Add more transport examples independently.
- Challenge classmates with classification activities.
- Explain how hierarchical diagrams organise information.

⇨ Activity B: Bar Graph Interpretation

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read bar graphs correctly.
- Compare heights of bars visually.
- Identify quantities represented by bars.
- Read labels on both axes carefully.

Observe learners who:

- Cannot interpret graph values correctly.
- Need repeated visual guidance.
- Confuse categories and quantities.
- Struggle to compare bars logically.

Remediation Support

For learners struggling with graphs:

- Explain axes and labels step by step.
- Show how taller bars represent larger quantities.
- Compare one bar at a time together.
- Use classroom examples to create simple bar graphs.

For learners needing additional support:

- Highlight bars using colours.
- Use finger tracking while reading graphs.
- Practise interpreting smaller graphs first.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own bar graph using classroom data.
- Write questions based on the graph.
- Compare categories independently.
- Explain graph trends logically.

➪ Activity C: Line Graph – Time Spent Playing Basketball

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read values from tables correctly.
- Plot points on a graph accurately.
- Identify increases and decreases in values.
- Compare trends across days logically.

Observe learners who:

- Cannot plot points accurately.
- Need repeated support reading graph scales.
- Struggle to identify trends.
- Confuse axes while plotting data.

Remediation Support

For learners struggling with line graphs:

- Explain x-axis and y-axis clearly.
- Plot one point at a time together.
- Use rulers for joining points neatly.
- Discuss graph changes step by step.

For learners needing additional support:

- Start with fewer data points first.
- Provide guided plotting examples.
- Allow collaborative graph interpretation.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own line graph using collected data.
- Compare trends independently.
- Write questions based on graph patterns.
- Explain increases and decreases logically.

➪ Activity D: Line Graph – Spelling Test Scores

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read graph scales correctly.
- Interpret values from plotted data.
- Identify highest, lowest, and most common values.
- Compare score distributions logically.

Observe learners who:

- Cannot interpret graph values accurately.
- Need repeated support understanding graph trends.
- Confuse scores with learner counts.
- Struggle to identify modal values.

Remediation Support

For learners struggling with interpretation:

- Read one graph point at a time together.
- Highlight highest and lowest points visually.
- Discuss graph labels carefully.
- Use examples to explain mode and comparison.

For learners needing additional support:

- Start with smaller graphs first.
- Provide guided interpretation questions.
- Allow learners to discuss answers collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own score graph.
- Compare graph trends independently.
- Write interpretation questions for classmates.
- Explain how graphs help analyse information.

Concept 3.4: Decode the Code (LB Pages 52–53)

➪ Activity A: Decode and Choose the Correct Option

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise coded relationships between letters, numbers, and symbols.
- Interpret patterns carefully.
- Apply rules step by step.
- Compare options logically.

Observe learners who:

- Cannot identify the coding rule correctly.
- Need repeated support analysing patterns.
- Guess answers without checking logic.
- Struggle to apply rules consistently.

Remediation Support

For learners struggling with coding rules:

- Explain one coding pattern at a time.
- Show examples of how letters or numbers transform.
- Use colour coding to highlight patterns.
- Encourage learners to explain each step aloud.

For learners needing additional support:

- Start with simpler code examples first.
- Provide guided decoding demonstrations.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own coding system.
- Write coded puzzles for classmates.

- Challenge classmates with advanced decoding tasks.
- Explain how the coding rule works logically.

Concept 3.5: Binary Representation of Information (LB Pages 54–55)

⇨ Activity A: Complete the Binary Grid

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise binary values 0 and 1.
- Read row-column codes carefully.
- Match binary values with grid positions.
- Observe patterns in binary representation logically.

Observe learners who:

- Confuse 0 and 1 placements.
- Need repeated support mapping codes.
- Struggle to follow row-column references.
- Make sequencing errors in the grid.

Remediation Support

For learners struggling with binary grids:

- Explain row-column mapping step by step.
- Fill one row together before independent work.
- Use colour coding for 0 and 1.
- Encourage learners to verify entries carefully.

For learners needing additional support:

- Start with smaller binary grids first.
- Provide guided examples before independent solving.
- Allow collaborative coding activities.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own binary grid puzzle.
- Design patterns using binary values independently.

- Challenge classmates with binary games.
- Explain how binary represents information in computers.

➪ Activity B: Binary Numbers and Problem Solving

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read binary numbers carefully.
- Compare binary and decimal values logically.
- Solve arithmetic problems step by step.
- Recognise patterns in binary counting.

Observe learners who:

- Cannot identify binary values correctly.
- Need repeated support converting values.
- Struggle to compare binary sequences.
- Make arithmetic errors during problem solving.

Remediation Support

For learners struggling with binary numbers:

- Review decimal-to-binary examples slowly.
- Use place-value charts for binary conversion.
- Compare binary and decimal side by side.
- Encourage learners to calculate step by step.

For learners needing additional support:

- Start with smaller binary numbers first.
- Provide guided conversion examples.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Convert larger decimal numbers into binary.
- Create binary arithmetic puzzles independently.
- Challenge classmates with binary-conversion tasks.
- Explain how computers use binary for calculations.

Coding Challenge – 3: Venn Diagrams (LB Page 56)

⇨ Activity: Place the Names in the Correct Venn Diagram

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read information tables carefully.
- Classify people based on conditions.
- Recognise overlapping categories logically.
- Compare attributes such as age, height, and preferences.

Observe learners who:

- Cannot interpret conditions correctly.
- Need repeated support with classification.
- Confuse overlapping regions in the Venn diagram.
- Struggle to compare multiple attributes logically.

Remediation Support

For learners struggling with classification:

- Discuss one condition at a time.
- Highlight overlapping regions clearly.
- Compare one person's attributes step by step.
- Use colour coding for different categories.

For learners needing additional support:

- Start with simpler Venn diagrams first.
- Use picture cards or simpler categories.
- Allow collaborative classification activities.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own Venn diagram challenge.
- Use more than two conditions independently.
- Challenge classmates with classification tasks.
- Explain why certain names belong in overlapping regions logically.

Level 4: Algorithmic Intelligence

Concept 4.1: Algorithm (LB Pages 58–59)

➪ Activity A: Algorithm – Organising a Birthday Party

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Identify tasks that follow a sequence of steps.
- Recognise beginning, middle, and ending stages in planning.
- Read instruction-based activities carefully.
- Arrange actions logically in order.

Observe learners who:

- Mix up the order of tasks.
- Need repeated support understanding sequences.
- Skip important planning steps.
- Struggle to explain why one step comes before another.

Remediation Support

For learners struggling with algorithms:

- Discuss one planning step at a time.
- Use real-life birthday examples for support.
- Arrange step cards physically before numbering them.
- Encourage learners to verbalise the sequence aloud.

For learners needing additional support:

- Start with shorter task sequences first.
- Provide guided examples before independent work.
- Allow learners to work collaboratively.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Write their own birthday-party algorithm.
- Create planning flowcharts independently.
- Challenge classmates with sequencing tasks.
- Explain why order is important in event planning.

⇨ Activity B: Algorithm to Find Area of Rectangle

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recall the formula for area of a rectangle.
- Recognise input, operation, and output.
- Follow mathematical procedures step by step.
- Read algorithm instructions carefully.

Observe learners who:

- Forget the formula for area.
- Need repeated support with sequencing instructions.
- Confuse multiplication with addition.
- Struggle to identify output steps logically.

Remediation Support

For learners struggling with mathematical algorithms:

- Revise the rectangle area formula visually.
- Discuss one algorithm step at a time.
- Use labelled diagrams for length and breadth.
- Encourage learners to explain the process aloud.

For learners needing additional support:

- Start with simpler arithmetic algorithms first.
- Provide guided examples before independent writing.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Write algorithms for perimeter or volume calculations.
- Create algorithm cards for classmates.
- Challenge classmates with formula-based tasks.
- Explain how algorithms simplify calculations.

⇨ Activity C: Algorithm to Find Perimeter of Square

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recall the formula for perimeter of a square.
- Recognise repeated multiplication in formulas.
- Follow step-by-step mathematical instructions.

- Identify input and output values correctly.

Observe learners who:

- Forget the perimeter formula.
- Need repeated support sequencing steps.
- Confuse perimeter and area concepts.
- Struggle to identify the correct operation.

Remediation Support

For learners struggling with perimeter algorithms:

- Revise square properties using diagrams.
- Explain each algorithm step slowly.
- Show how multiplying side × 4 gives the perimeter.
- Encourage learners to verbalise calculations aloud.

For learners needing additional support:

- Use small numerical examples first.
- Provide guided examples before independent work.
- Allow learners to use rough calculations.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Write algorithms for other geometric shapes.
- Create formula-based coding tasks independently.
- Challenge classmates with perimeter calculations.
- Explain how formulas work as algorithms.

Concept 4.2: Programs: Conditions (If–Then–Else) (LB Pages 60–67)

➪ Activity A: Real-Life Conditions

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise if–then situations in daily life.
- Identify conditions and outcomes logically.
- Compare true and false situations.
- Read conditional statements carefully.

Observe learners who:

- Cannot identify conditions clearly.
- Need repeated support with outcomes.

- Confuse "if" and "then" parts.
- Struggle to explain logical consequences.

Remediation Support

For learners struggling with conditions:

- Use real-life examples such as weather or school routines.
- Discuss one condition at a time.
- Highlight keywords like "if" and "then."
- Encourage learners to explain outcomes aloud.

For learners needing additional support:

- Use picture-based condition cards.
- Role-play simple conditional situations.
- Allow collaborative discussion before writing answers.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Write their own real-life conditional statements.
- Create if–then puzzles for classmates.
- Challenge classmates with logical outcomes.
- Explain how conditions influence actions.

➪ Activity B: Apply Multiple Conditions

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise AND and OR conditions correctly.
- Compare multiple conditions logically.
- Identify true and false combinations.
- Read compound conditions carefully.

Observe learners who:

- Confuse AND and OR logic.
- Need repeated support evaluating conditions.
- Struggle to identify combined outcomes.
- Guess answers without checking conditions.

Remediation Support

For learners struggling with multiple conditions:

- Use simple truth-table examples.
- Discuss one condition separately before combining them.

- Use colour coding for true and false statements.
- Encourage learners to explain why a result is true or false.

For learners needing additional support:

- Start with simple AND/OR examples first.
- Provide guided conditional reasoning tasks.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own AND/OR condition problems.
- Write truth-based puzzles independently.
- Challenge classmates with logical comparisons.
- Explain how computers evaluate conditions.

⇨ Activity C: Examine Programs and Predict Output

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read simple programs step by step.
- Identify conditions and outputs.
- Evaluate mathematical expressions correctly.
- Predict outcomes logically.

Observe learners who:

- Cannot follow program flow correctly.
- Need repeated support with condition evaluation.
- Confuse outputs for true and false conditions.
- Struggle to interpret program logic.

Remediation Support

For learners struggling with program outputs:

- Explain one condition at a time.
- Evaluate expressions step by step together.
- Highlight which output matches each condition.
- Encourage learners to verbalise the logic aloud.

For learners needing additional support:

- Start with simple if–else examples first.
- Provide guided program-tracing examples.
- Allow collaborative prediction activities.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Write their own conditional programs.
- Create output-prediction puzzles independently.
- Challenge classmates with logic-based tasks.
- Explain how conditions determine outputs.

⇨ Activity D–F: Writing Conditional Statements

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Write simple if–then statements correctly.
- Recognise conditions and results logically.
- Use AND and OR conditions accurately.
- Identify true and false situations in real life.

Observe learners who:

- Cannot frame conditional statements correctly.
- Need repeated support with logical wording.
- Confuse conditions and outcomes.
- Struggle to apply AND/OR logic.

Remediation Support

For learners struggling with conditional writing:

- Use sentence templates for if–then–else structure.
- Discuss one real-life condition at a time.
- Highlight logical connectors clearly.
- Encourage learners to explain conditions verbally first.

For learners needing additional support:

- Use simple examples before complex conditions.
- Provide guided sentence completion tasks.
- Allow collaborative writing practice.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Write advanced conditional programs.
- Create condition cards for classmates.
- Challenge classmates with logic-based statements.
- Explain how conditions influence program decisions.

⇨ Activity G: Evaluate Conditions and Write Output

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Substitute values into conditions correctly.
- Evaluate logical expressions step by step.
- Identify outputs based on conditions.
- Compare values logically.

Observe learners who:

- Make errors evaluating conditions.
- Need repeated support with substitution.
- Confuse outputs for true and false cases.
- Struggle to follow the sequence of evaluation.

Remediation Support

For learners struggling with condition evaluation:

- Substitute one value at a time together.
- Evaluate conditions step by step aloud.
- Highlight true and false results clearly.
- Encourage learners to check calculations carefully.

For learners needing additional support:

- Start with simpler value substitutions first.
- Provide guided examples before independent work.
- Allow collaborative evaluation tasks.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own condition-evaluation problems.
- Use larger values and multiple conditions independently.
- Challenge classmates with output-prediction tasks.
- Explain how conditions affect outputs logically.

⇨ Activity H: Nested Conditions (If–Else)

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise multiple conditional branches.
- Identify divisibility rules correctly.
- Follow nested if–else logic step by step.
- Compare outputs based on conditions.

Observe learners who:

- Cannot follow nested conditions correctly.
- Need repeated support with divisibility checks.
- Confuse the order of condition evaluation.
- Struggle to determine final outputs logically.

Remediation Support

For learners struggling with nested conditions:

- Explain one condition branch at a time.
- Use flowcharts to show decision paths.
- Check divisibility rules step by step.
- Encourage learners to evaluate conditions aloud.

For learners needing additional support:

- Start with simple if–else examples first.
- Provide guided nested-condition demonstrations.
- Allow collaborative problem solving.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own nested-condition program.
- Use additional divisibility rules independently.
- Challenge classmates with logic-based tasks.
- Explain how nested conditions work step by step.

Concept 4.3: Programs: Loops (LB Pages 68–70)

➪ Activity A: Program Using Loop

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Recognise repeated instructions in a sequence.
- Identify patterns of movement logically.
- Compare loop and non-loop instructions.
- Follow repeated actions step by step.

Observe learners who:

- Cannot identify repeated steps.
- Need repeated support understanding loops.
- Confuse single and repeated actions.
- Struggle to simplify repeated instructions.

Remediation Support

For learners struggling with loops:

- Highlight repeated actions using colours.
- Compare loop and non-loop examples side by side.
- Use physical movement demonstrations.
- Encourage learners to count repetitions aloud.

For learners needing additional support:

- Start with shorter loops first.
- Use arrows to show repeated movement clearly.
- Allow collaborative practice.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own loop-based movement program.
- Simplify long instructions using loops.
- Challenge classmates with loop puzzles.
- Explain how loops reduce repetition.

Activity B: Output of Loop Programs

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Read loop instructions carefully.
- Recognise repeated execution of conditions.
- Predict outputs based on loops logically.
- Follow repeated actions step by step.

Observe learners who:

- Cannot track repeated outputs correctly.
- Need repeated support with loops and conditions together.
- Confuse loop count and outputs.
- Struggle to analyse repeated program execution.

Remediation Support

For learners struggling with loop outputs:

- Evaluate one repetition at a time together.
- Highlight each loop cycle clearly.
- Use tables to track outputs step by step.
- Encourage learners to verbalise outputs aloud.

For learners needing additional support:

- Start with loops repeating fewer times first.

- Provide guided examples before independent work.
- Allow collaborative prediction tasks.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own loop-output programs.
- Predict outputs for advanced loops independently.
- Challenge classmates with repeated-condition puzzles.
- Explain how loops repeatedly execute instructions.

⇨ Activity C: Perform Loop Instructions

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Follow repeated instructions accurately.
- Recognise patterns formed by loops.
- Identify movement directions in a grid.
- Observe repeated sequences logically.

Observe learners who:

- Cannot follow repeated movement instructions.
- Need repeated support with loop patterns.
- Skip steps while repeating actions.
- Struggle to maintain sequence consistency.

Remediation Support

For learners struggling with loop instructions:

- Demonstrate one loop cycle physically.
- Highlight repeated movement patterns clearly.
- Use arrows and symbols for movement guidance.
- Encourage learners to count repetitions aloud.

For learners needing additional support:

- Start with simple repeated instructions first.
- Provide guided examples before independent work.
- Allow collaborative loop practice.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own loop-pattern activity.
- Design repeated movement instructions independently.
- Challenge classmates with pattern-based tasks.
- Explain how loops create repeated outputs.

Coding Challenge – 4: Where is Esi? (LB Page 71)

⇨ Activity: Trace Esi's Path

Diagnostic Check *(Work in Pairs)*

Before the activity, ask learners to:

- Identify directions such as North, South, East, and West.
- Follow step-by-step movement instructions.
- Recognise left and right turns logically.
- Track movement on a grid carefully.

Observe learners who:

- Confuse directions while tracing paths.
- Need repeated support counting blocks.
- Struggle to follow multi-step instructions.
- Lose track of movement during navigation.

Remediation Support

For learners struggling with directional movement:

- Use a classroom compass chart for demonstration.
- Practise left-right and cardinal directions physically.
- Trace one instruction step at a time together.
- Encourage learners to count blocks aloud.

For learners needing additional support:

- Start with simpler grid-navigation tasks first.
- Provide guided examples before independent tracing.
- Allow collaborative path tracking.

Extension Activity *(Work Individually / in Groups)*

Ask fast learners to:

- Create their own direction-based grid puzzle.
- Write movement instructions independently.
- Challenge classmates with path-following games.
- Explain how algorithms help track movement logically.

Core Competencies Mapping

LEVEL 1: REASONING

Concept	Core Competencies Developed
1.1 Arithmagons	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
1.2 Number Puzzle	Critical Thinking and Problem Solving (CP)
1.3 Patterns	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
1.4 Reason Wisdom	Critical Thinking and Problem Solving (CP)
1.5 Verbal Reasoning	Critical Thinking and Problem Solving (CP)
1.6 Palindrome	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
Coding Challenge-1: Math Squares	Critical Thinking and Problem Solving (CP)

LEVEL 2: CRITICAL THINKING AND ANALYSIS

Concept	Core Competencies Developed
2.1 Tricky Way Out	Critical Thinking and Problem Solving (CP); Communication and Collaboration (CC)
2.2 Analogy	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
2.3 Logical Analysis	Critical Thinking and Problem Solving (CP)
2.4 Line of Symmetry	Critical Thinking and Problem Solving (CP); Creativity and Innovation (CI); Digital Literacy (DL)
2.5 Sudoku	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
2.6 Coded Riddles	Critical Thinking and Problem Solving (CP)
Coding Challenge-2: Fun with Rebus	Critical Thinking and Problem Solving (CP); Creativity and Innovation (CI)

LEVEL 3: DATA PROCESSING

Concept	Core Competencies Developed
3.1 Venn Diagram	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
3.2 Data Compression	Digital Literacy (DL); Critical Thinking and Problem Solving (CP)
3.3 Data and Information	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
3.4 Decode the Code	Digital Literacy (DL); Critical Thinking and Problem Solving (CP)
3.5 Binary Representation of Information	Digital Literacy (DL); Critical Thinking and Problem Solving (CP)
Coding Challenge-3: Venn Diagrams	Critical Thinking and Problem Solving (CP)

LEVEL 4: ALGORITHMIC INTELLIGENCE

Concept	Core Competencies Developed
4.1 Algorithm	Critical Thinking and Problem Solving (CP); Digital Literacy (DL); Creativity and Innovation (CI)
4.2 Program: Conditions	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
4.3 Programs: Loops	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)
Coding Challenge-4: Where is Esi?	Critical Thinking and Problem Solving (CP); Digital Literacy (DL)

Facilitator's Page-wise Teaching Instructions

Level 1 Reasoning

Reasoning activities help learners develop logical thinking, pattern recognition, number relationships, and language reasoning skills. These abilities form an important foundation for computational thinking and prepare learners for more advanced coding concepts such as algorithms, decision making, and problem solving.

In this level, learners engage with activities that require them to analyse number puzzles, recognise patterns, solve logical problems, and identify relationships between words and numbers. These activities strengthen learners' ability to observe details, think critically, and apply reasoning to reach correct solutions.

Through these activities, learners begin to understand that complex problems can often be solved by breaking them into smaller logical steps and identifying patterns, which is a key principle used in coding and programming.

Concept 1.1: Arithmagons

(LB Pages 8–9)

Teaching Intent

To help learners understand number relationships and logical reasoning through arithmagon puzzles.

Arithmagons are shapes where numbers placed on the sides are obtained by adding the two numbers at the adjacent corners.

These puzzles help learners practise addition and logical deduction.

Concept Explanation

In an arithmagon:

- Circles represent the numbers at the vertices.
- Boxes on the sides represent the sum of the two adjacent circle numbers.

Example rule:

Circle number + Circle number = Side number

Learners must determine the missing numbers by analysing the relationships between the numbers given.

⇨ Activity A: Solve the Arithmagons

Teacher Instructions

- Ask learners to observe the numbers given in the circles and boxes.
- Explain that each side number equals the sum of the two adjacent corner numbers.
- Ask learners to calculate the missing values using addition or subtraction.
- Encourage learners to verify their answers by checking all sides of the shape.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which two numbers make the number shown on the side?
- If the side value is 15 and one circle is 9, what must the other circle be?
- Can we subtract to find the missing number?

Teacher Guidance

Help learners understand that:

- Logical reasoning helps determine unknown numbers.
- Checking each side ensures the solution is correct.

Reinforce:

Arithmagons develop numerical reasoning and logical deduction, which are useful in coding and mathematical problem solving.

Concept 1.2: Number Puzzle (LB Pages 10–12)

Teaching Intent

To help learners strengthen their numerical reasoning, mental arithmetic, and logical problem-solving skills by solving interconnected number puzzles.

Through these puzzles, learners practise basic arithmetic operations such as addition, subtraction, multiplication, and division, while also developing the ability to analyse relationships between numbers in different directions.

These activities encourage learners to think carefully about how numbers interact and to use reasoning to determine missing values.

Concept Explanation

A number puzzle is a mathematical puzzle where some numbers are missing and must be found by applying arithmetic operations correctly.

In these puzzles:

- Numbers are connected through mathematical equations.
- The puzzles may run horizontally or vertically.
- Each blank box must be filled with the correct number so that the equation becomes true.

To solve a number puzzle, learners must:

1. Carefully read each equation.
2. Apply the correct arithmetic operation.
3. Check that the answer works in both directions if boxes intersect.

These puzzles help learners practise logical thinking and accuracy in calculations, which are important skills in coding and computational thinking.

➪ Activity A: Fill the Boxes and Complete the Number Puzzle

Teacher Instructions

- Ask learners to observe the puzzle carefully.
- Explain that each row or column represents a mathematical equation.
- Tell learners to solve the equations and write the missing numbers in the blank boxes.
- Encourage them to check intersecting boxes to ensure the numbers satisfy both equations.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which equation looks easiest to solve first?
- If the result of the equation is 20, what two numbers could produce that result?
- Does the number you filled also work for the vertical equation?

Encourage learners to solve simpler equations first and then move to the more complex ones.

Teacher Guidance

Help learners understand that:

- Solving easier equations first often reveals numbers needed for other parts of the puzzle.
- Checking answers in both directions ensures accuracy.

Reinforce:

Number puzzles require careful observation and logical reasoning.

➪ Activity B: Complete the Number Puzzle Using Arithmetic Operations

Teacher Instructions

- Ask learners to identify the operations shown between the boxes.
- Guide them to complete the puzzle step by step by solving each equation.
- Encourage learners to verify their answers by checking intersecting equations.

Teacher–Learner Interaction

Ask questions such as:

- What number added to 7 gives 15?
- What happens when we multiply 4 by 7?
- Which equation can be solved first?

Encourage learners to write rough calculations if needed.

Teacher Guidance

Explain that:

- Each number placed in a box may affect other equations connected to it.
- Logical thinking helps determine the correct values.

Reinforce:

Checking results helps avoid mistakes in multi-step puzzles.

➪ Activity C: Solve the Extended Number Puzzle

Teacher Instructions

- Ask learners to carefully analyse each equation.
- Encourage them to fill the blanks systematically.
- Remind learners to verify answers by checking both horizontal and vertical equations.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which operation appears in this equation?
- What number must be added or subtracted to reach the result?

- Does the number fit correctly in the crossing equation?

Encourage learners to explain their reasoning.

Teacher Guidance

Help learners understand that:

- Logical reasoning helps identify the correct sequence of steps.
- Some numbers can be discovered only after solving other parts of the puzzle.

Reinforce:

Number puzzles improve problem-solving skills and strengthen mathematical thinking.

Concept 1.3: Patterns (LB Pages 13–15)

Teaching Intent

To help learners recognise, analyse, and complete visual, colour, shape, and number patterns.

Through engaging pattern-based activities, learners practise identifying repeating sequences and predicting the next element in a pattern. These skills strengthen observation, logical reasoning, and analytical thinking, which are essential foundations for computational thinking and coding.

By working with different types of patterns, learners begin to understand that patterns follow specific rules, and identifying these rules helps predict future elements in a sequence.

Concept Explanation

A pattern is a sequence of objects, numbers, shapes, or colours that follow a particular rule and repeat in a predictable way.

Patterns can appear in many forms, such as:

- **Shape patterns** – repeating shapes or arrangements
- **Colour patterns** – repeating colour sequences
- **Number patterns** – numbers increasing or decreasing by a fixed rule

Example:

2, 4, 6, 8, 10

In this sequence, the rule is add 2 each time.

Recognising patterns helps learners develop logical thinking because they must observe the sequence, identify the rule, and apply the rule to predict the next item.

Pattern recognition is also an important skill in coding because computer programs often rely on repeating structures and logical sequences.

➪ Activity A: Identify the Next Picture in the Pattern

Teacher Instructions

- Ask learners to observe the sequence of shapes carefully.
- Explain that the shapes follow a particular repeating rule.
- Encourage learners to analyse how the shapes change in position, colour, or orientation.
- Ask them to tick the correct picture that completes the pattern.

Teacher–Learner Interaction

Ask guiding questions such as:

- What changes in each step of the pattern?
- Are the shapes rotating or repeating?
- Which option continues the same rule?

Encourage learners to explain how they identified the correct answer.

Teacher Guidance

Help learners understand that:

- Patterns may involve changes in position, colour, or direction.
- Careful observation helps identify the pattern rule.

Reinforce:

Patterns help organise information and predict future elements in a sequence.

➪ Activity B: Draw and Complete the Pattern

Teacher Instructions

- Ask learners to study the shapes and objects shown in each sequence.
- Encourage them to observe how the shapes repeat or change.
- Ask learners to draw the next shapes that continue the pattern.

Teacher–Learner Interaction

Ask guiding questions such as:

- What object comes next in the repeating sequence?
- Is the pattern repeating or changing gradually?

- How many shapes repeat before the pattern starts again?

Encourage learners to describe the rule they identified.

Teacher Guidance

Explain that:

- Some patterns repeat in cycles.
- Others change gradually in position or orientation.

Reinforce

Understanding the rule helps predict the next element in the sequence.

➪ Activity C: Complete the Colour Pattern

Teacher Instructions

- Ask learners to observe the coloured grid carefully.
- Explain that the colours follow a repeating pattern.
- Encourage learners to identify the colour sequence.
- Ask them to fill the blank spaces using the same colour pattern.

Teacher–Learner Interaction

Ask questions such as:

- Which colour appears after blue?
- Do the colours repeat in the same order in each row?
- What colour should fill the next box?

Encourage learners to check the pattern across both rows and columns.

Teacher Guidance

Explain that:

- Colour patterns often repeat at regular intervals.
- Recognising the repeating unit helps complete the grid correctly.

Reinforce

Patterns can appear in colours, shapes, numbers, and many real-life situations.

➪ Activity D: Complete the Number Patterns

Teacher Instructions

- Ask learners to read the numbers carefully.

- Explain that each sequence follows a rule such as adding or subtracting a fixed number.
- Encourage learners to identify the rule before filling the blanks.

Teacher–Learner Interaction

Ask guiding questions such as:

- What is the difference between the first two numbers?
- Does the pattern increase or decrease?
- What number should come next if the rule continues?

Encourage learners to test their answers.

Teacher Guidance

Help learners understand that:

- Number patterns follow a consistent rule.
- Identifying the rule helps predict the remaining numbers.

Reinforce

Number patterns help develop logical thinking and problem-solving skills used in coding.

Concept 1.4: Reason Wisdom (LB Pages 16–19)

Teaching Intent

To help learners develop logical reasoning, analytical thinking, and pattern recognition skills by solving reasoning puzzles involving numbers, letters, shapes, and symbols.

These activities encourage learners to carefully observe relationships between different elements and use logical rules to determine missing values or identify correct patterns.

Through such reasoning exercises, learners practise analysing information, identifying hidden patterns, and applying logical thinking to reach correct conclusions. These abilities form an important foundation for computational thinking and problem-solving in coding.

Concept Explanation

Reasoning puzzles are problems that require learners to think logically and identify relationships between numbers, letters, shapes, or symbols.

To solve such puzzles, learners must:

- observe patterns carefully
- identify relationships between elements
- apply logical rules to find the correct answer

For example, in some puzzles the numbers in a circle may combine to produce a number in the centre. In others, letters may follow alphabetical patterns or shapes may change in orientation.

By analysing these relationships step by step, learners can determine the missing value or complete the sequence.

Reasoning puzzles strengthen important thinking skills such as logical analysis, problem solving, and pattern recognition, which are widely used in mathematics, science, and computer programming.

⇨ Activity A: Find the Missing Number

Teacher Instructions

- Ask learners to observe each diagram carefully.
- Explain that the numbers or letters follow a specific rule or pattern.
- Encourage learners to analyse the relationship between the given values.
- Ask them to determine the missing number or letter that completes the pattern.

Teacher–Learner Interaction

Ask guiding questions such as:

- What relationship do you notice between the numbers in the shapes?
- How might the outer numbers combine to produce the centre number?
- Does the pattern involve addition, subtraction, or multiplication?
- Do the letters follow alphabetical order?

Encourage learners to explain their reasoning.

Teacher Guidance

Help learners understand that:

- Many reasoning puzzles follow simple mathematical relationships.
- Looking for patterns between neighbouring numbers helps identify the rule.
- Careful observation often reveals the missing value.

Reinforce

Logical reasoning helps identify patterns and solve complex problems.

➪ Activity B: Choose the Correct Option

Teacher Instructions

- Ask learners to study the sequence of shapes, arrows, or symbols.
- Explain that each sequence follows a pattern or rule.
- Encourage learners to compare the given options carefully.
- Ask them to choose the option that best continues the pattern.

Teacher–Learner Interaction

Ask guiding questions such as:

- What change occurs between the first and second figures?
- Is the shape rotating or changing direction?
- Does the number of lines or shapes increase or decrease?

Encourage learners to justify their answers.

Teacher Guidance

Explain that:

- Visual patterns may involve rotation, reflection, or repetition.
- Careful comparison helps identify the correct continuation of the sequence.

Reinforce

Observing small visual changes is an important skill in logical reasoning.

➪ Activity C: Count the Number of Triangles

Teacher Instructions

- Ask learners to observe the figure carefully.
- Encourage them to count triangles of different sizes within the diagram.
- Remind learners that triangles may be formed by combining smaller triangles.

Teacher–Learner Interaction

Ask guiding questions such as:

- How many small triangles can you see?
- Can two small triangles combine to form a larger triangle?
- Are there triangles formed by overlapping lines?

Encourage learners to count systematically.

Teacher Guidance

Help learners understand that:

- Complex figures often contain triangles of different sizes.
- Counting systematically helps avoid missing any shapes.

Reinforce

Breaking a complex figure into smaller parts makes counting easier.

Concept 1.5: Verbal Reasoning (LB Pages 20–22)

Teaching Intent

To help learners develop language-based reasoning skills, vocabulary awareness, and alphabetical understanding through engaging word puzzles and logical word relationships.

These activities encourage learners to analyse how words are formed, recognise patterns in letters, and apply logical thinking to complete word sequences. By solving such puzzles, learners strengthen their spelling awareness, word recognition, and analytical thinking abilities.

Verbal reasoning tasks also help learners understand how language patterns work, which supports communication skills and strengthens logical thinking used in computational problem solving.

Concept Explanation

Verbal reasoning involves analysing relationships between words, letters, and language patterns.

In verbal reasoning activities, learners may be asked to:

- complete words by identifying missing letters
- recognise patterns in word formation
- identify relationships between pairs of words
- arrange words according to alphabetical order

For example:

TOW _ EST

By inserting the letter N, the first word becomes TOWN and the second word becomes NEST.

These puzzles encourage learners to observe how a single letter can connect two different words and form meaningful results.

Verbal reasoning strengthens learners' ability to recognise patterns, analyse language structures, and think logically, which are valuable skills in problem solving and coding.

➪ Activity A: Fill in the Missing Letter

Teacher Instructions

- Ask learners to read each pair of incomplete words carefully.
- Explain that one letter must complete both words.
- Encourage learners to think about meaningful words that can be formed.
- Ask them to fill the blank with the correct letter.

Teacher–Learner Interaction

Ask guiding questions such as:

- What letter completes the first word?
- Does the same letter also form a correct second word?
- Can you think of other words that use the same pattern?

Encourage learners to pronounce the completed words aloud.

Teacher Guidance

Help learners understand that:

- One letter must form two meaningful words.
- Checking both words ensures the correct answer.

Reinforce

Language patterns help us recognise word relationships quickly.

➪ Activity B: Identify the Correct Word Pair Sequence

Teacher Instructions

- Ask learners to observe the given pairs of words carefully.
- Explain that the second word in each pair is formed from the letters of the first word.
- Encourage learners to determine the pattern used to derive the second word.
- Ask learners to arrange the pairs in the correct order according to the pattern.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which letters are taken from the first word?

- Are the letters selected in a specific order?
- Does the pattern remain the same for each pair?

Encourage learners to analyse each pair before deciding the order.

Teacher Guidance

Explain that:

- Some word puzzles involve selecting letters in a specific sequence.
- Identifying the pattern helps determine the correct order.

Reinforce

Logical analysis helps identify hidden patterns in words.

⇨ Activity C: Identify the Word that Comes Last Alphabetically

Teacher Instructions

- Ask learners to read each set of words carefully.
- Explain that they must determine which word would appear last in alphabetical order.
- Encourage learners to compare the words letter by letter.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which letter comes later in the alphabet?
- If two words begin with the same letter, which letter should we compare next?
- Which word would appear last in a dictionary?

Encourage learners to analyse each letter step by step.

Teacher Guidance

Help learners understand that:

- Alphabetical order depends on comparing letters from left to right.
- If the first letters are the same, the next letters must be compared.

Reinforce

Understanding alphabetical order improves vocabulary organisation and dictionary skills.

Concept 1.6: Palindrome (LB Pages 23–25)

Teaching Intent

To help learners understand the concept of palindromes and recognise words, phrases, and numbers that read the same both forwards and backwards.

Through engaging word searches and number-based activities, learners practise identifying symmetrical patterns in language and numbers. These activities strengthen observation, language awareness, and logical reasoning skills, which are important components of computational thinking.

By analysing palindromes, learners also explore patterns and symmetry, helping them understand how sequences behave in structured ways.

Concept Explanation

A **palindrome** is a word, phrase, or number that reads the same both forwards and backwards.

Examples of palindromes include:

POP

REFER

LEVEL

Some numbers can also be palindromes.

Examples:

454

76567

543212345

In these numbers, the digits appear in the same order when read from left to right and from right to left.

Palindromes can also appear as phrases when spaces are ignored.

Example:

NEVER ODD OR EVEN

The concept of palindromes helps learners recognise symmetry and repeating patterns in language and numbers.

➪ Activity A: Identify Palindrome Words

Teacher Instructions

- Ask learners to read each word carefully.
- Explain that they must identify which words read the same forwards and backwards.
- Encourage learners to colour or mark the words that are palindromes.

Teacher–Learner Interaction

Ask guiding questions such as:

- What happens when you read the word backwards?
- Does the spelling remain the same?
- Which letters appear symmetrically in the word?

Encourage learners to test the words by reading them in reverse order.

Teacher Guidance

Help learners understand that:

- In a palindrome, the sequence of letters remains the same when reversed.
- Not all words that look similar are palindromes.

Reinforce

Palindromes display symmetry in language.

⇨ Activity B: Find Palindromes in the Word Grid

Teacher Instructions

- Ask learners to observe the word grid carefully.
- Explain that palindrome words may appear horizontally, vertically, or diagonally.
- Encourage learners to search for the words and circle them in the grid.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which words look the same when reversed?
- Can you find the word hidden vertically?
- Are there any diagonal palindrome words?

Encourage learners to cross-check each word by reading it backwards.

Teacher Guidance

Explain that:

- Word searches require careful observation.
- Some palindromes may appear in unexpected directions.

Reinforce

Careful observation helps identify hidden patterns.

⇨ Activity C: Convert Numbers into Palindromes

Teacher Instructions

- Ask learners to observe the example provided.
- Explain the process of creating a palindrome by reversing the digits of a number and adding it to the original number.
- Guide learners to repeat the process until a palindrome is formed.

Example process:

46

- 64 (reverse of 46)
- = 110

110

- 011 (reverse)
- = 121 → Palindrome

Teacher–Learner Interaction

Ask guiding questions such as:

- What is the reverse of the number?
- What happens when we add the number and its reverse?
- Does the result read the same forwards and backwards?

Encourage learners to check each step carefully.

Teacher Guidance

Help learners understand that:

- Some numbers become palindromes after one step, while others may take multiple steps.
- This activity combines numerical operations with pattern recognition.

Reinforce

Mathematics and patterns often work together to create interesting number properties.

Coding Challenge – 1: Math Squares (LB Page 26)

Teaching Intent

To help learners apply their numerical reasoning, logical thinking, and problem-solving skills by solving a number puzzle using mathematical operations. In this activity,

learners fill numbers from 1 to 9 in a grid such that each row and column forms a correct mathematical equation.

This activity strengthens learners' understanding of operations (addition, subtraction, multiplication, division), number placement strategies, and logical analysis, which are essential for computational thinking and algorithmic problem solving.

➪ Activity: Complete the Math Squares

Teacher Instructions

- Ask learners to carefully observe the math square puzzle.
- Explain that they must fill in numbers from 1 to 9, using each number only once.
- Tell learners that each row and column forms a mathematical equation.
- Remind them to follow the rule of operations (multiplication and division before addition and subtraction).
- Encourage learners to start with rows or columns that seem easier (e.g., those with higher or lower totals).
- Ask learners to check each equation after filling in the numbers.

Teacher–Learner Interaction

Ask guiding questions such as:

- What numbers are you allowed to use in the puzzle?
- Can any number be repeated?
- Which operation should be solved first in an equation?
- Which row or column looks easiest to start with?

Encourage learners to explain how they arrived at their answers.

Teacher Guidance

Encourage learners to:

- Read each equation carefully before filling in numbers.
- Use trial and error logically to test possible number placements.
- Follow the correct order of operations (BODMAS rule).
- Check each row and column after solving.

Reinforce

Solving problems step by step using rules and logic is similar to how computers follow instructions in coding. Breaking a problem into smaller parts helps find accurate solutions.

Review Exercise

1. Why is it important to follow the correct order of operations?
2. What happens if a number is repeated in the puzzle?
3. How can you decide which part of the puzzle to solve first?
4. Why is checking each equation important?

Differentiated Lessons

Remedial Activity

- Provide simpler number puzzles with fewer numbers.
- Ask learners to solve basic equations step by step.

Challenging Activity

- Ask learners to create their own math square puzzle using different numbers and operations.
- Let classmates solve the puzzle and verify the equations.

Teacher Closure for Level 2

Summarise the key learning points:

Learners have learned to:

- Use numbers logically in a puzzle
- Apply mathematical operations correctly
- Follow rules such as order of operations
- Analyse and solve problems step by step
- Check and verify their answers

These activities help learners develop logical reasoning, numerical thinking, and problem-solving skills, which are important for computational thinking and coding concepts.

2 Level

Critical Thinking & Analysis

Critical Thinking and Analysis activities help learners develop the ability to observe carefully, compare information, identify relationships, and solve problems logically. These skills strengthen learners' analytical thinking and help them approach problems in a systematic way.

In this level, learners engage with activities that require them to analyse visual puzzles, understand relationships between words and objects, interpret patterns, and solve logical challenges. These tasks encourage learners to think deeply, evaluate different possibilities, and select correct solutions based on reasoning.

Through these activities, learners begin to understand that many problems can be solved by observing patterns, comparing information, and applying logical analysis, which are essential skills in computational thinking and coding.

Concept 2.1: Tricky Way Out

(LB Pages 28–29)

Teaching Intent

To help learners develop spatial reasoning, observation skills, and logical decision-making abilities through maze-solving activities.

These activities encourage learners to carefully analyse pathways, identify correct routes, and avoid dead ends while navigating through complex mazes. Such tasks strengthen learners' ability to plan steps, analyse possible outcomes, and solve problems systematically.

Maze-solving also supports the development of computational thinking because it requires learners to follow sequences of steps and determine the best path to reach a goal.

Concept Explanation

A maze is a puzzle that contains several pathways, but only one path leads from the starting point to the correct destination.

To solve a maze, learners must:

- carefully observe the available paths
- avoid blocked routes or dead ends
- follow the path step by step until the destination is reached

Maze puzzles strengthen logical thinking and problem-solving skills because learners must analyse multiple possible routes before choosing the correct one.

Such activities also relate to computer programming concepts where algorithms help determine the best path to solve a problem.

➪ Activity A: Find Your Way Out

Teacher Instructions

- Ask learners to observe the maze carefully.
- Explain that they must trace a path from START to END.
- Encourage learners to follow the path slowly and avoid incorrect routes.
- Learners may use a pencil to trace the correct path.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which path should we try first from the start point?
- Does this path lead to a dead end?
- If a path is blocked, what should we do?

Encourage learners to check each turn carefully before proceeding.

Teacher Guidance

Help learners understand that:

- Some paths may look correct initially but may lead to dead ends.
- Backtracking and trying alternative routes is an effective strategy.

Reinforce

Logical exploration helps find the correct path.

➪ Activity B: Help Mimbo Reach Nimbo

Teacher Instructions

- Ask learners to observe the complex maze carefully.
- Explain that the character Mimbo must reach Nimbo by following the correct pathway.
- Encourage learners to trace the route step by step from the starting point.
- Learners may use a pencil to mark the path.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which direction should Mimbo move first?
- Does this path lead closer to Nimbo or away from him?
- Are there alternative routes if the path is blocked?

Encourage learners to visualise the route before tracing it.

Teacher Guidance

Explain that:

- Complex mazes require patience and careful observation.
- Analysing different pathways helps identify the correct route.

Reinforce

Planning steps carefully helps solve maze puzzles efficiently.

Concept 2.2: Analogy

(LB Pages 30–31)

Teaching Intent

To help learners understand how two objects, ideas, or words can be related through a common relationship or comparison.

Through analogy-based activities, learners practise identifying relationships between words, objects, and situations. These exercises strengthen learners' logical reasoning, vocabulary understanding, and analytical thinking skills.

By recognising similarities between different pairs of items, learners develop the ability to analyse patterns and relationships, which are important aspects of computational thinking and problem solving.

Concept Explanation

An analogy is a comparison between two things that shows how they are similar in some way.

In an analogy, the relationship between the first pair of items helps determine the relationship in the second pair.

Example:

Cup : Sip

Bottle : Drink

Here, a cup is used for sipping, and a bottle is used for drinking.

Similarly:

Watch : Wrist

Ring : Finger

In this analogy, both objects are worn on specific parts of the body.

Understanding analogies requires learners to identify the relationship between the first pair and apply the same relationship to complete the second pair.

Analogies help learners improve logical thinking, word relationships, and reasoning skills.

⇨ Activity A: Complete Each Analogy

Teacher Instructions

- Ask learners to read each pair of words carefully.
- Explain that the first two words show a relationship.
- Encourage learners to identify the same relationship in the second pair.
- Ask them to fill in the blank with the appropriate word.

Teacher–Learner Interaction

Ask guiding questions such as:

- What is the relationship between the first two words?
- Does the second pair follow the same idea?
- What word would logically complete the analogy?

Encourage learners to think about meanings and relationships.

Teacher Guidance

Help learners understand that:

- Analogies depend on recognising relationships such as function, category, opposites, or life stages.
- Identifying the relationship first makes it easier to find the correct answer.

Reinforce

Understanding relationships helps solve reasoning problems effectively.

⇨ Activity B: Choose the Correct Word

Teacher Instructions

- Ask learners to read each analogy carefully.
- Explain that they must choose the option that best completes the relationship.

- Encourage learners to analyse the relationship between the first pair before selecting an answer.

Teacher–Learner Interaction

Ask guiding questions such as:

- What action is associated with scissors?
- What does a policeman deal with?
- What tools belong to different professions?

Encourage learners to explain their choices.

Teacher Guidance

Explain that:

- Analogies may involve relationships such as tool and function, profession and object, **or** cause and effect.
- Carefully analysing the relationship helps identify the correct option.

Reinforce

Logical thinking helps determine the correct relationship between words.

Activity C: Picture Analogy

Teacher Instructions

- Ask learners to observe the first two pictures carefully.
- Explain that these pictures show a specific relationship.
- Encourage learners to identify the same relationship between the third picture and the correct option.

Teacher–Learner Interaction

Ask guiding questions such as:

- What relationship do the first two pictures show?
- Is the second object used with the first object?
- Which option shows a similar relationship?

Encourage learners to analyse how the objects are connected.

Teacher Guidance

Help learners understand that:

- Picture analogies require careful observation.
- The same relationship must apply to both pairs.

Reinforce

Recognising relationships between objects strengthens logical reasoning skills.

Concept 2.3: Logical Analysis (LB Pages 32–33)

Teaching Intent

To help learners develop analytical reasoning, logical thinking, and problem-solving skills by analysing patterns, symbols, and relationships in numbers and shapes.

Through these activities, learners practise identifying hidden rules and applying logical reasoning to determine the correct outcomes. These exercises strengthen learners' ability to analyse information carefully and solve problems step by step.

Logical analysis activities also help learners understand that problems can often be solved by observing patterns, interpreting symbols, and applying logical rules, which are important skills in computational thinking and coding.

Concept Explanation

Logical analysis involves carefully studying information, identifying patterns or rules, and using reasoning to reach a correct conclusion.

In these activities, learners may encounter:

- symbols that represent different mathematical operations
- number patterns that require logical interpretation
- shape transformations that follow specific rules

For example, if a symbol represents a particular mathematical operation, learners must determine how to apply it correctly to solve the problem.

Similarly, when analysing shapes, learners observe how one shape changes into another and apply the same transformation to complete the sequence.

Logical analysis strengthens learners' ability to interpret information, recognise patterns, and apply reasoning, which are essential skills for programming and algorithmic thinking.

⇨ Activity A: Solve the Logical Equations

Teacher Instructions

- Ask learners to observe the given expressions carefully.
- Explain that the mathematical symbols have been replaced with different operations.

- Encourage learners to determine the meaning of each symbol before solving the expression.
- Ask learners to calculate the final value based on the given rules.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which operation does each symbol represent?
- What happens when we replace the symbols with the correct operations?
- Which operation should be performed first?

Encourage learners to follow the correct order of operations.

Teacher Guidance

Help learners understand that:

- Symbols can represent different operations depending on the rules given.
- Carefully interpreting the rules is essential before solving the expression.

Reinforce

Logical reasoning helps interpret unfamiliar symbols and solve problems accurately.

⇨ Activity B: Identify the Shape Transformation

Teacher Instructions

- Ask learners to observe the first pair of shapes carefully.
- Explain that the first shape changes into the second by following a specific rule.
- Encourage learners to identify the transformation.
- Ask them to apply the same rule to determine the correct answer from the given options.

Teacher–Learner Interaction

Ask guiding questions such as:

- How does the first shape change into the second shape?
- Does the shape rotate, flip, or change position?
- Which option follows the same transformation?

Encourage learners to compare each option carefully.

Teacher Guidance

Explain that:

- Shape patterns often involve **rotat**ion, reflection, resizing, or rearrangement**.**
- Careful observation helps identify the correct transformation.

Reinforce

Analysing visual patterns improves logical reasoning and observation skills.

Concept 2.4: Line of Symmetry (LB Pages 34–35)

Teaching Intent

To help learners understand the concept of symmetry and identify lines that divide shapes into two equal and identical halves.

Through these activities, learners explore how shapes can be split into mirror images and practise recognising symmetrical patterns. These exercises strengthen learners' visual observation, spatial reasoning, and analytical thinking skills.

Understanding symmetry helps learners develop pattern recognition abilities, which are important for mathematical reasoning and computational thinking.

Concept Explanation

A line of symmetry is an imaginary line that divides a shape or object into two equal and identical halves.

When a shape is folded along the line of symmetry, both halves match exactly.

Different shapes may have different numbers of lines of symmetry.

Examples:

- **Rectangle:** 2 lines of symmetry (horizontal and vertical)
- **Square:** 4 lines of symmetry
- **Circle:** infinite lines of symmetry

Symmetry can be seen in many objects around us, such as flowers, butterflies, buildings, and patterns in nature.

Recognising symmetry helps learners understand balance and patterns in shapes and designs.

⇨ Activity A: Identify the Number of Lines of Symmetry

Teacher Instructions

- Ask learners to observe each shape carefully.
- Explain that they must determine how many lines can divide the shape into two identical halves.
- Encourage learners to imagine folding the shape along possible lines.

Teacher–Learner Interaction

Ask guiding questions such as:

- If we fold the shape along this line, do both sides match?
- Are there any other directions where the shape can be folded?
- Which shapes have more than one line of symmetry?

Encourage learners to draw possible symmetry lines lightly.

Teacher Guidance

Help learners understand that:

- Some shapes have only one line of symmetry.
- Some shapes may have several lines of symmetry.
- Irregular shapes may not have any lines of symmetry.

Reinforce

Symmetry means both halves of a shape are identical mirror images.

⇨ Activity B: Create Patterns with One Line of Symmetry

Teacher Instructions

- Ask learners to colour four boxes in each grid.
- Explain that the coloured pattern must have exactly one line of symmetry.
- Encourage learners to check whether the coloured boxes match on both sides of the symmetry line.

Teacher–Learner Interaction

Ask guiding questions such as:

- If we draw a line in the middle, do both sides look the same?
- Which boxes must be coloured to maintain symmetry?

- Does the pattern still have only one symmetry line?

Encourage learners to experiment with different patterns.

Teacher Guidance

Explain that:

- A symmetrical pattern must mirror itself across the line of symmetry.
- Adding or removing colours may break the symmetry.

Reinforce

Symmetry creates balanced and organised designs.

➪ Activity C: Complete the Symmetrical Figure

Teacher Instructions

- Ask learners to observe the half figure shown on the grid.
- Explain that the dashed line represents the line of symmetry.
- Encourage learners to draw the missing half so that the figure becomes symmetrical.

Teacher–Learner Interaction

Ask guiding questions such as:

- Where should the next line be drawn to mirror the existing shape?
- How far should each point be from the line of symmetry?
- Does the completed figure look balanced?

Encourage learners to count grid squares for accuracy.

Teacher Guidance

Help learners understand that:

- Each point on one side must have a corresponding point at the same distance on the other side.
- Careful observation helps maintain symmetry.

Reinforce

Symmetry helps create balanced and visually appealing shapes.

Concept 2.5: Sudoku (LB Pages 36–38)

Teaching Intent

To help learners develop logical reasoning, concentration, and problem-solving skills through Sudoku puzzles.

These activities encourage learners to think systematically, analyse given information, and apply logical rules to complete the puzzle correctly. Sudoku strengthens learners' ability to identify patterns, eliminate possibilities, and make accurate decisions, which are essential skills in computational thinking.

By solving Sudoku, learners also develop patience, focus, and the ability to work step by step toward a solution.

Concept Explanation

Sudoku is a puzzle game played on a grid. The most common Sudoku is a 9 × 9 grid, divided into smaller 3 × 3 boxes.

The goal of Sudoku is to fill the empty cells with numbers so that:

- Each row contains numbers from 1 to 9 without repetition
- Each column contains numbers from 1 to 9 without repetition
- Each 3 × 3 box contains numbers from 1 to 9 without repetition

Learners solve Sudoku by using logical thinking and elimination rather than guessing.

Basic strategies include:

- Checking rows and columns for missing numbers
- Looking at the most filled rows or boxes first
- Eliminating numbers that are already used

Sudoku helps learners understand how rules and logic can be applied to solve problems step by step.

⇨ Activity A: Solve the Given Sudokus

Teacher Instructions

- Ask learners to observe the Sudoku grid carefully.
- Explain the rules of Sudoku clearly before starting.
- Encourage learners to begin with rows, columns, or boxes that already have more numbers filled.
- Guide them to fill one number at a time using logical reasoning.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which number is missing in this row?
- Can this number be placed in this column?
- Which numbers are already used in this box?

Encourage learners to explain how they found each answer.

Teacher Guidance

Help learners understand that:

- Sudoku is solved through logic, not guessing.
- Filling easier sections first helps solve the puzzle step by step.
- Each number must follow all three rules (row, column, and box).

Reinforce

Logical elimination is the key strategy in solving Sudoku.

➪ Activity B: Picture Sudoku

Teacher Instructions

- Ask learners to observe the grid and identify the different fruits used.
- Explain that each fruit represents a unique value and must not repeat in any row, column, or box.
- Encourage learners to place the correct fruit in each empty cell following Sudoku rules.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which fruit is missing in this row?
- Is this fruit already present in the column?
- Which fruit completes the box?

Encourage learners to cross-check their answers.

Teacher Guidance

Help learners understand that:

- The same Sudoku rules apply even when symbols or pictures are used.
- Visual Sudoku improves observation and pattern recognition.

Reinforce

Sudoku can be solved using numbers, symbols, or pictures—all follow the same logical rules.

Concept 2.6: Coded Riddles (LB Page 39)

Teaching Intent

To help learners develop logical reasoning, decoding skills, and pattern recognition abilities by solving riddles using letter–number codes.

These activities encourage learners to analyse coded information, identify patterns between numbers and letters, and apply logical thinking to decode meaningful answers. Such tasks strengthen learners' ability to interpret symbols, solve puzzles systematically, and think analytically, which are important aspects of computational thinking.

Concept Explanation

Coded riddles are puzzles in which letters are represented by numbers or symbols. To solve the riddle, learners must:

- understand the given code (letter–number relationship)
- decode the sequence of numbers
- form meaningful words or answers

For example, if:

1 → A

2 → B

3 → C

Then the code **3–1–20** can be decoded as CAT.

After decoding the word, learners use it to answer the riddle.

Coded riddles help learners understand how encoding and decoding work, which is an important concept in computer science and data processing.

⇨ Activity A: Solve the Coded Riddles

Teacher Instructions

- Ask learners to observe the letter–number code given at the top.
- Explain how each number corresponds to a letter.
- Demonstrate one example of decoding a number sequence into a word.
- Ask learners to decode each sequence and then answer the riddle.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which letter does this number represent?
- What word is formed after decoding the numbers?
- Does the decoded word answer the riddle correctly?

Encourage learners to read the decoded word aloud.

Teacher Guidance

Help learners understand that:

- Each number corresponds to a specific letter.
- Decoding must be done carefully to form meaningful words.
- After decoding, the word must match the riddle logically.

Reinforce

Decoding information is an important problem-solving skill used in coding and real-life applications.

Coding Challenge – 2: Fun with Rebus (LB Page 38)

Teaching Intent

To help learners develop their logical thinking, observation, and language interpretation skills by solving rebus puzzles. In this activity, learners interpret pictures, symbols, and word arrangements to identify meaningful words or phrases.

This activity strengthens learners' analytical thinking, visual decoding skills, and ability to recognise patterns and relationships, which are important for computational thinking and problem solving.

⇨ Activity: Solve the Rebus Puzzles

Teacher Instructions

- Ask learners to carefully observe each picture and word combination.
- Explain that a rebus puzzle uses images, symbols, and letter arrangements to represent a word or phrase.
- Tell learners to analyse how the picture and text are related.
- Ask learners to think about what the combined meaning could be.
- Instruct learners to write the correct word or phrase in the blank provided.
- Encourage learners to check their answers by rethinking the clues.

Teacher–Learner Interaction

Ask guiding questions such as:

- What do you see in the picture?
- How does the picture relate to the word given?
- Are any letters placed differently or unusually?
- What could the combined meaning be?

Encourage learners to explain how they arrived at each answer.

Teacher Guidance

Encourage learners to:

- Observe both the picture and the text carefully.
- Look for clues in the position, size, or direction of letters.
- Break the puzzle into smaller parts and interpret each part.
- Combine the clues logically to form the final answer.

Reinforce

Rebus puzzles require interpreting symbols and patterns. In coding, similar skills are used to understand instructions, symbols, and logic.

Review Exercise

1. What is a rebus puzzle?
2. Why is observation important when solving rebus puzzles?
3. How do symbols and pictures help in understanding meaning?
4. How is solving a rebus puzzle similar to solving a coding problem?

Differentiated Lessons

Remedial Activity

- Provide simple rebus puzzles using basic pictures and words.
- Guide learners step by step to understand how the clues form a word.

Challenging Activity

- Ask learners to create their own rebus puzzles using drawings and words.
- Let their classmates solve the puzzles and explain their answers.

Teacher Closure for Level 2

Summarise the key learning points:

Learners have learned to:

- Interpret pictures and symbols
- Recognise patterns in words and images
- Analyse clues to form meaningful answers
- Apply logical thinking to solve puzzles
- Improve observation and reasoning skills

These activities help learners develop analytical thinking, pattern recognition, and problem-solving skills, which are essential for computational thinking and coding concepts.

3 Level Data Processing

Data Processing activities help learners develop the ability to organise, interpret, and analyse information in meaningful ways. These skills are an important part of computational thinking and help learners understand how computers collect, store, and process data to produce useful information.

In this level, learners engage with activities that require them to classify objects using diagrams, interpret compressed information, understand the relationship between raw data and meaningful information, decode coded messages, and explore how computers represent information using binary numbers. These activities strengthen learners' analytical thinking, observation skills, and their ability to identify relationships in data.

Through these activities, learners begin to understand that large amounts of information can be organised, simplified, and analysed using logical methods. This understanding prepares learners for concepts used in computing such as data representation, coding systems, and information processing.

Concept 3.1: Venn Diagram

(LB Pages 42-43)

Teaching Intent

To help learners understand how to classify and organise data into groups based on common properties using Venn diagrams.

Through these activities, learners practise identifying similarities and differences between groups and placing elements in the correct regions. This strengthens learners' analytical thinking, classification skills, and data organisation abilities, which are essential for computational thinking.

Venn diagrams also help learners visualise relationships between sets, making data easier to interpret and analyse.

Concept Explanation

A Venn diagram is a visual tool used to represent relationships between different groups or sets.

It usually consists of overlapping circles, where:

- The left circle represents one group (Set A)
- The right circle represents another group (Set B)
- The overlapping region represents elements common to both sets

There are four possible regions in a Venn diagram:

1. Elements only in Set A
2. Elements only in Set B
3. Elements common to both A and B
4. Elements not belonging to either set

Example:

If Set A represents even numbers and Set B represents numbers less than 500, then:

- Numbers that are even and less than 500 go in the overlap
- Numbers that are only even go in Set A
- Numbers that are only less than 500 go in Set B
- Venn diagrams help learners compare, classify, and organise information logically.

Activity A: Place Numbers in the Correct Venn Diagram

Teacher Instructions

- Ask learners to read the conditions given for each circle carefully.
- Explain what each set represents (e.g., even numbers, multiples of 5, etc.).
- Encourage learners to check each number and decide which category it belongs to.
- Ask learners to place each number in the correct region of the Venn diagram.

Teacher–Learner Interaction

Ask guiding questions such as:

- Is this number even or odd?
- Is this number less than 500?
- Can this number belong to both sets?
- Where should we place numbers that do not belong to any set?

Encourage learners to justify their answers.

Teacher Guidance

Help learners understand that:

- Some numbers may satisfy both conditions and belong in the overlapping region.
- Some numbers may belong to only one set.
- Some numbers may not belong to either set.

Reinforce

Classifying data helps organise information clearly and logically.

Concept 3.2: Data Compression (LB Pages 44–46)

Teaching Intent

To help learners understand how information can be represented in a shorter form using abbreviations and symbols. This concept introduces learners to data compression, which is an important idea in computational thinking and digital communication.

Learners will recognise that:

- Long information can be shortened without losing meaning
- Symbols and abbreviations help in saving space and time
- Coding and decoding messages require logical thinking and interpretation skills

Concept Explanation

Data compression means reducing the size of information by representing it in a shorter form.

In everyday life, we use abbreviations such as:

- DOB → Date of Birth
- ASAP → As soon as possible
- DIY → Do it yourself

These shortened forms make communication faster and more efficient.

Learners are also introduced to:

- Symbol-based compression (using icons/images instead of words)
- Decoding (converting compressed information back to full form)

This builds a foundation for understanding how computers store and transmit data efficiently.

Activity A: Rewrite the Compressed Story

Teacher Instructions

- Ask learners to carefully read the compressed story.
- Draw attention to the given key (legend) that explains abbreviations (e.g., fam = family, strg = strong).
- Guide learners to replace each abbreviation with its full form.
- Encourage them to rewrite the passage neatly in complete sentences.

Teacher–Learner Interaction

Ask guiding questions:

- What does "fam" stand for?
- Can you find all the short forms in the story?
- Why do you think short forms are used here?
- Does the meaning change after expanding the words?

Teacher Guidance

Explain that:

- Abbreviations help reduce writing time and space
- Understanding context helps in decoding meaning
- Accuracy is important while expanding compressed data

Reinforce

Compressed information must be decoded correctly to understand the full message.

➪ Activity B: Decode the Story (Using Symbols)

Teacher Instructions

- Ask learners to observe the story carefully.
- Explain that pictures (icons) are used in place of words.
- Guide learners to identify what each picture represents (e.g., cat, bird, TV).
- Ask them to rewrite the complete story using proper words.

Teacher–Learner Interaction

Ask:

- What does this picture represent?
- Where is the cat in the story?
- What happens after the milk spills?
- Can you retell the story in your own words?

Encourage discussion before writing.

Teacher Guidance

Support learners to understand that:

- Pictures can act as codes for words
- Decoding requires observation and logical interpretation
- Sequence of events must be maintained while rewriting

Reinforce

Symbols and images are also a form of data compression used in digital systems.

Concept 3.3: Data and Information (LB Pages 47–51)

Teaching Intent

To help learners understand the difference between data and information, and how raw data can be processed to become meaningful information. This concept develops learners' ability to organise, interpret, and analyse data, which is a key component of computational thinking.

Learners will understand that:

- Data are raw facts
- Information is processed data with meaning
- Processing helps in decision-making

Concept Explanation

Data

Data refers to raw facts or figures that are collected but not yet organised.

Example: Names, numbers, dates

Data Processing

Processing is the method of organising and arranging data so that it becomes meaningful.

Information

Information is the final meaningful result obtained after processing data.

Example Explanation

Data:

Henry, 12 years, football player, won a match, 28th April

Information:

Henry is a 12-year-old football player who won a match on 28th April.

This shows how data becomes meaningful information after processing.

Activity A: Transportation Hierarchy

Teacher Instructions

- Ask learners to observe the diagram carefully.

- Explain the classification of transportation into:
  - Land
  - Water
  - Air
- Guide learners to identify missing categories and examples.
- Ask them to fill in the blanks accordingly.

Teacher–Learner Interaction

Ask:

- What are the three main types of transport?
- Can you name examples of land transport?
- Which vehicles travel in water?
- What vehicles are used in air?

Encourage learners to relate with real-life examples.

Teacher Guidance

Explain that:

- Data can be organised into categories
- Classification helps in better understanding
- Hierarchical diagrams show relationships clearly

Reinforce

Organising data into groups makes it easier to analyse and understand.

➪ Activity B: Bar Graph Interpretation

Teacher Instructions

- Ask learners to study the bar graph showing pizzas sold on different days.
- Guide them to:
  - Read labels on axes
  - Observe height of bars
  - Compare values
- Help learners fill the table and answer questions.

Teacher–Learner Interaction

Ask:

- Which day shows the highest bar?
- Which day has the lowest number?

- How can we compare two days?
- What does the height of a bar represent?

Encourage learners to explain answers verbally.

Teacher Guidance

Support learners to understand:

- Graphs represent data visually
- Taller bars indicate higher values
- Comparing bars helps in analysis

Reinforce

Graphs make data easy to read, compare, and interpret.

Activity C: Line Graph – Time Spent Playing Basketball

Teacher Instructions

- Ask learners to observe the table showing time (in minutes) spent over 6 days.
- Guide them to transfer this data onto the line graph.
- Explain how to:
  - Mark values on axes
  - Plot points correctly
  - Join points to form a line graph
- After plotting, ask learners to answer the given questions.

Teacher–Learner Interaction

Ask:

- Which day has the highest time value?
- What happens from Day 4 to Day 5?
- Which day shows the least time?
- How do we compare two days using a graph?

Encourage learners to explain trends in their own words.

Teacher Guidance

Support learners to understand:

- A line graph shows changes over time
- Points must be plotted accurately using given values
- Joining points helps visualise patterns

Reinforce

Graphs help us easily observe increases, decreases, and comparisons.

➪ Activity D: Line Graph – Spelling Test Scores

Teacher Instructions

- Ask learners to study the line graph carefully.
- Explain:
  - X-axis represents scores
  - Y-axis represents number of learners
- Guide learners to interpret the graph and answer questions.

Teacher–Learner Interaction

Ask:

- Which score has the highest number of learners?
- What is the meaning of "most common score"?
- How can we identify values less than or greater than a number?
- What trend do you observe in the graph?

Encourage reasoning before answering.

Teacher Guidance

Explain that:

- The highest point on the graph shows the most common value (mode)
- Graphs help in identifying patterns and trends quickly
- Careful reading of axes is important for correct interpretation

Reinforce

Interpreting graphs is an important real-life skill used in reports, surveys, and analysis.

Concept 3.4: Decode the Code (LB Pages 52–53)

Teaching Intent

To help learners develop logical reasoning, pattern recognition, and decoding skills by interpreting coded information. This concept strengthens learners' ability to identify relationships, apply rules, and solve problems step-by-step, which are essential skills in computational thinking and coding.

Learners will learn to:

- recognise patterns in letters, numbers, and symbols
- apply given rules to decode information
- think logically to solve coded problems
- understand that coding follows specific rules or algorithms

Concept Explanation

Coding refers to representing information using a set of rules or patterns, while decoding means interpreting that information to find its original meaning.

In these activities, learners work with:

- Letter coding (changing positions or patterns of letters)
- Number coding (identifying relationships between numbers)
- Symbol-based logic (interpreting given conditions)
- Analogy-based reasoning (finding similar patterns)

These tasks simulate how computers process and transform data using rules.

⇨ Activity A: Decode and Choose the Correct Option

Teacher Instructions

- Ask learners to carefully read each coded statement.
- Encourage them to identify the rule or pattern used.
- Guide them to apply the same rule to find the correct answer.
- Remind learners to check all options before selecting one.

Teacher–Learner Interaction

Use probing questions such as:

- What rule is being followed in this question?
- Is the pattern based on letters, numbers, or meaning?
- Can you apply the same rule to the new word/number?
- Which option matches your logic?

Encourage learners to explain their reasoning.

Teacher Guidance

1. **Meaning-Based Coding**

   Example: Triangle → Circle → Square → Rectangle → Ball

- Help learners follow the chain of meaning step-by-step
- Emphasise careful tracking of relationships

Reinforce

Always follow the sequence given in the question.

2. **Letter Rearrangement Coding**

   Example: STARK → LBFMG

   - Guide learners to observe how each letter changes
   - Look for shifts, patterns, or substitutions

Reinforce

Each letter follows a specific rule—apply it consistently.

3. **Number Logic Coding**

   Example: SET = 1900, WET = 2300

   - Help learners identify value patterns (place value, addition, etc.)
   - Encourage breaking numbers into smaller parts

Reinforce

Numbers often follow arithmetic or positional rules.

4. **Position-Based Coding**

   Example: RAJU → 11-12-13-14

   - Explain alphabetical positions (A=1, B=2…)
   - Guide learners to map letters to numbers

Reinforce

Understanding letter positions is key to decoding.

5. **Operation-Based Coding**

   Example: P = add, V = multiply, M = divide

   - Ask learners to replace symbols with operations
   - Solve step-by-step

Reinforce

Always follow the correct order of operations.

6. **Classification / Logic-Based Questions**

   Example: Flower classification or object renaming

   - Encourage logical thinking based on properties

Reinforce

Think about real-world meaning and categories.

7. **Word Transformation**

   Example: MISSION → MSISNOS

   - Guide learners to observe rearrangement patterns

Reinforce

Look for repeated or shifting letter positions.

8. **Analogy & Relationship-Based Coding**

   Example: Wall → Window → Door → Floor

   - Help learners track relationships step-by-step

Reinforce

Follow the chain carefully to reach the final answer.

9. **Alphabet Value Coding**

   Example: Z = 52, ACT = 48

   - Guide learners to assign numerical values to letters

Reinforce

Letters can represent numbers based on position.

10. **Digit Rearrangement Coding**

    Example: 59643 → 37421

    - Help learners identify digit transformation patterns

Reinforce

Observe how positions or values are changing.

Concept 3.5: Binary Representation of Information (LB Pages 54–55)

Teaching Intent

To introduce learners to the concept of binary representation, where information is stored using only two digits: 0 and 1. This lesson helps learners understand how computers store and process data in a simple coded form.

Learners will:

- understand that computers use binary language
- recognise patterns using 0s and 1s

- apply binary codes to complete grids and solve problems
- connect mathematical operations with binary representation

Concept Explanation

Binary Language

Binary is a system that uses only:

- **0 → OFF / No / False**
- **1 → ON / Yes / True**

Computers use binary because electronic circuits can easily represent two states (on/off).

Binary Representation

Numbers, letters, and images can all be represented using combinations of 0s and 1s.
Example:

- 1 → 0001
- 2 → 0010
- 3 → 0011

This shows that even numbers can be written in binary form.

Key Idea:

Binary is the basic language of computers.

Activity A: Complete the Binary Grid

Teacher Instructions

- Ask learners to observe the given binary codes (e.g., PA = 0, QB = 1, etc.).
- Explain that each pair represents a value (0 or 1).
- Guide learners to fill the grid using the provided codes.
- Encourage careful matching of rows (P–T) and columns (A–E).

Teacher–Learner Interaction

Ask:

- What does 0 represent? What does 1 represent?
- How do we find the value for PA or QB?
- Where should we place the value in the grid?

Encourage learners to verify each entry.

Teacher Guidance

Support learners to:

- Read codes correctly (row + column mapping)
- Place values accurately in the grid
- Check for mistakes systematically

Reinforce

Binary uses only two values, but can represent complex information.

➪ Activity B: Binary Numbers and Problem Solving

Teacher Instructions

- Ask learners to study the table of numbers and their binary forms.
- Explain how each number corresponds to a binary code.
- Guide learners to solve questions using normal arithmetic first, then relate to binary if needed.

Teacher–Learner Interaction

Ask:

- What is the binary of 5?
- How is 6 different from 7 in binary?
- Can you identify patterns in binary numbers?
- Do binary numbers increase in a pattern?

Teacher Guidance

Explain that:

- Binary numbers follow a place value system (like decimal)
- Each position represents powers of 2
- Even if learners solve using decimal, they should relate answers to binary understanding

Reinforce

Binary helps computers perform calculations and store data efficiently.

Coding Challenge – 3: Venn Diagrams (LB Page 56)

Teaching Intent

To help learners develop their data classification, logical reasoning, and analytical thinking skills by organising information using Venn diagrams. In this activity, learners analyse given data about individuals and place them correctly based on shared characteristics.

This activity strengthens learners' ability to compare, categorise, and interpret data, which are important skills in computational thinking and data processing.

➪ Activity: Place the Names in the Correct Venn Diagram

Teacher Instructions

- Ask learners to carefully observe the table containing information about each person (gender, age, height, and preferences).
- Explain the meaning of each Venn diagram category (e.g., boys, age more than 7 years, likes soccer, shorter than 125 cm).
- Tell learners to read each person's details carefully.
- Ask them to place each name in the correct section of the Venn diagram (left circle, right circle, or intersection).
- Encourage learners to check all conditions before placing a name.
- Remind learners that the intersection represents people who satisfy both conditions.

Teacher–Learner Interaction

Ask guiding questions such as:

- Who are the boys in the list?
- Who is older than 7 years?
- Can someone belong to both groups?
- What does the middle (overlapping) part of the diagram represent?

Encourage learners to explain why they placed each name in a particular section.

Teacher Guidance

Encourage learners to:

- Read and understand each condition carefully.
- Compare the data given for each person.
- Identify whether a person belongs to one group or both.
- Place names step by step to avoid confusion.

Reinforce

Organising data into groups helps us understand information clearly. In coding and computing, similar classification helps in sorting and analysing data efficiently.

Review Exercise

1. What is a Venn diagram?
2. What does the overlapping section represent?
3. Why is it important to read all conditions before placing an item?
4. How do Venn diagrams help in organising information?

Differentiated Lessons

Remedial Activity

- Provide simple categories such as fruits and colours.
- Ask learners to place items in a basic Venn diagram.

Challenging Activity

- Ask learners to create their own Venn diagram using two conditions.
- Let classmates classify objects or people based on the diagram.

Teacher Closure for Level 3

Summarise the key learning points:

Learners have learned to:

- Classify data based on given conditions
- Use Venn diagrams to organise information
- Compare and analyse different attributes
- Understand overlapping categories
- Apply logical thinking in data organisation

These activities help learners develop data interpretation, analytical thinking, and logical reasoning skills, which are essential for computational thinking and coding concepts.

Level 4 Algorithmic Intelligence

Algorithmic Intelligence activities help learners develop the ability to think systematically, follow step-by-step instructions, and solve problems logically. These skills form the core of computational thinking and are essential for understanding how computer programs work.

In this level, learners explore how tasks can be solved using algorithms, conditional statements, and loops, which are fundamental programming concepts. Through practical activities and real-life examples, learners understand how instructions can be organised in a sequence, how computers make decisions based on conditions, and how repeated tasks can be simplified using loops.

The activities encourage learners to analyse situations, design logical steps to solve problems, and predict the outcomes of given programs. These experiences strengthen learners' reasoning ability and prepare them for real computer programming.

Concept 4.1: Algorithm

(LB Pages 58–59)

Teaching Intent

To introduce learners to the concept of an algorithm as a step-by-step set of instructions used to complete a task or solve a problem. This lesson develops learners' ability to think sequentially, organise tasks logically, and follow structured processes, which are fundamental to coding and programming.

Learners will:

- understand what an algorithm is
- arrange steps in logical order
- create simple algorithms for real-life situations
- connect everyday tasks with computational thinking

Concept Explanation

An algorithm is a set of clear, step-by-step instructions used to complete a task.

Examples from daily life:

- Making tea
- Getting ready for school
- Organising a party

The correct order of steps is important. If steps are not followed properly, the result may be incorrect.

➪ Activity A: Algorithm – Organising a Birthday Party

Teacher Instructions

- Ask learners to read the incomplete steps carefully.
- Introduce the Help Box and explain that words must be chosen appropriately.
- Guide learners to:
  - Understand each step
  - Fill in the blanks logically
  - Maintain the correct sequence of actions

Teacher–Learner Interaction

Ask:

- What is the first thing we do when planning a party?
- Why is making a guest list important?
- What happens before sending invitations?
- What do we do at the end of a party?

Encourage learners to relate to real-life experiences.

Teacher Guidance

Support learners to understand:

- Algorithms must follow a logical sequence
- Each step depends on the previous one
- Missing steps can affect the final outcome

Reinforce

Planning is a real-life example of algorithmic thinking.

➪ Activity B: Algorithm to Find Area of Rectangle

Teacher Instructions

- Revise the formula for area of a rectangle:
- Area = Length × Breadth
- Ask learners to write the steps in order.

- Guide them to include:
  - Start
  - Input values
  - Calculation
  - Output

Teacher–Learner Interaction

Ask:

- What do we need to find area?
- What operation is used?
- What should be the final step?

Teacher Guidance

Expected steps:

1. Start
2. Take length and breadth
3. Multiply length and breadth
4. Get the area
5. Display the result
6. End

Reinforce

Algorithms break problems into simple steps.

➪ Activity C: Algorithm to Find Perimeter of Square

Teacher Instructions

- Revise the formula:
- Perimeter = 4 × Side
- Ask learners to write step-by-step instructions.

Teacher–Learner Interaction

Ask:

- What is needed to find perimeter?
- How many sides does a square have?
- What operation is used?

Teacher Guidance

Expected steps:

1. Start
2. Take the length of one side
3. Multiply side by 4
4. Get the perimeter
5. Display the result
6. End

Reinforce

Mathematical problems can also be solved using algorithms.

Concept 4.2: Programs: Conditions (If–Then–Else) (LB Pages 60–67)

Teaching Intent

To introduce learners to conditional statements (If–Then–Else), which allow decisions to be made based on specific situations. This concept helps learners understand how computers think logically and choose actions depending on conditions.

Learners will:

- understand how conditions control actions
- use If–Then–Else statements in real-life situations
- interpret simple conditional programs
- apply logical reasoning to predict outcomes

Concept Explanation

A condition is a situation that decides what action should be taken.

If–Then–Else Structure

- If (condition is true) → do something
- Else (condition is false) → do something else

Examples

- If it is cold → wear a jacket
- Else → do not wear a jacket
- If marks > 40 → display pass
- Else → display fail

Key Idea:

Computers follow conditions to make decisions.

⇨ Activity A: Real-Life Conditions

Teacher Instructions

- Ask learners to read each situation carefully.
- Guide them to frame answers using:
- If (condition), then (action).
- Encourage complete and meaningful responses.

Teacher–Learner Interaction

Ask:

- What is the condition in this situation?
- What action should follow if it happens?
- What would you do differently if it does not happen?

Examples:

- If lights are left on → what will happen?
- If keys are misplaced → what action will you take?

Teacher Guidance

Support learners to:

- Identify condition clearly
- Provide logical outcomes
- Express answers in structured If–Then format

Reinforce

Every decision depends on a condition.

■ Multiple Conditions (AND / OR)

Concept Explanation

AND Condition

- Both conditions must be true
- If one is false → result is false

Example:

If (6 > 4 AND 2 > 3) → False

OR Condition

- At least one condition must be true
- Only false if both are false

Example:

If (6 > 4 OR 2 > 3) → True

Key Idea:

AND is strict (both needed), OR is flexible (any one works).

➪ Activity B: Apply Multiple Conditions

Teacher Instructions

- Ask learners to read each condition carefully.
- Guide them to evaluate each part:
  - Is it true or false?
- Help them determine the final result based on AND/OR logic.

Teacher–Learner Interaction

Ask:

- Are both conditions true?
- What happens if only one is true?
- Which rule applies here: AND or OR?

Encourage step-by-step reasoning.

Teacher Guidance

Explain that:

- Conditions must be checked individually first
- Then combined logically
- Final answer depends on the rule used

Reinforce

Logical operators help computers make complex decisions.

⇨ Activity C: Examine Programs and Predict Output

Teacher Instructions

- Ask learners to carefully read each program.
- Guide them to:
  1. Identify the condition
  2. Check whether it is true or false
  3. Decide which statement (Then/Else) will execute
- Encourage learners to solve step-by-step before writing answers.

Teacher–Learner Interaction

Ask:

- What is the condition being checked?
- Is the condition true or false for this value?
- Which part will run: Then or Else?

Teacher Guidance

1. **If P × 3 < 20**
   - P = 8 → 8×3 = 24 → False → "Less than 20"
   - P = 4 → 12 < 20 → True → "Greater than 20" (as per given program statement)
   - P = 10 → 30 < 20 → False → "Less than 20"

Reinforce

Always evaluate the condition numerically.

2. **Divisible by 2**
   - 28 → Even → Divisible by 2
   - 81 → Odd → Not divisible by 2
   - 54 → Even → Divisible by 2

Reinforce

Even numbers are divisible by 2.

3. **Divisible by 5**
   - 18 → Not divisible → Not divisible by 5
   - 30 → Divisible → Divisible by 5
   - 25 → Divisible → Divisible by 5

Reinforce

Numbers ending in 0 or 5 are divisible by 5.

4. **Number ends with 1**
   - $2 \times 8 = 16 \rightarrow$ Ends with 6 $\rightarrow$ Will not go
   - $11 \times 11 = 121 \rightarrow$ Ends with 1 $\rightarrow$ Will go
   - $9 \times 6 = 54 \rightarrow$ Ends with 4 $\rightarrow$ Will not go

Reinforce

Check the last digit carefully.

⇨ Activity D–F: Writing Conditional Statements

Teacher Instructions

- Ask learners to write complete If–Then–Else statements.
- Emphasise:
  - Correct condition
  - Logical outcome
  - Proper structure

Teacher–Learner Interaction

Ask:

- What are the conditions in the situation?
- Should we use AND or OR?
- What happens if the condition is true?
- What happens if it is false?

■ Teacher Guidance

D. Saturday AND Holiday

If (today is Saturday AND you have a holiday)
Then Print "Yes"
Else Print "No"

E. Sleeping OR Got Late

If (you are sleeping OR you got late)
Then Print "Yes"
Else Print "No"

F. Picnic AND Sick

If (you want to go to a picnic AND you are sick)

Then Print "Yes"

Else Print "No"

Reinforce

- AND → both conditions must be true
- OR → at least one condition must be true

➪ Activity G: Evaluate Conditions and Write Output

Teacher Instructions

- Ask learners to read each condition carefully.
- Remind them that:
  - Given values: P = 150, Q = 300
- Guide learners to:
  1. Evaluate the condition
  2. Decide if it is True or False
  3. Choose the correct output

Teacher–Learner Interaction

Ask:

- What is the value of P and Q?
- Is the condition true or false?
- Which part will execute: Then or Else?

Teacher Guidance

1. **If (P < 200)**

   150 < 200 → True → Print "Stand"
2. **If (Q < 200)**

   300 < 200 → False → Print "Relax"
3. **If (P > 100 AND Q > 100)**

   150 > 100 (True) AND 300 > 100 (True) → True → Print "Stay"
4. **If (P > 200 OR Q > 200)**

   150 > 200 (False) OR 300 > 200 (True) → True → Print "Hi"

Reinforce

- AND → both must be true
- OR → at least one must be true

➪ Activity H: Nested Conditions (If–Else)

Teacher Instructions

- Ask learners to read the condition structure carefully:
  - First check divisibility by 3
  - If not, check divisibility by 4
  - Otherwise, print "Not Divisible"
- Guide learners to evaluate each number step-by-step.

Teacher–Learner Interaction

Ask:

- Is the number divisible by 3?
- If not, is it divisible by 4?
- Which condition will execute first?

Teacher Guidance

Number	Output
31	Not Divisible
15	Divisible by 3
18	Divisible by 3
10	Not Divisible
20	Divisible by 4
27	Divisible by 3
19	Not Divisible
28	Divisible by 4
16	Divisible by 4
9	Divisible by 3

Reinforce

- Conditions are checked in order
- Once a condition is true, the rest are skipped

Concept 4.3: Programs: Loops (LB Pages 68–70)

Teaching Intent

To introduce learners to the concept of loops, where a set of instructions is repeated multiple times. This helps learners understand how repetition simplifies tasks and improves efficiency in programming.

Learners will:

- understand the idea of repetition in programming
- identify repeated patterns in instructions
- convert repeated steps into loop-based instructions
- analyse outputs of loop-based programs

Concept Explanation

A loop is a set of instructions that is repeated until a condition is met or for a fixed number of times.

Why use loops?

Instead of writing the same instruction many times, we use a loop to repeat it.

Example:

- Without loop: Move 1 step (written many times)
- With loop: Repeat 5 times → Move 1 step

Key Idea

Loops make programs shorter, faster, and easier to understand.

⇨ Activity A: Program Using Loop

Teacher Instructions

- Ask learners to compare:
  - Program without loop
  - Program with loop
- Guide them to identify repeated steps.
- Help them rewrite the program using a loop.

Teacher–Learner Interaction

Ask:

- Which steps are repeating?
- How many times is each step repeated?
- Can we combine these steps into one instruction?

Teacher Guidance

Explain that:

- Repeated actions can be grouped
- A loop reduces the number of instructions
- Patterns help identify repetition

Reinforce

Loops simplify long instructions into shorter programs.

➪ Activity B: Output of Loop Programs

Teacher Instructions

- Ask learners to read the program carefully.
- Guide them to:
  1. Understand the loop count (Repeat 2 times / 3 times)
  2. Apply the condition for each value
  3. Write outputs accordingly

Teacher–Learner Interaction

Ask:

- How many times will the loop run?
- What happens inside each loop?
- What is the condition being checked?

Teacher Guidance

1. **Marks Program (Repeat 3 times)**

   Condition: If marks ≥ 35 → pass, else fail

Marks	Result
45	pass
26	fail
52	pass
14	fail
38	pass

2. **A and B Comparison (Repeat 2 times)**

A	B	Output
24	69	A is smaller
47	35	B is smaller
61	40	B is smaller
83	98	A is smaller
72	82	A is smaller

Reinforce

Each value is checked separately within the loop.

➪ Activity C: Perform Loop Instructions

Teacher Instructions

- Ask learners to follow each instruction step-by-step.
- Emphasise careful reading of:
  - Number of repetitions
  - Movement directions
  - Actions (draw, shade, write)

Teacher–Learner Interaction

Ask:

- How many times will the loop repeat?
- What happens in each step?
- What pattern is formed?

Teacher Guidance

1. **Repeat 4 times**
   - Output:
   - "I am a student"
   - "I am 9 years old"
   - (repeated 4 times alternately)
2. **Grid Movement (Plus Sign)**
   - Learners move right and down
   - A pattern of plus signs is formed diagonally
3. **Grid Shading**
   - Learners move step-by-step
   - Boxes are shaded in a pattern (diagonal/step pattern)

Reinforce

Loops help create patterns easily through repetition.

Coding Challenge – 4: Where is Esi? (LB Page 71)

Teaching Intent

To help learners apply their understanding of directions, sequencing, and logical reasoning by following step-by-step instructions on a grid. In this activity, learners track Esi's movement based on given directions and identify her final position.

This activity strengthens learners' spatial awareness, direction sense, and algorithmic thinking, which are essential for computational thinking and programming.

➪ Activity: Trace Esi's Path

Teacher Instructions

- Ask learners to carefully observe the grid and the symbols shown (park, library, house, hospital, candy shop).
- Explain the directions: North, South, East, and West.
- Tell learners that Esi starts from the position marked "E".
- Read the instructions step by step with the learners.
- Ask learners to trace Esi's movement on the grid according to the directions given.
- Encourage learners to move step by step and mark the path lightly if needed.
- Ask learners to identify the place where Esi finally reaches.

Teacher–Learner Interaction

Ask guiding questions such as:

- Which direction is the rising sun (East)?
- In which direction is Esi facing at the start?
- What does "go straight for 4 blocks" mean?
- When do we turn left or right?
- Where does Esi reach at the end?

Encourage learners to point and trace the path while answering.

Teacher Guidance

Encourage learners to:

- Understand directions clearly before starting.
- Follow each instruction step by step without skipping.
- Count the blocks carefully while moving.
- Use their finger or pencil to trace the path.

Reinforce

Following directions step by step is similar to how computers follow instructions in a program. Each step must be accurate to reach the correct result.

Review Exercise

1. Why is it important to follow directions step by step?
2. What happens if we miss a step while following instructions?
3. How do directions help us move correctly on a map or grid?
4. How is this activity similar to writing a program?

Differentiated Lessons

Remedial Activity

- Provide a simple grid with fewer steps.
- Ask learners to follow basic directions such as left, right, forward.

Challenging Activity

- Ask learners to create their own direction-based puzzle on a grid.
- Let classmates follow the instructions and find the final position.

Teacher Closure for Level 4

Summarise the key learning points:

Learners have learned to:

- Understand and use directions (North, South, East, West)
- Follow step-by-step instructions
- Track movement on a grid
- Apply logical reasoning to reach a destination
- Understand sequencing in problem solving

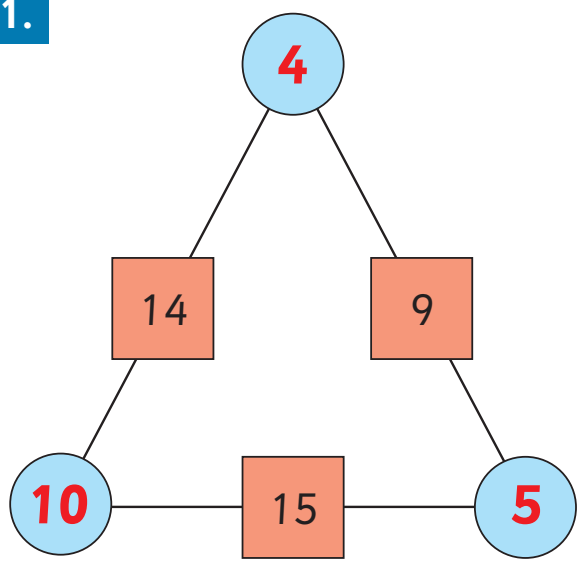
These activities help learners develop spatial reasoning, logical thinking, and algorithmic skills, which are essential for computational thinking and coding concepts.

Answer Key

1.1 Arithmagons

A. Solve the following arithmagons:

1.



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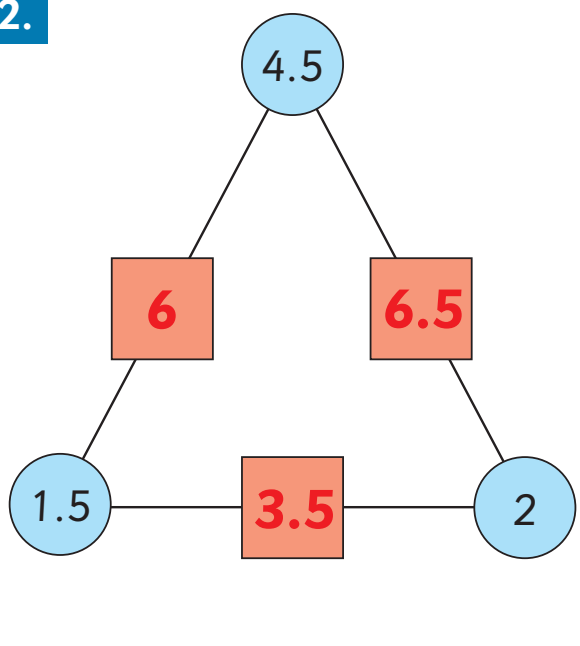
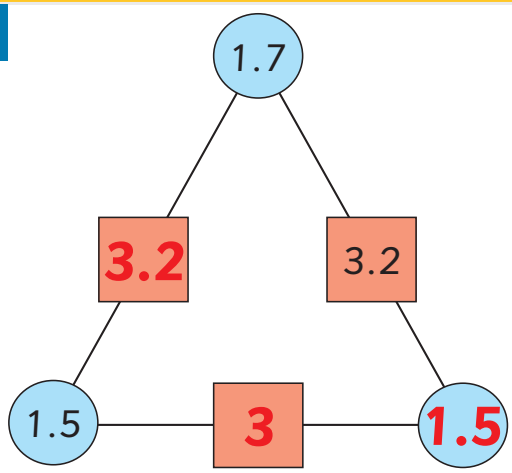
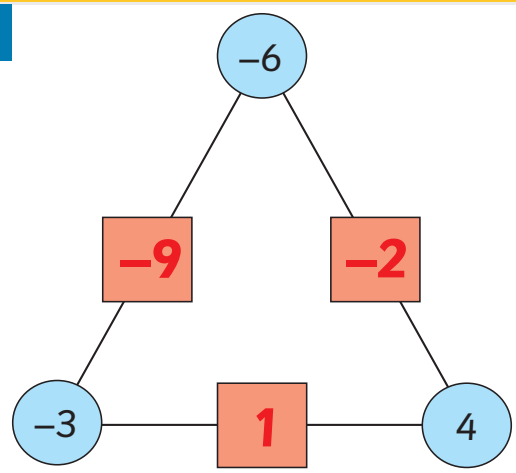


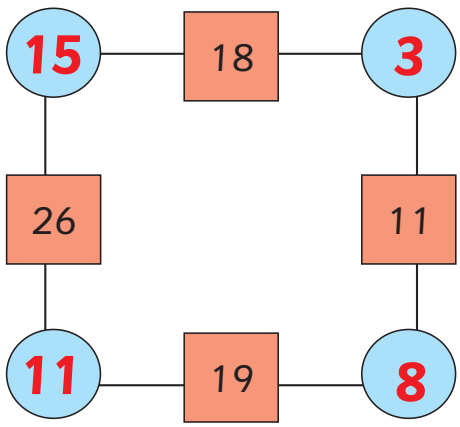
3.


1.7
3.2
3.2
1.5
3
1.5

4.


−6
−9
−2
−3
1
4

5.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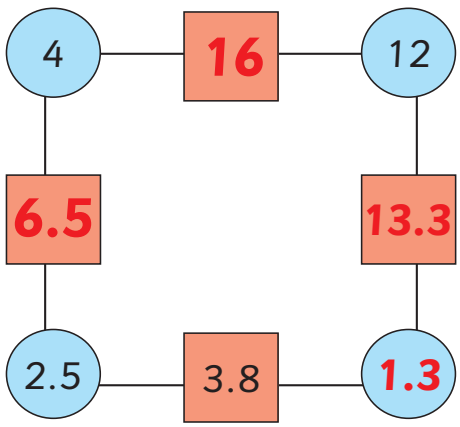
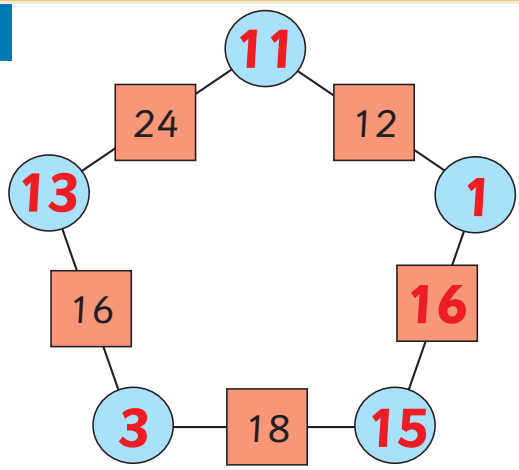
18
3
26
11
11
19
8

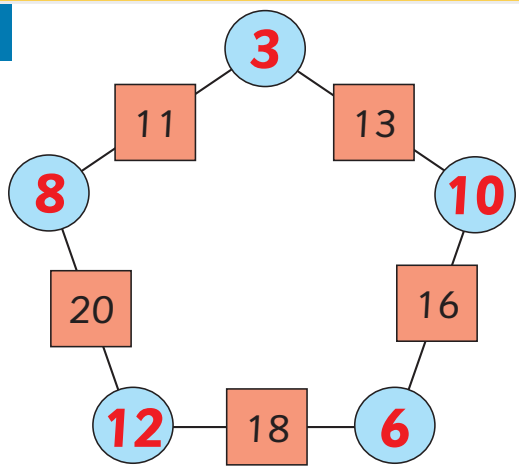
6.


4
16
12
6.5
13.3
2.5
3.8
1.3

7.

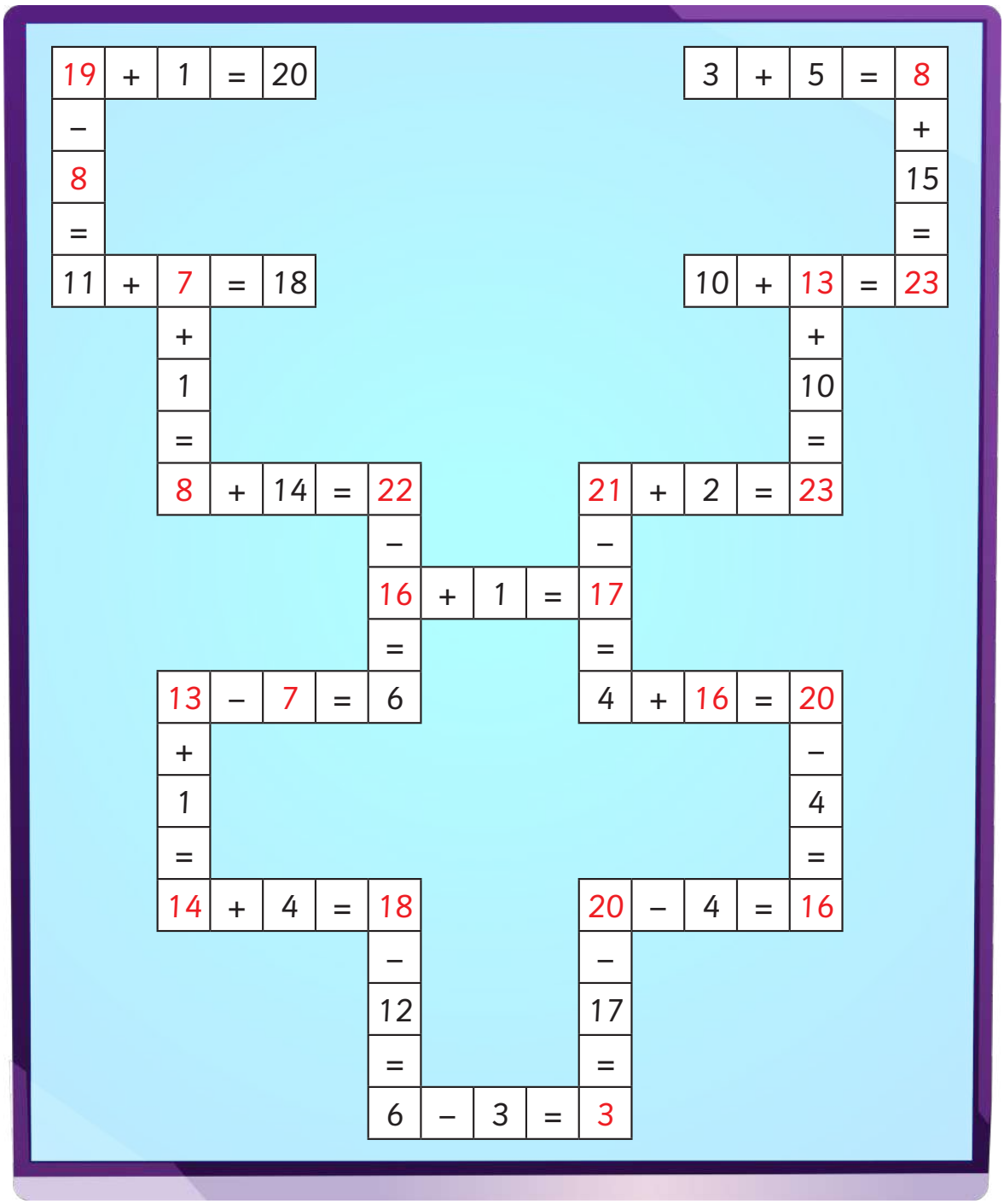

11
24
12
13
1
16
16
3
18
15

8.

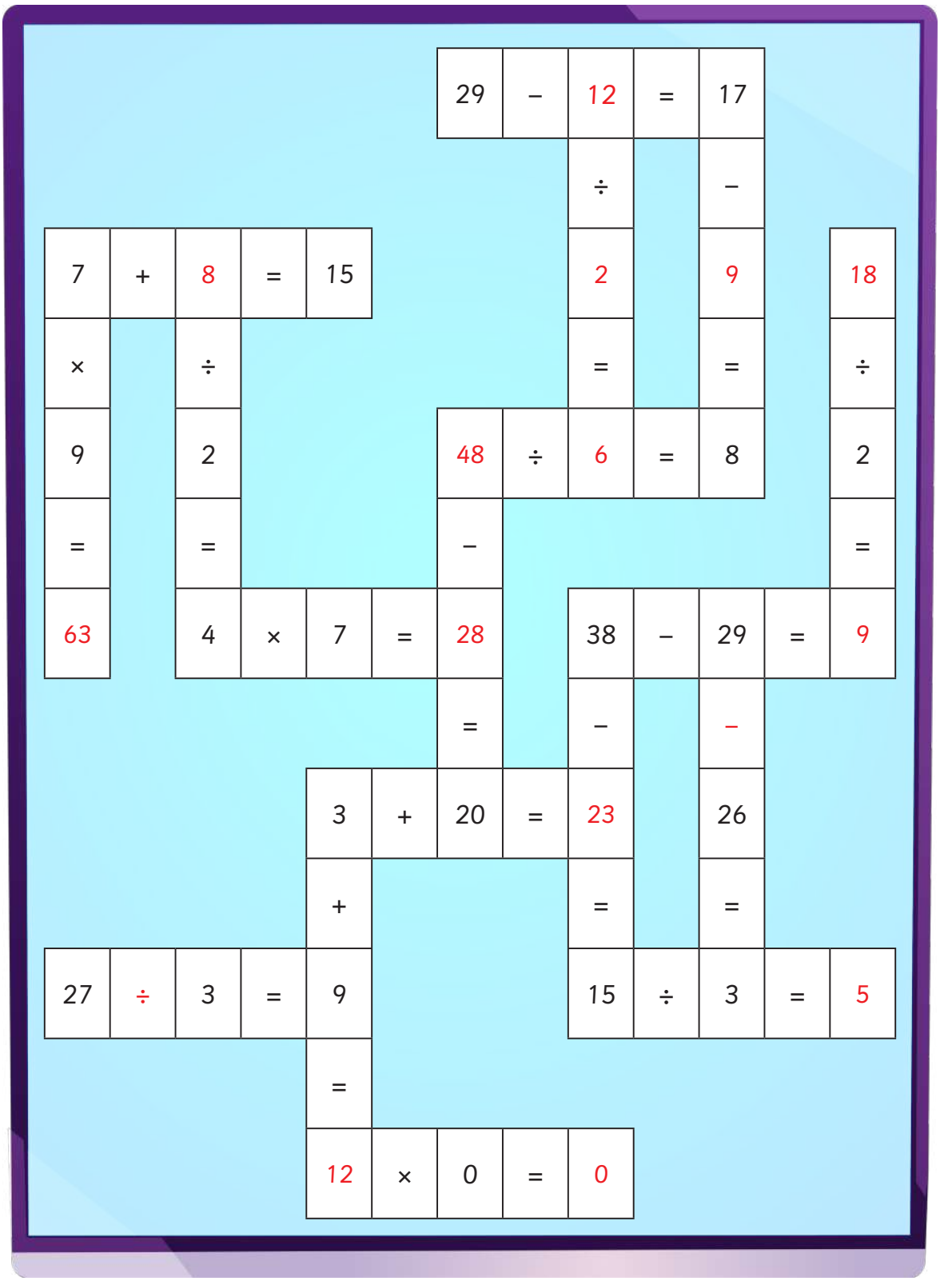

3
11
13
8
10
20
16
12
18
6

1.2 Number Puzzle

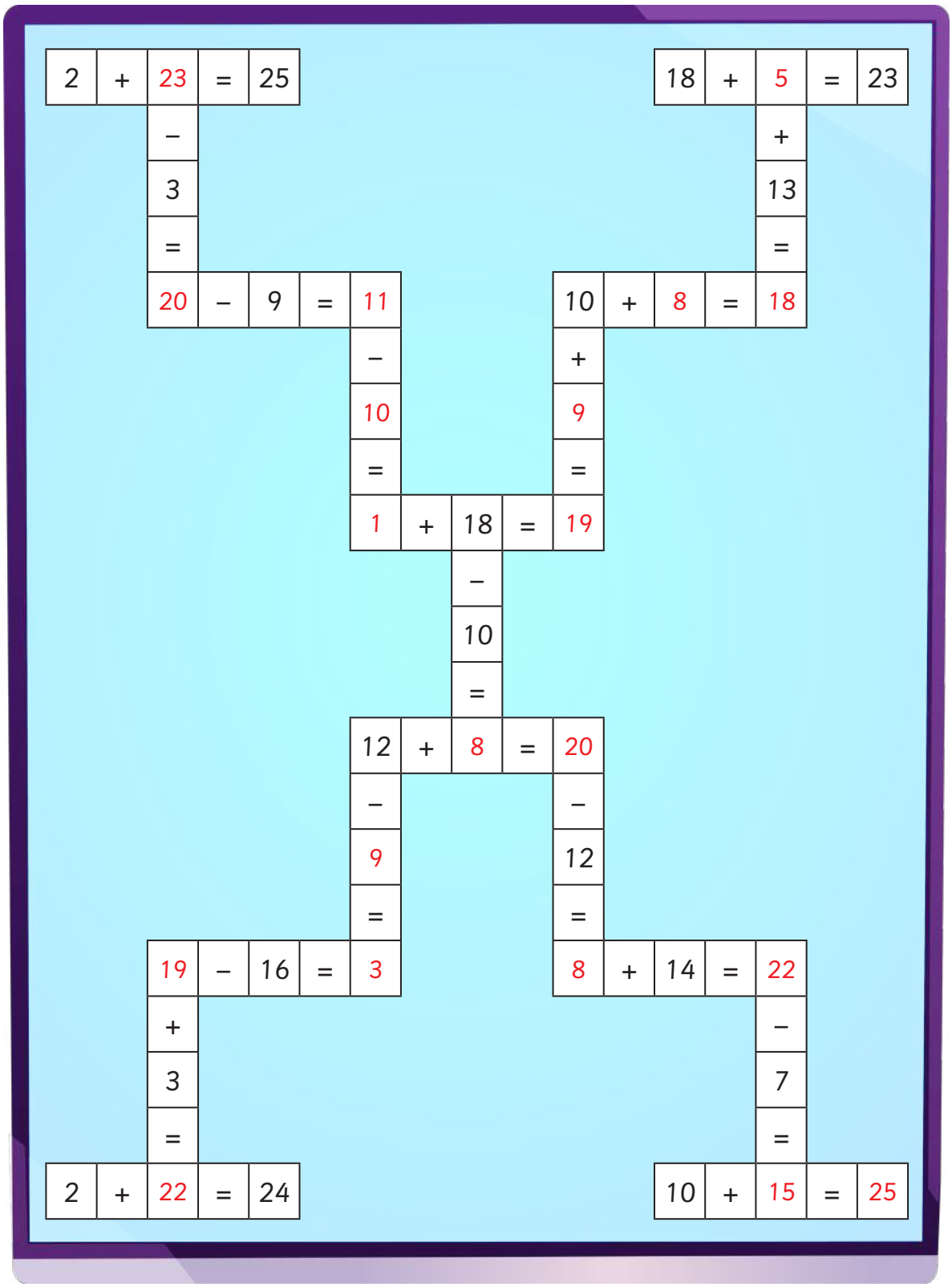
A. *Fill the boxes and complete the number puzzle.*



B. *Fill the boxes and complete the number puzzle.*

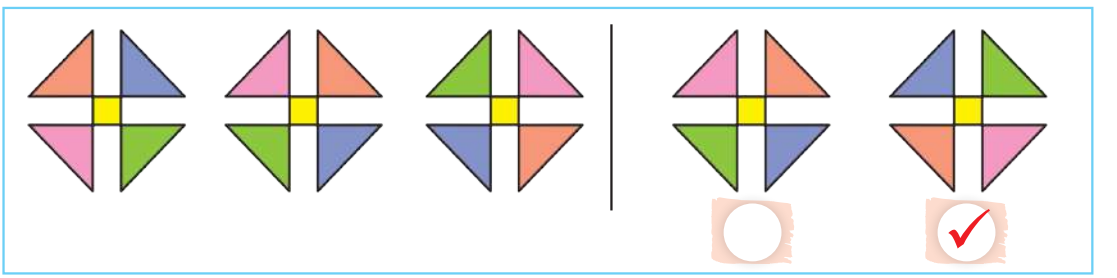


C. *Fill the boxes and complete the number puzzle.*

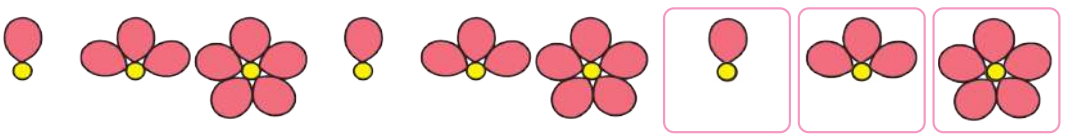


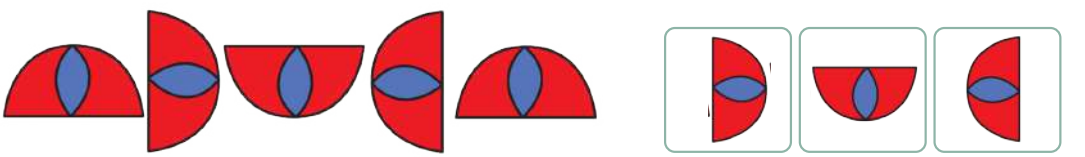
1.3 Patterns

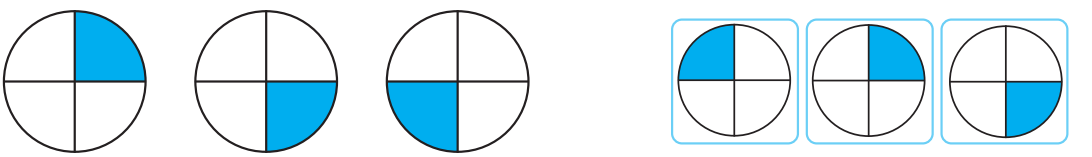
A. Tick (✓) the correct picture that comes next in the pattern.



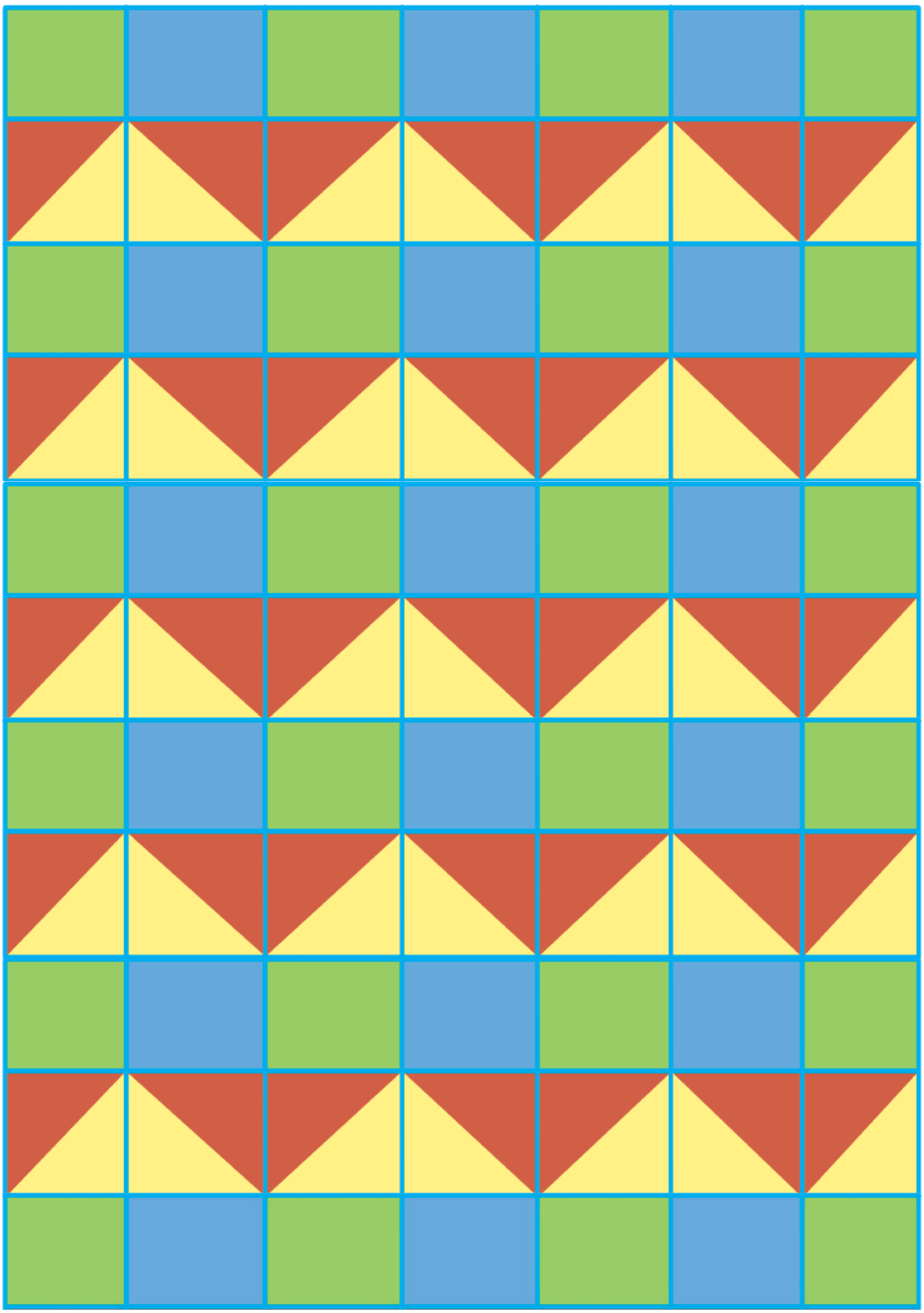
B. Draw and complete the patterns given below:





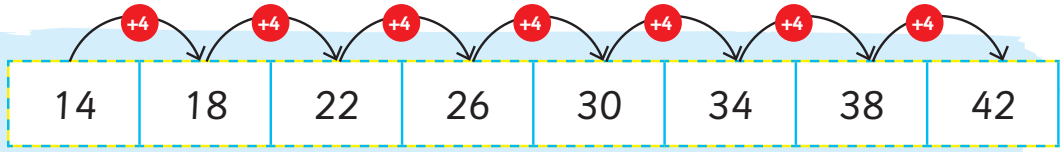


C. Complete the colour pattern given below.



D. *Understand and complete the given number patterns. One has been done for you.*

1.



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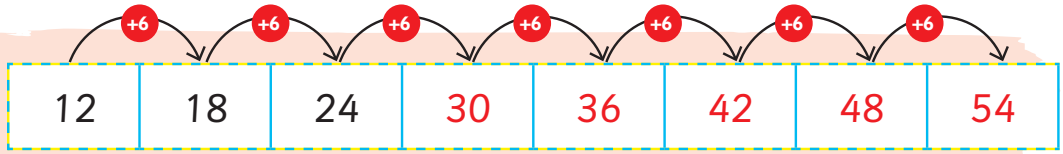

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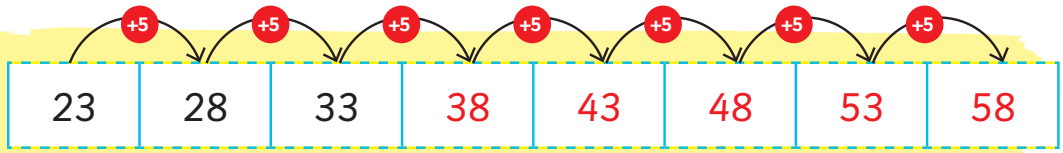

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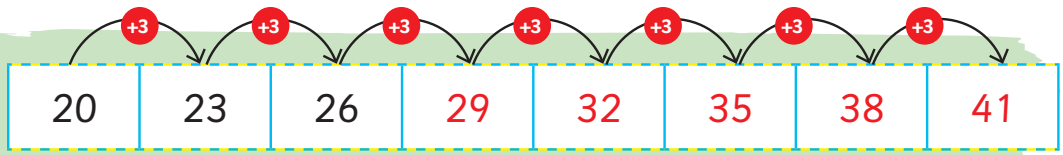

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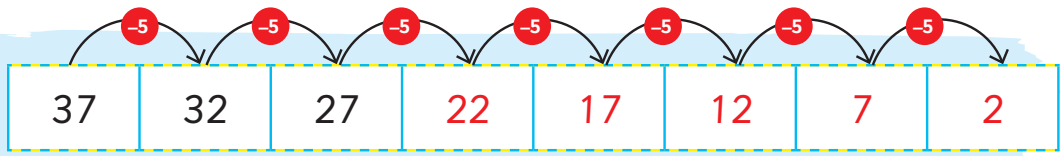

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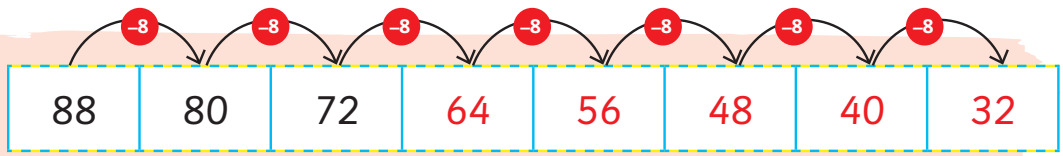

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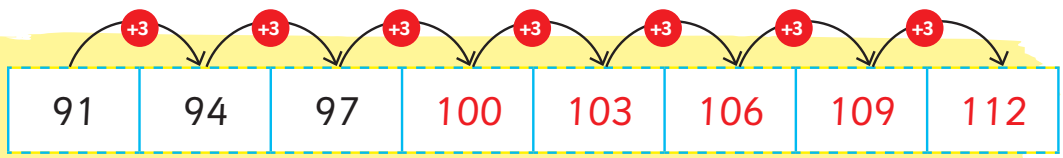

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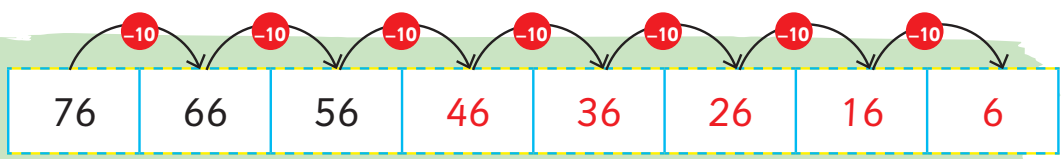
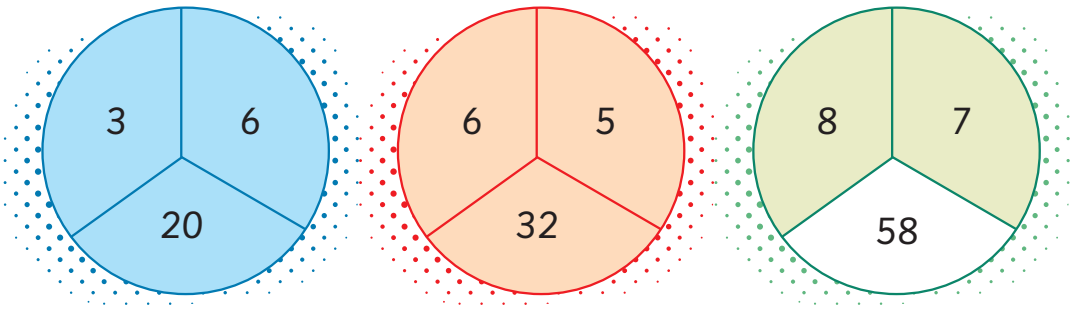


1.4 Reason Wisdom

A. Find the missing number.

1.



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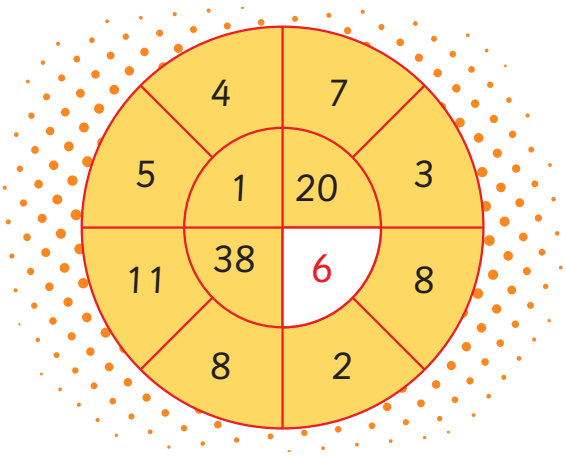
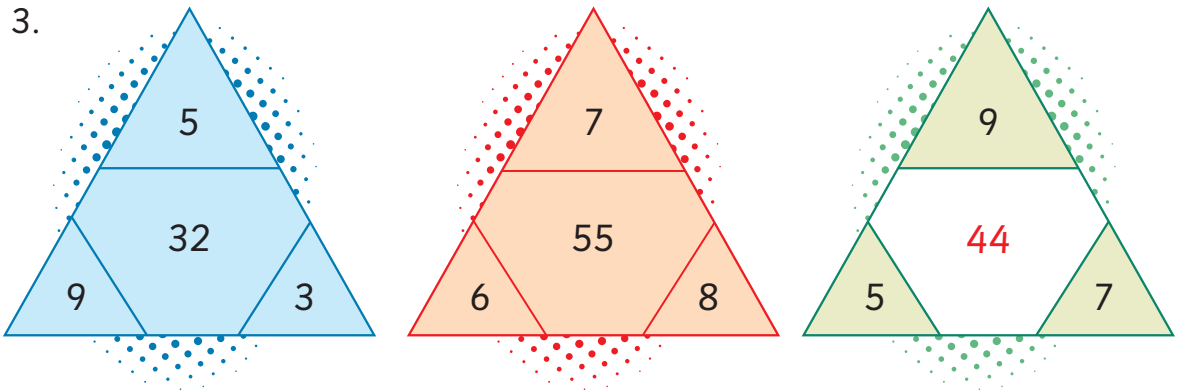


3.



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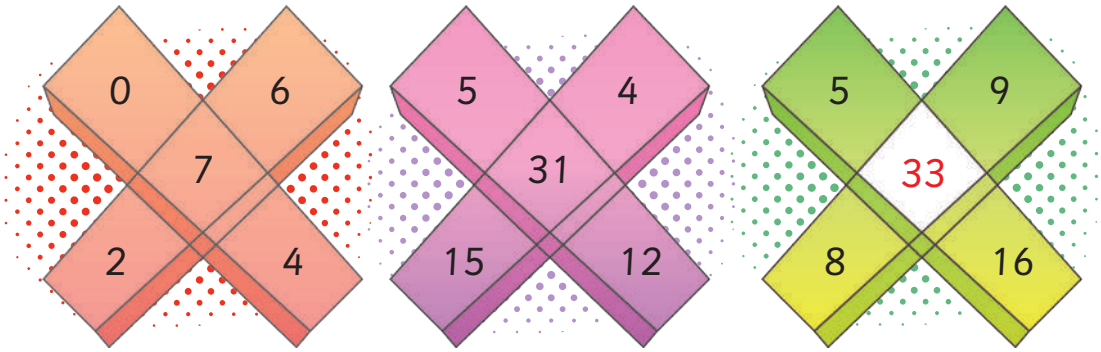

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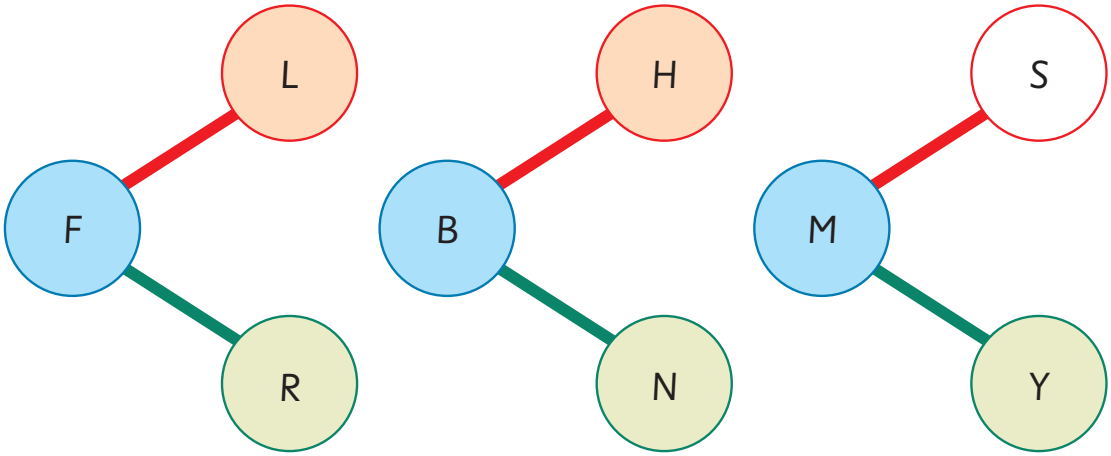
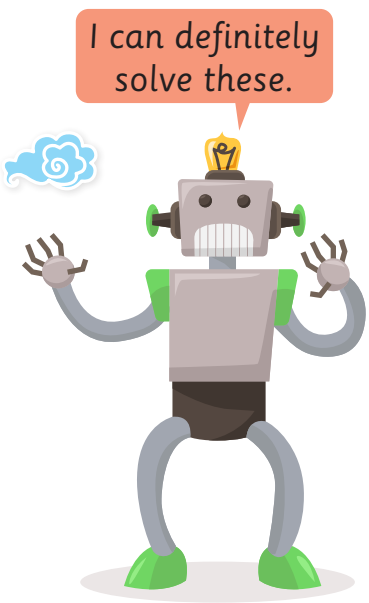
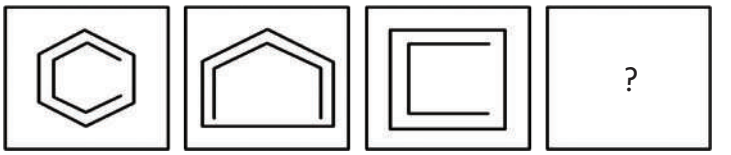


6.

Bd	Eg	Hj
Km	Np	Qs
Tv	Wy	Zb



B. Choose the correct option.

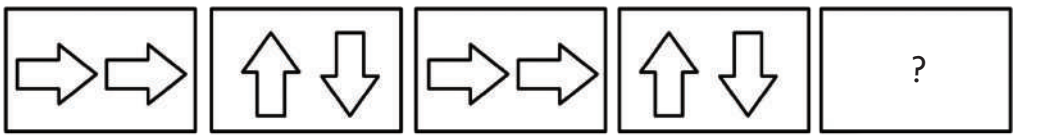
1. 

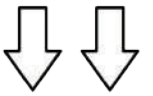
(i) 

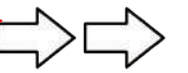
(ii) 

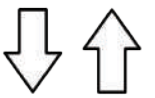
(iii) 

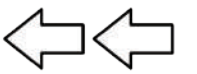
(iv) 

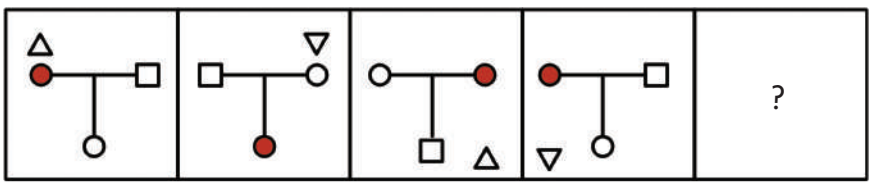
2. 

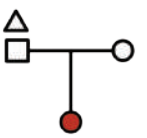
(i) 

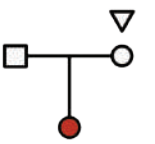
(ii) 

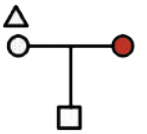
(iii) 

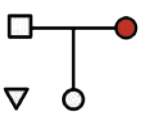
(iv) 

3. 

(i) 

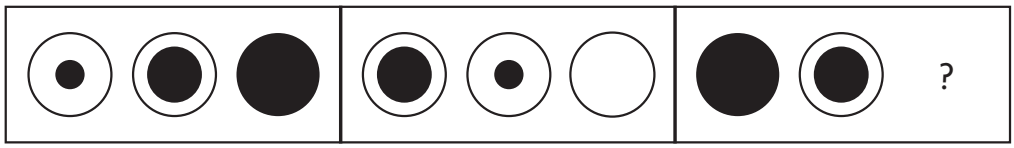
(ii) 

(iii) 

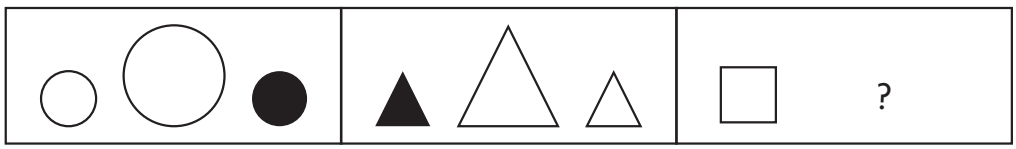
(iv) 

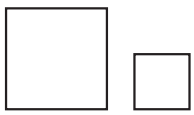
4. 

(i)  (ii)  (iii)  (iv) 

5. 

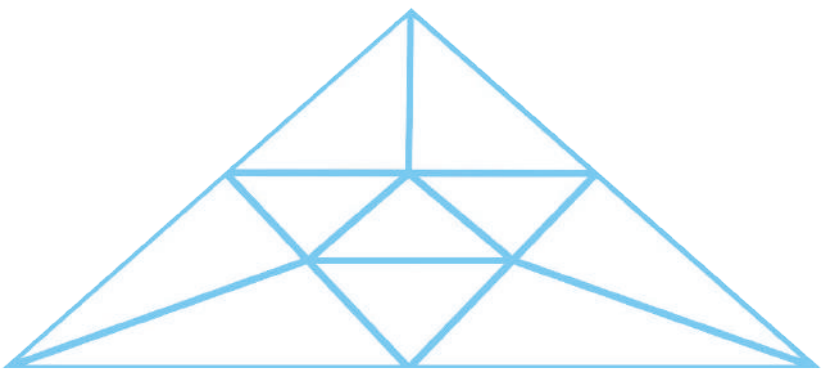
(i)  (ii)  (iii)  (iv) 

6. 

(i)  (ii) 

(iii)  (iv) 

C. *How many triangles are there in the following figure?*



15 triangles

1.5 Verbal Reasoning

A. *There are two sets of words given with a blank space in between. Fill in the missing letter to complete the first word and begin the second word. One has been done for you.*

1. TOW N EST

2. HOR N OSE

3. CAS T OME

4. PAR T ITE

5. SOLV E NTER

6. PRES S TAND

7. BEAC H OLLY

8. TWIS T IRED

9. DAIL Y EARS

10. APPL E AGLE

11. SLEE P ETAL

12. ARRO W ASTE

B. *There are three pairs of words given. The second word in each pair is derived from the letters in the first word, following a sequence. Complete the last pair of words and state the order. One has been done for you.*

1. DEFINE, FIND | POSTED, STEP | MOTHER, THEM

   Order is 3451

2. TABLES, SALT | SINGER, RIGS | REMAIN, NEAR

   Order is 6241

3. FLOOD, GOOD | BOAST, CAST | STALE, TALE

   Order is 1'345

   The first letter changes to the next letter in the alphabet, and the remaining letters follow order 3-4-5.

4. CRASH, DASH | FLASH, GASH | SHAPE, TAPE

   Order is 1'345

   The first letter changes to the next letter in the alphabet, and the remaining letters follow order 3-4-5.

5. RETIRE, RITE | SMILE, SLIM | DECIDE, DICE

   Order is 1432

6. CUSTARD, CARD | VIOLENT, VENT | SAILING, SING

   Order is 1567

C. Circle the word that would come last when written alphabetically. One has been done for you.

1. high dress torch cover
2. novel quick score prove
3. chart lucky human guard
4. march order state idea
5. family screen narrow common
6. train whole brand youth
7. again quest honest fuel
8. insect zebra force magic
9. eaten drunk crime buddy
10. pause occur mixed loyal
11. ego candle trance ginger
12. xerox urban vowel yummy

1.6 Palindrome

A. Colour the words that make a palindrome.

CIVIC

NOON

BIRD

PAPER

SLEEPER

MOM

SHEEP

MADAM

SEEMS

BORROW

DEED

ROTATOR

B. *Find and circle all of the palindromes. The words may be horizontally, vertically, or diagonally placed.*

B	V	T	P	L	W	Z	B	J	R	N	T	M	K	T	M	V	H	T
I	H	E	E	E	A	P	E	E	P	R	O	T	A	T	O	R	V	E
B	P	F	A	J	Z	O	R	K	E	B	U	B	V	Q	M	Q	Q	N
O	Z	H	E	M	Z	P	W	F	R	O	X	S	K	A	Y	A	K	E
O	T	C	N	O	L	B	E	U	Y	G	G	K	E	L	G	M	P	T
L	L	A	I	U	G	R	E	D	D	E	R	E	J	E	F	A	X	J
U	C	E	R	V	X	W	A	A	R	D	F	T	W	Y	S	D	B	L
G	Y	N	W	S	I	G	F	D	W	S	R	T	S	S	Z	A	C	H
W	A	G	Y	E	A	C	C	U	A	V	B	Z	L	A	K	M	S	S
Z	D	X	V	F	I	C	D	N	H	R	A	C	P	G	C	J	F	T
J	N	J	A	E	H	S	C	B	X	Q	U	Q	S	A	E	F	Q	A
R	L	L	S	Z	H	G	R	X	N	H	C	N	V	S	H	S	W	T
G	P	Z	E	E	Y	E	N	L	I	Q	N	E	B	M	I	W	N	S
Y	I	H	T	V	N	O	R	J	P	A	Z	Y	V	S	D	J	G	C
F	S	A	S	A	E	O	P	F	V	T	Z	G	N	E	H	L	G	S
B	D	X	I	S	O	L	O	S	Z	M	I	E	D	W	A	X	S	Z
Q	A	G	F	B	N	Y	G	N	W	T	I	Y	F	Z	U	U	N	T
N	D	C	W	X	Y	A	Z	I	O	O	P	R	X	I	K	A	U	M
S	E	Z	A	E	G	U	L	T	A	K	W	T	O	O	T	T	D	Y

C. *Solve the following numbers to convert them into a palindrome.*

1 95

```
  9 5
+ 5 9
-------
  1 5 4
+ 4 5 1
-------
  6 0 5
+ 5 0 6
-------
1 1 1 1
```

2 28

```
  2 8
+ 8 2
-------
  1 1 0
+ 0 1 1
-------
  1 2 1
```

3 436

```
  4 3 6
+ 6 3 4
-------
  1 0 7 0
+ 0 7 0 1
-------
  1 7 7 1
```

4 324

```
  3 2 4
+ 4 2 3
-------
  7 4 7
```

Coding Challenge-1

Math Squares

RULES:

1. You have to fill in the numbers 1–9 in the puzzle.
2. You can only use each number once.
3. Each row and column is a math equation.
4. Don't forget that multiplication and division are performed before addition and subtraction.

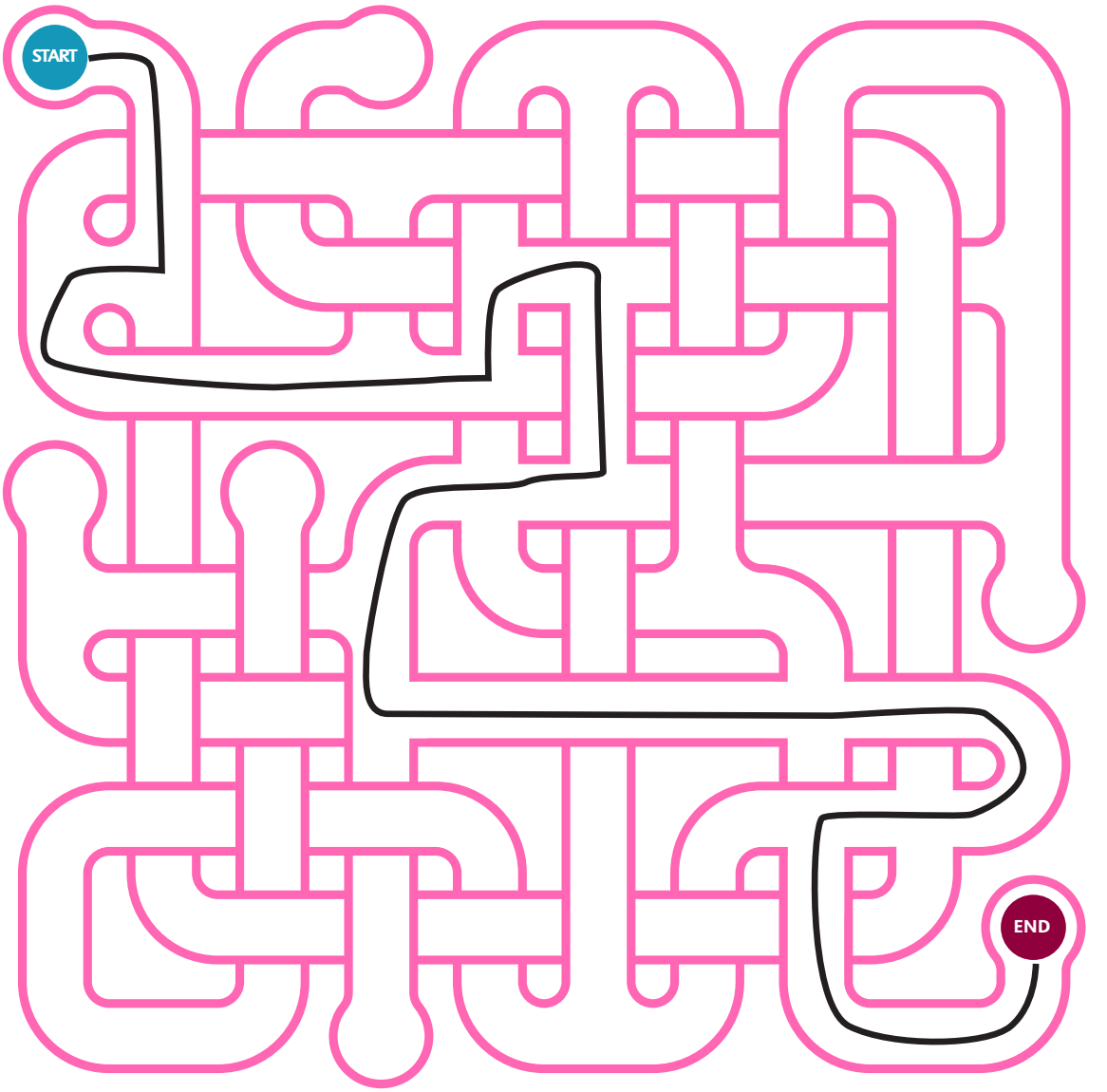
Tip: Start working with low or high sums.

9	–	1	+	7	15
/		–		–	
3	×	4	+	2	14
–		+		+	
8	–	5	+	6	9
–5		2		11	

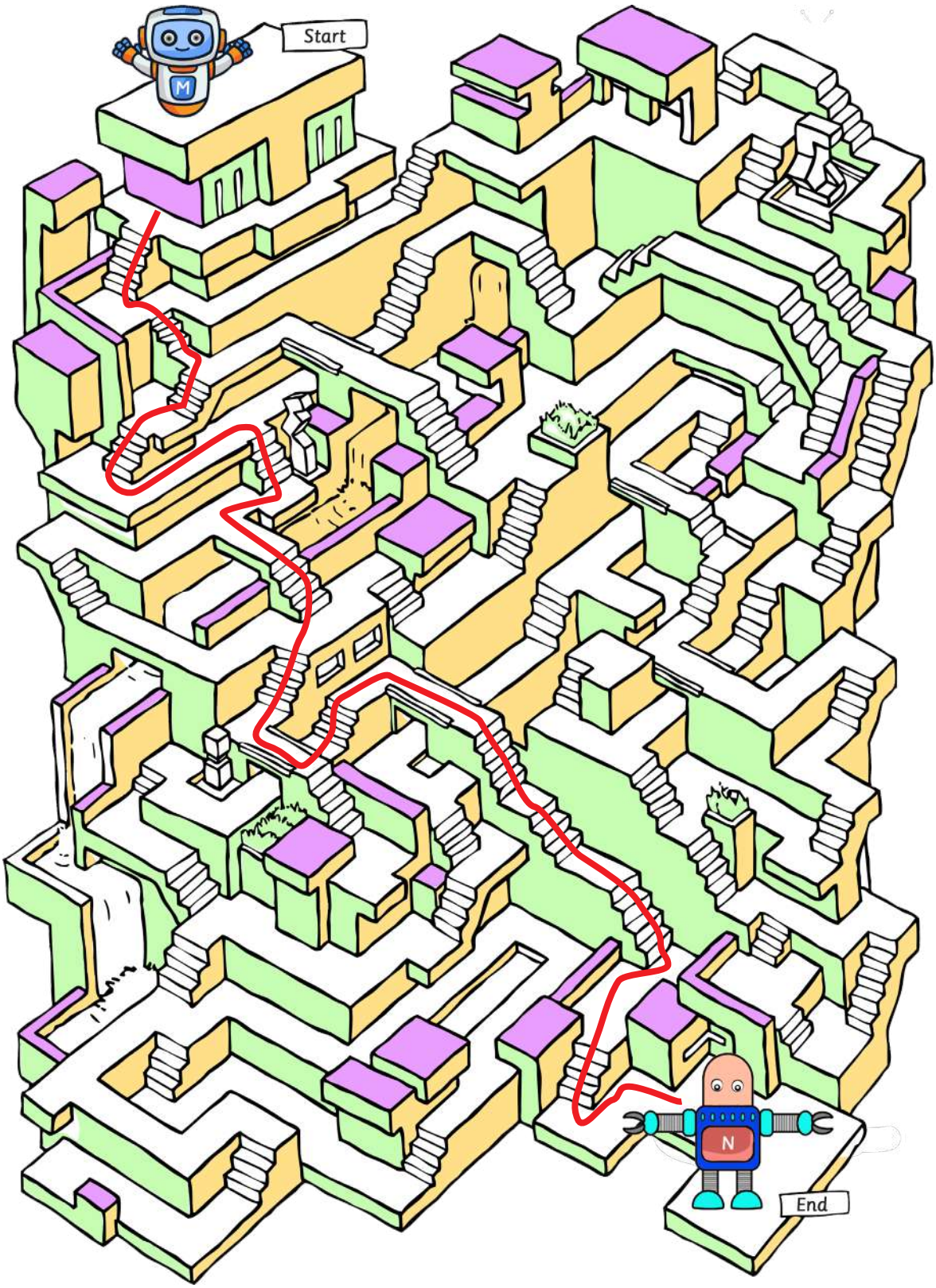
9	–	2	+	3	10
–		+		+	
8	/	4	+	6	8
–		–		+	
7	+	5	–	1	11
–6		1		10	

2.1 Tricky Way Out

A. Find your way out.



B. *Help Mimbo find his way out to reach Nimbo.*



2.2 Analogy

A. Complete each analogy with an appropriate word.

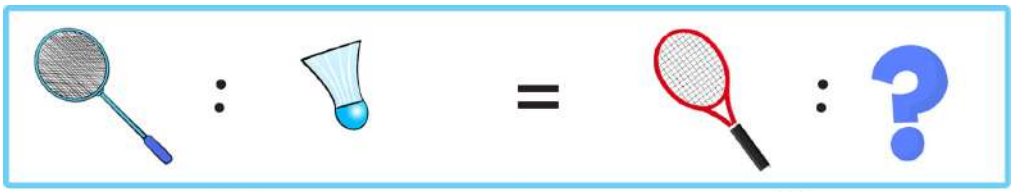
1. Cup is to adult as bottle is to baby
2. Watch is to wrist as ring is to finger
3. Tadpole is to frog as caterpillar is to butterfly
4. Rain is to spring as snow is to winter
5. Beautiful is to ugly as happy is to sad

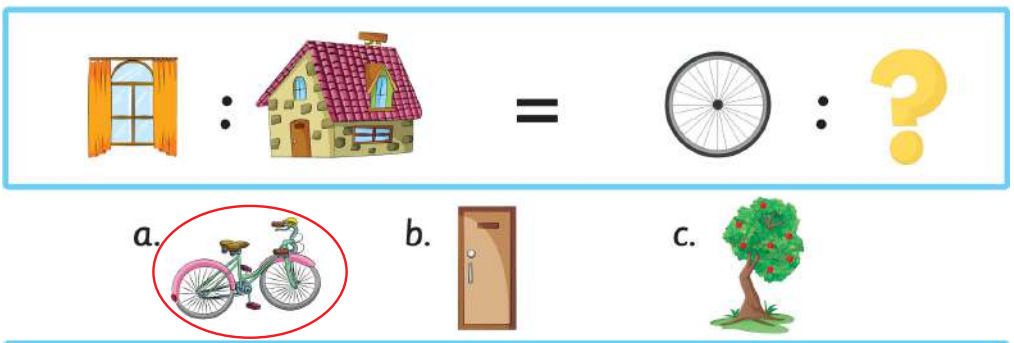
B. Choose the correct word to complete each analogy.

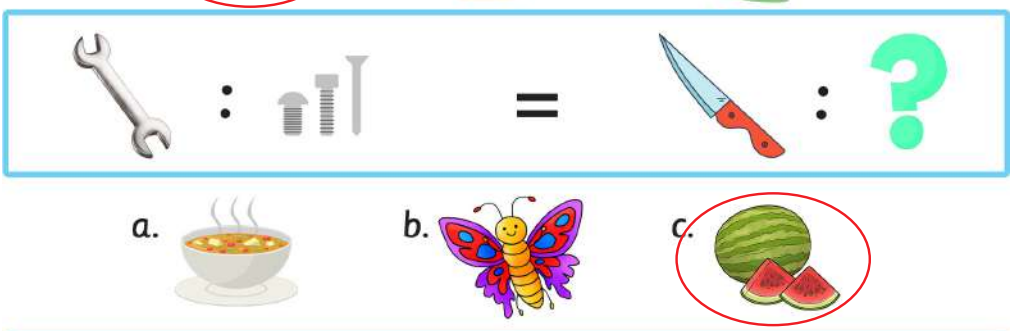
1. Scissors are to cut as axe is to _____.
   - a. chop ✓
   - b. burn
   - c. tree
   - d. sharpen
2. Policeman is to crime as doctor is to _____.
   - a. illness ✓
   - b. nurse
   - c. stethoscope
   - d. patient
3. Hunger is to eat as thirst is to _____.
   - a. food
   - b. cup
   - c. milk
   - d. drink ✓
4. Carpenter is to hammer as doctor is to _____.
   - a. axe
   - b. nurse
   - c. stethoscope ✓
   - d. drill

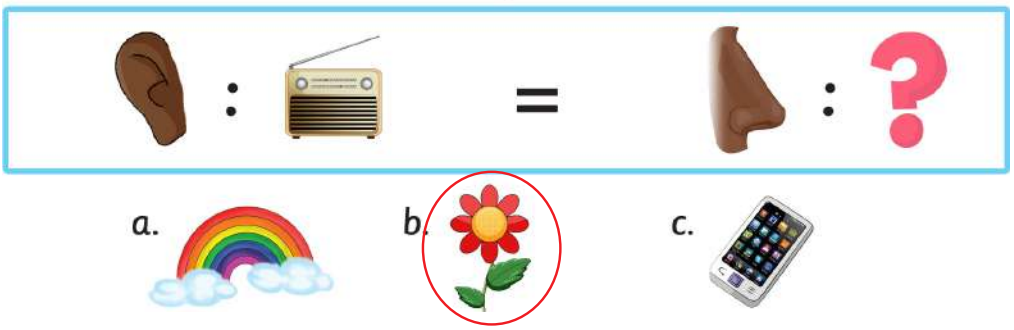
C. *Observe the first two pictures and try to understand how they are related. Find the image below that is related to the third picture in the same way as the second picture is related to the first.*

Circle the correct option.

1. 

2. 

3. 

4. 

2.3 Logical Analysis

A. Solve and answer the following questions.

If + means ÷, – means +, × means –, and ÷ means ×; then, find the value of:
24÷12–18+9 = 290

If 12×7 = 408, and 9×8 = 207, then 13×7 = 109

If × means ÷, – means ×, ÷ means +, and + means – ; then, find the value of:
(3-15÷19)×8+6 = 32

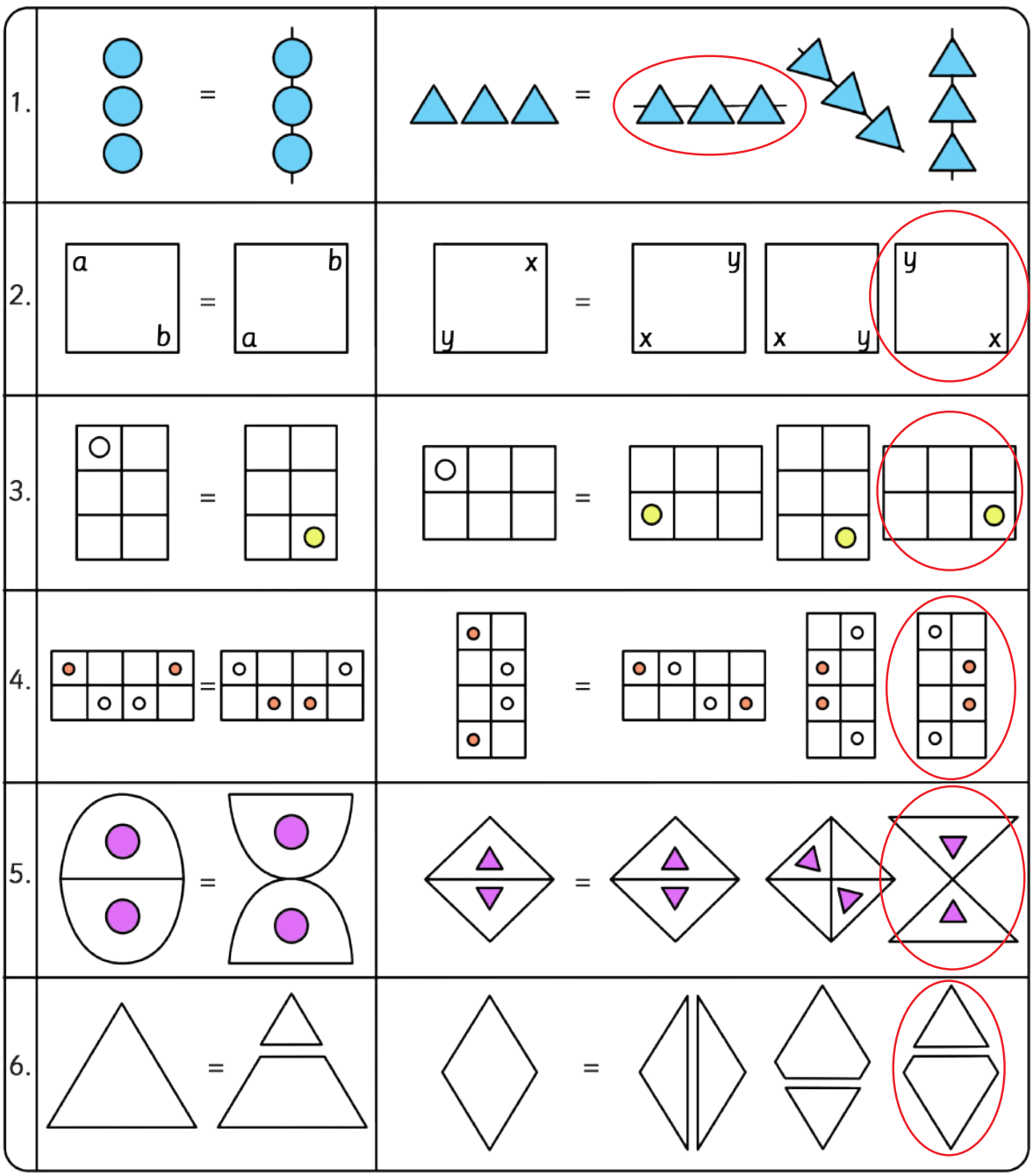
If × means +, ÷ means –, – means ×, and + means ÷ ; then, find the value of :
14×3÷11–12+3 = –27

If A means '+' , @ means ' ×', & means '÷' and V means '–'; then, find the value of:
7@2v135&5@3&9A1 = 6

B. *Look at the first set of shapes. Imagine how the first shape changes to become the second one.*

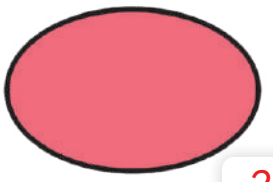
Now look at the second set of shapes and see if you can find what the first shape should change into.

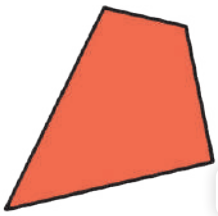
Circle the correct shape in the group given on the right.

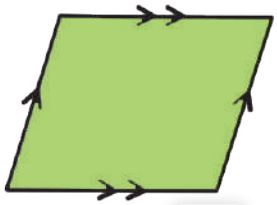


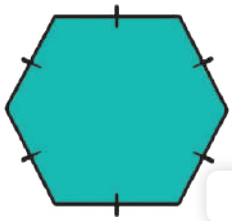
2.4 Line of Symmetry

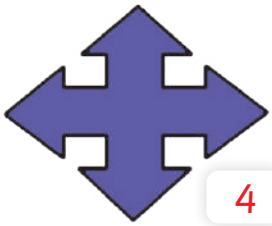
A. How many lines of symmetry does each shape have?

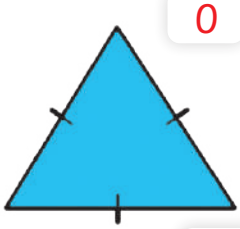
1.  2

2.  0

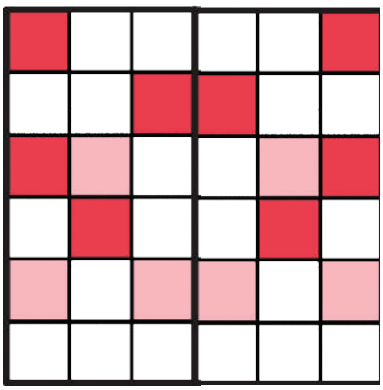
3.  0

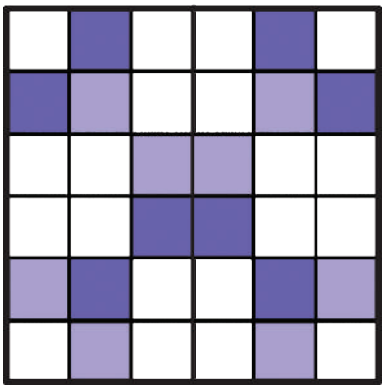
4.  6

5.  4

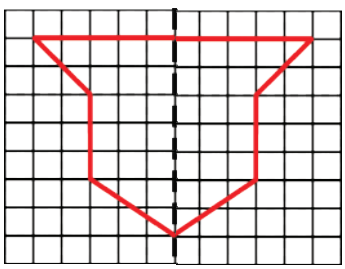
6.  3

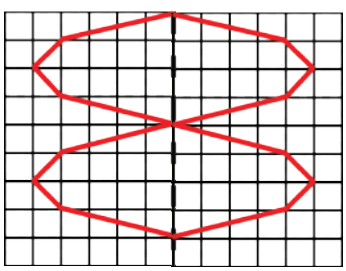
B. Shade 4 boxes in each pattern below such that each one have 1 line of symmetry.

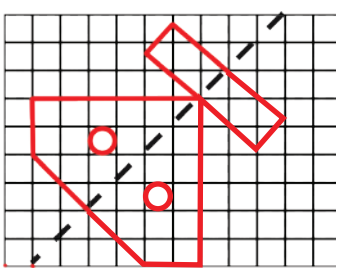
1. 

2. 

C. Complete each figure—the dashed line is the line of symmetry.

1. 

2. 

3. 

2.5 Sudoku

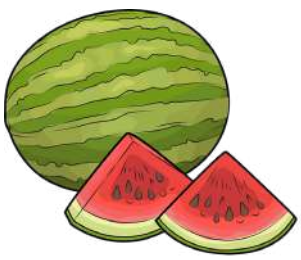
A. Solve the given Sudokus.

5	3	4	6	7	8	9	1	2
6	7	2	1	9	5	3	4	8
1	9	8	3	4	2	5	6	7
8	5	9	7	6	1	4	2	3
4	2	6	8	5	3	7	9	1
7	1	3	9	2	4	8	5	6
9	6	1	5	3	7	2	8	4
2	8	7	4	1	9	6	3	5
3	4	5	2	8	6	1	7	9

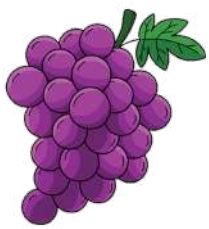
1	9	4	8	3	5	7	6	2
7	3	2	4	1	6	9	8	5
8	5	6	9	7	2	3	1	4
6	2	5	7	4	3	8	9	1
3	8	1	5	2	9	6	4	7
4	7	9	6	8	1	5	2	3
5	1	7	2	6	8	4	3	9
9	6	3	1	5	4	2	7	8
2	4	8	3	9	7	1	5	6

B. *Solve the following picture Sudoku by putting in the correct fruit number in the empty cells.*

1		5			2
3		2	1		
6					
			6		
2	3		4		
4		1			

1. 

2. 

3. 

4. 

5. 

6. 

2.6 Coded Riddles

A. Solve the coded riddles using the hints.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
K	A	O	G	R	E	U	Y	N	F	H	T	S	D	M	I	L	B	W	P

1. What goes up when rain comes down?

U	M	B	R	E	L	L	A
7	15	18	5	6	17	17	2

2. What building has the most stories?

L	I	B	R	A	R	Y
17	16	18	5	2	5	8

3. What can hold water when it is full of holes?

S	P	O	N	G	E
13	20	3	9	4	6

4. What demands an answer without asking a question?

D	O	O	R	B	E	L	L
14	3	3	5	18	6	17	17

5. What belongs to you but is used more by others?

Y	O	U	R	N	A	M	E
8	3	7	5	9	2	15	6

6. What can run but can't walk?

W	A	T	E	R
19	2	12	6	5

7. What is made that can't be seen?

N	O	I	S	E
9	3	16	13	6

8. What can break without being touched?

P	R	O	M	I	S	E
20	5	3	15	16	13	6

Coding Challenge-2

Fun with Rebus

A rebus *is a type of puzzle where pictures or symbols represent words or phrases. You have to figure out the meaning by putting the pieces together.*

Coffee Time

Football

Heartbreak

Misunderstood

Downtown

Tricycle

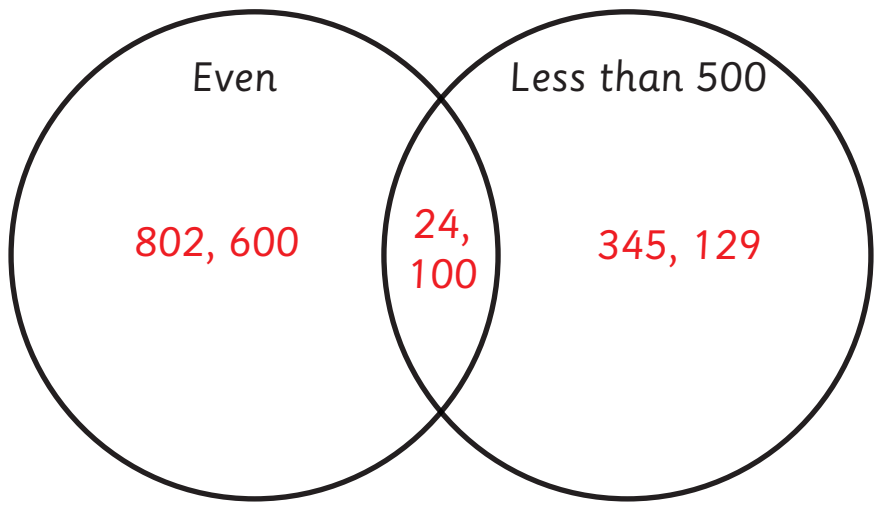
U-Turn

Watermark

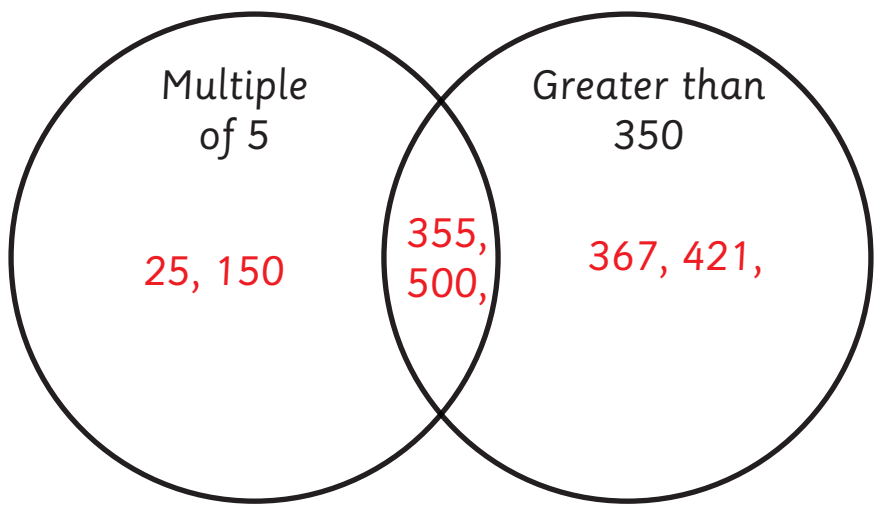
3.1 Venn DiaGram

A. Put these 8 numbers in the correct places in these Venn diagrams.

1. 24, 802, 345, 129, 701, 999, 100, 600,

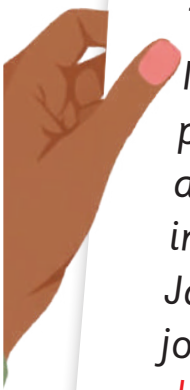


2. 355, 367, 421, 14, 500, 25, 150, 133



3.2 Data Compression

A. Read the story given below in a compressed form. Rewrite the same in a non-compressed form.



The S fam is a loving and close-knit unit. Mr. S, a HW DAD, is always there to provide for his fam. Mrs. S, a caring and nrtrg MOM, creates a warm and inviting home. Their C, Sarah and Jack, are full of energy and bring joy to EO. They share LG, meals, and cher moments together. Th their sup, US, and love for one another, the S fam creates a strg bond that makes them feel safe, sec, and loved.

S = Smith
fam = family
DAD = father
nrtrng = nurturing
MOM = mother
C = children
EO = everyone
LG = laughter
cher = cherished
sup = support
US = understanding
strg = strong
sec = secure
Th = Through
HW = hardworking

Ans. The Smith family is a loving and close-knit unit. Mr. Smith, a hardworking dad, is always there to provide for his family. Mrs. Smith, a caring and nurturing mother, creates a warm and inviting home. Their children, Sarah and Jack, are full of energy and bring joy to everyone. They share laughter, meals, and cherished moments together. Through their support, understanding, and love for one another, the Smith family creates a strong bond that makes them feel safe, secure, and loved.

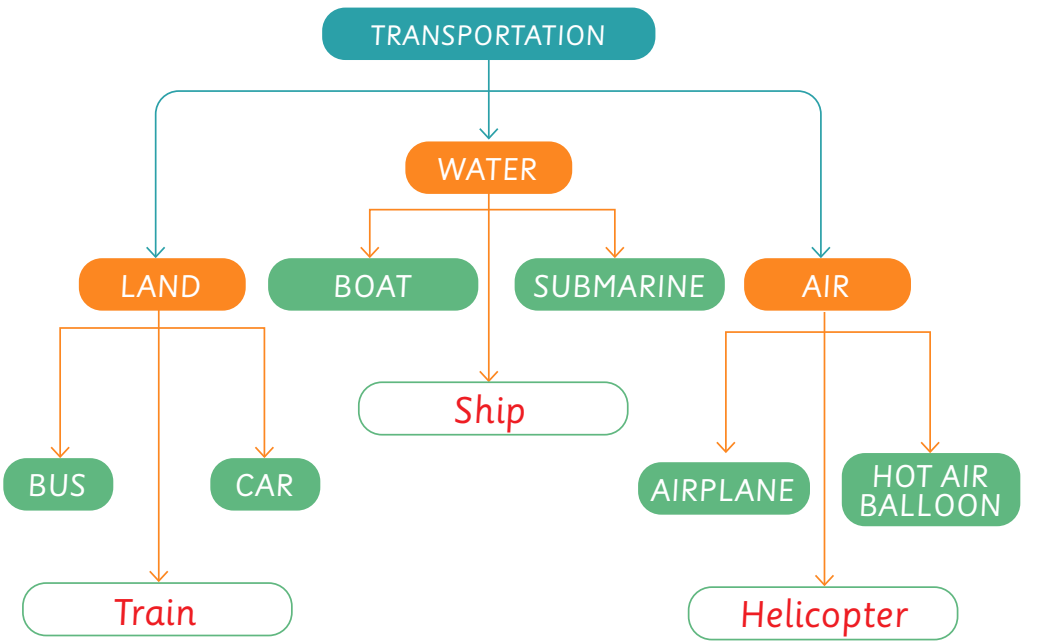
B. *Decode the compressed story and rewrite it in a non-compressed form in the space given below.*

Kiki the  licked her  and stared at Bitty the  , who was singing a silly  song in her cage. Cartoon noises played in the background as the  watched  . Kiki tiptoed to the edge of the kitchen counter. Bitty kept singing, unaware of the creeping  , but aware that she was protected by the metal bird  . Kiki went for it. She sprang toward the bird  , but as she did, she slipped on some  on the counter that the  had spilled. Kiki fell off the counter and landed in the  . The lid closed on the  -covered kitty. Laughter played on the  . Bitty kept whistling.

Ans. Kiki the cat licked her lips and stared at Bitty the bird, who was singing a silly bird song in her cage. Cartoon noises played in the background as the children watched television. Kiki tiptoed to the edge of the kitchen counter. Bitty kept singing, unaware of the creeping cat, but aware that she was protected by the metal bird cage. Kiki went for it. She sprang toward the bird, but as she did, she slipped on some milk on the counter that the children had spilled. Kiki fell off the counter and landed in the dustbin. The lid closed on the milk-covered kitty. Laughter played on the television. Bitty kept whistling.

3.3 Data and Information

A. Look at the given hierarchy system of transportation and answer the questions given below.



1. What are the categories of transportation?

   Land, Water, and Air

2. Write an example of land transport.

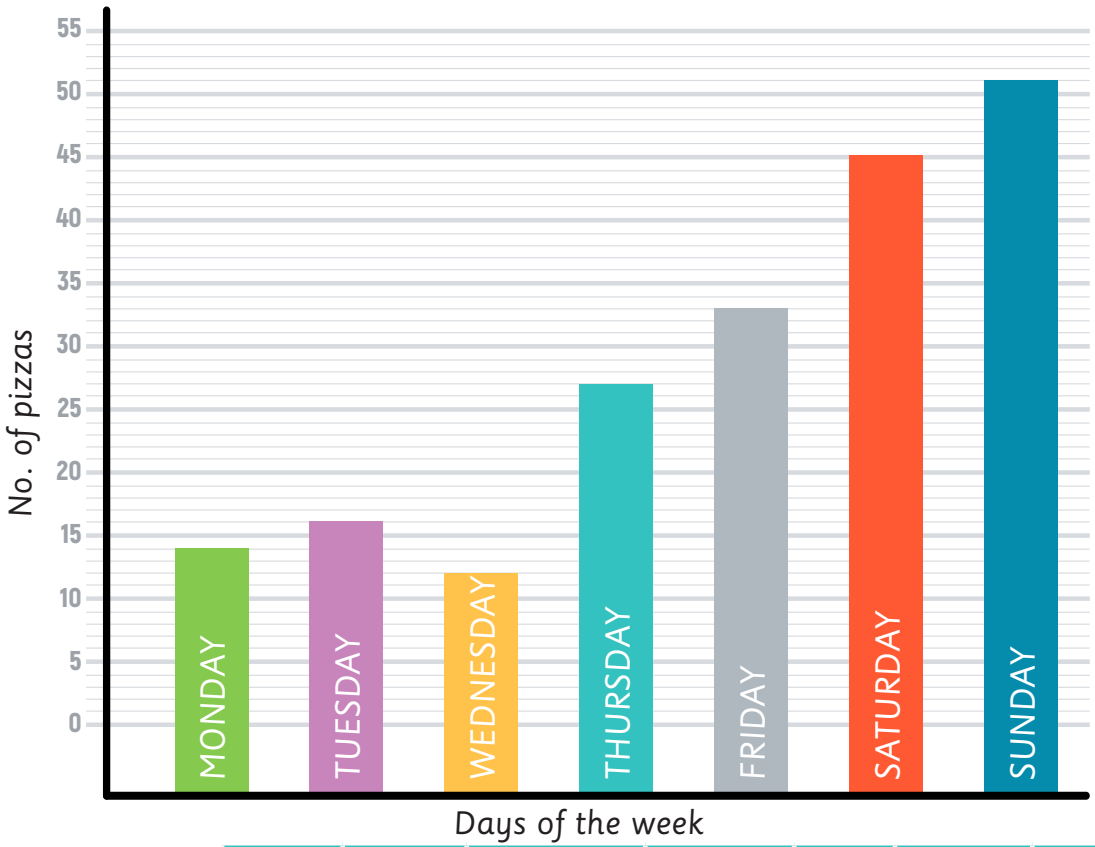
   Bus

3. Write an example of air transport.

   Airplane

4. Fill in all the blank boxes with suitable answer.

B. Study the following bar graph and answer the given questions.

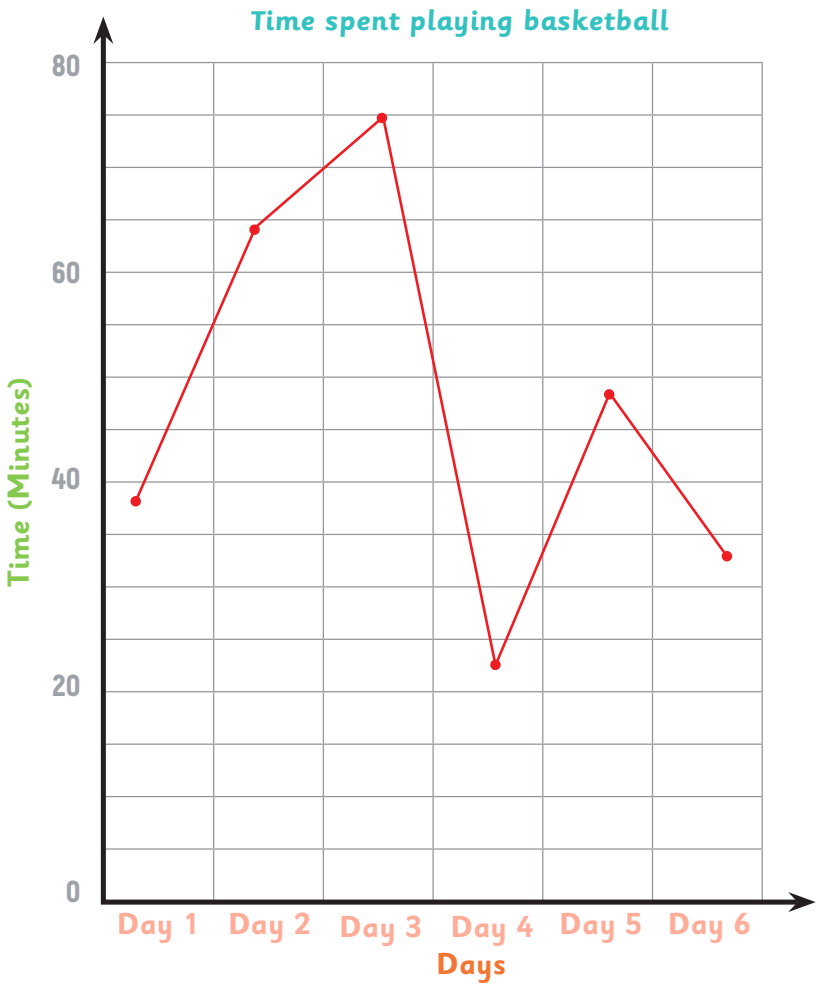


Day of the week →	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of sold pizzas →	14	16	12	27	33	45	51

Complete the table given above.

1. How many more pizzas were sold on Saturday compared to Wednesday? — 33
2. Which day sold the lowest number of pizzas? — Wednesday
3. How many pizzas were sold on Monday and Wednesday? — 26
4. How many pizzas were sold on Thursday and Friday? — 60

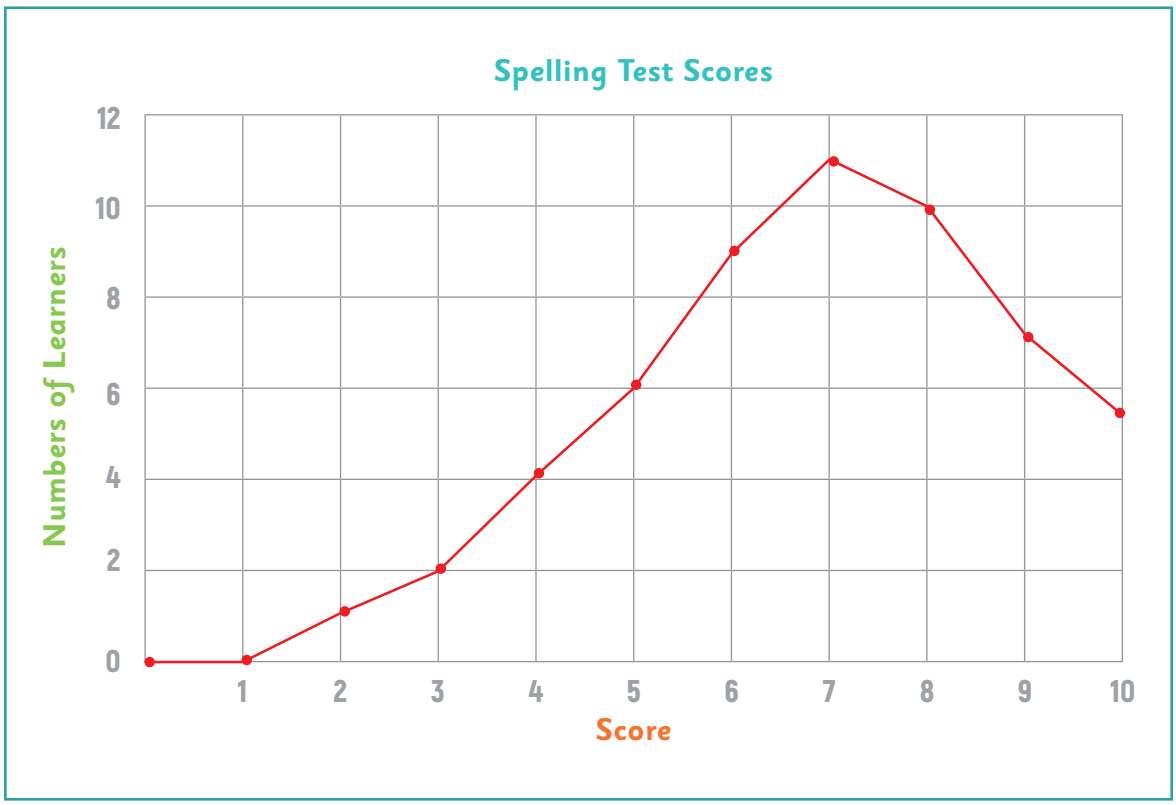
C. Kim and Joy recorded the time they spent playing basketball for 6 days. Draw a line graph using the data.



Day	Time (Minutes)
Day 1	40
Day 2	65
Day 3	75
Day 4	25
Day 5	50
Day 6	30

1. Which day did they spend the most time playing basketball? — Day 3
2. From day 4 to day 5, did the amount of time increase or decrease? — Increase
3. How many more minutes did they spend on day 1 and day 2 than day 5 and day 6? — 25 minutes
4. How many days did they play at least 40 minutes? — 4 days
5. What is the least time spent playing on a day? — 25 minutes (Day 4)

D. *Here are a set of spelling test scores out of 10 marks for a group of 55 learners. Answer the following questions about the data.*



1. What was the modal (most common) score? 7 marks

2. How many learners scored exactly half marks? 6 learners

3. How many learners score less than half-marks? 7 learners

4. How many learners scored more than 8 marks? 12 learners

5. Which spelling score did exactly 7 learners get? 9 marks

3.4 Decode the Code

A. *Decode the given information and choose the correct option.*

If triangle means circle, circle means square, square means rectangle, and rectangle means ball, then which has exactly four lines of symmetry?

a. Rectangle ☐ b. Square ☐
c. Circle ☑ d. Triangle ☐

In a certain code language, 'STARK' is written as 'LBFMG' and MOBILE is written as 'TNRSPJ'. How will 'BLAME' be written in that same code language?

a. TSFRJ ☐ b. NJFTP ☐
c. RPFTJ ☑ d. TSFGJ ☐

If SET=1900, WET= 2300, then NET will be equal to:

a. 1500 ☐ b. 1300 ☐
c 1400 ☑ d. 1600 ☐

If 'RAJU' is coded as 11-12-13-14 and 'JUNK' is coded as 13-14-10-9, then how will you code 'RANK'?

a. 11-12-10-9 ☑ b. 12-11-10-9 ☐
c. 9-10-11-12 ☐ d. 10-11-12-9 ☐

If P means 'to add', V means 'multiply by' and M means 'to divide by', then 5V2P10M2=?

a. 10 ☐ b. 15 ☑
c. 30 ☐ d. 20 ☐

If Rose is Lotus, Lotus is Lily, and Lily is Tulip, then which flower blossoms in water?

a. Tulip ☐ b. Lotus ☐
c. Lily ☑ d. Rose ☐

In a certain code 'MISSION' is written as 'MSIISNOS'. How will be 'ONLINE' written?

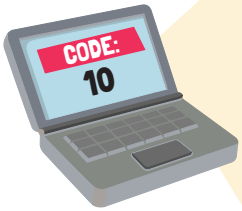
a. NOILNE ☐ b. EONLIN ☐
c. OLNNIE ☑ d. ENLINO ☐

If Wall is called Window, Window is called Door, Door is called Floor, Floor is called Roof and Roof is called Ventilator, what will a person stand on?

a. Ventilator ☐ b. Roof ☑
c. Wall ☐ d. Floor ☐

If Z = 52 and ACT = 48, then BAT will be equal to:

a. 46 ☑ b. 45 ☐
c. 48 ☐ d. 47 ☐



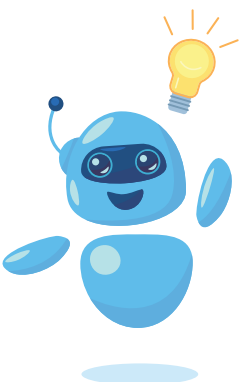
If the code of 59643 is 37421, then what will be the code of 3865?

a. 1843 ☐ b. 1643 ☑
c. 1643 ☐ d. 1779 ☐

3.5 Binary Representation of Information

A. *Use the provided binary code pattern to complete the grid that is provided below.*

PA = 0	QA = 0	RA = 0	SA = 0	TA = 0
PB = 1	QB = 1	RB = 1	SB = 1	TB = 1
PC = 0	QC = 1	RC = 0	SC = 1	TC = 0
PD = 1	QD = 0	RD = 1	SD = 0	TD = 1
PE = 0	QE = 0	RE = 0	SE = 0	TE = 0



	A	B	C	D	E
P	0	1	0	1	0
Q	0	1	1	0	0
R	0	1	0	1	0
S	0	1	1	0	0
T	0	1	0	1	0

B. *Examine the binary codes representing numbers 1-10 and answer the provided questions using binary digits.*

Number	Binary	Number	Binary
1	0001	6	0110
2	0010	7	0111
3	0011	8	1000
4	0100	9	1001
5	0101	10	1010

1. *Write the division of 32 by 8.*

   Ans: 0100

2. *Write the sum of 3 and 6.*

   Ans: 1001

3. *How many prime numbers are there between 1 and 10?*

   Ans: 0100

4. *How many odd numbers are there between 1 and 10?*

   Ans: 0101

5. *Write the product of 2 and 4.*

   Ans: 1000

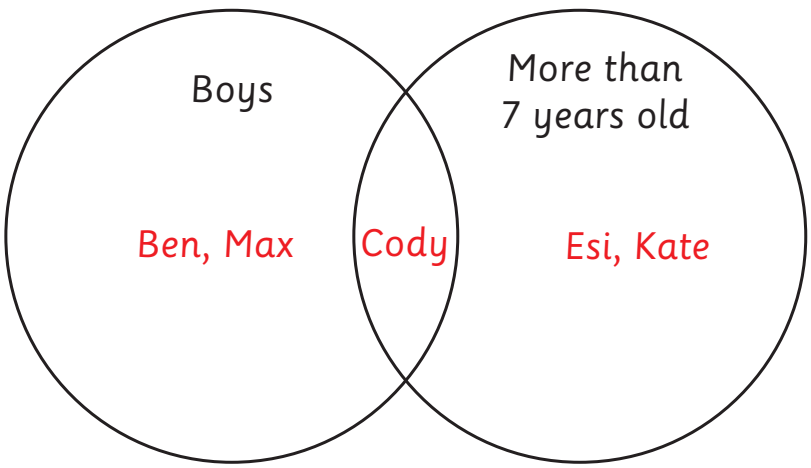
Coding Challenge-3

Venn Diagrams

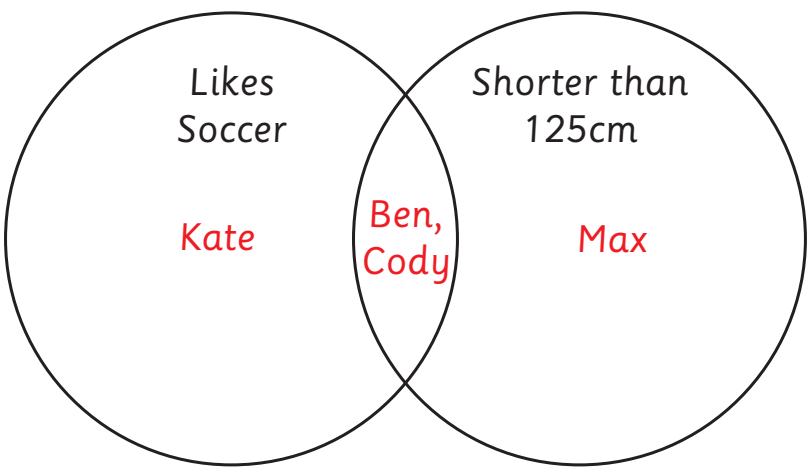
Put these people in the correct places in these Venn diagrams.

	Ben	Esi	Kate	Max	Cody	Sophie
Boy/Girl	boy	girl	girl	boy	boy	girl
Age	6	9	8	6	8	7
Height (cm)	116	132	135	114	121	130
Likes soccer	yes	no	yes	no	yes	no

1.



2.



4.1 Algorithm

A. Write an algorithm to organise a birthday party and invite friends.

1. Choose a suitable ___date___ for the birthday ___party___.
2. Make a ___list___ of friends you want to ___invite___.
3. Select a suitable ___venue___ for the party.
4. Create and send out ___invitations___ with all the necessary details.
5. Plan and arrange ___decorations___ that match the chosen theme.
6. Organize engaging activities and games for ___entertainment___.
7. Coordinate food and ___drinks___ for the party.
8. Order a ___birthday___ cake that suits the theme.
9. Set up the party venue, decorating and arranging the ___space___.
10. Greet and ___welcome___ your friends as they arrive.
11. ___Enjoy___ the party together, participating in games and activities.

Help Box

space
date
decorations
party
list
invite
welcome
enjoy
venue
invitations
drinks
entertainment
birthday

B. Write an algorithm to find the area of rectangle.

1. Start.
2. Take the length of the rectangle.
3. Take the breadth (width) of the rectangle.
4. Multiply the length by the breadth.
5. The result is the area of the rectangle.
6. Write or display the area.
7. Stop.

C. Write an algorithm to find the perimeter of a square.

1. Start.
2. Take the length of one side of the square.
3. Multiply the side by 4.
4. The result is the perimeter of the square.
5. Write or display the perimeter.
6. Stop.

4.2 Program: Conditions

A. Read the conditions and use the If-then-statements.

Example: What would happen if you accidentally spill water on your laptop?

If

I accidentally spill water on my laptop

Then

I would immediately power it off, dry it thoroughly, and seek professional assistance or technical support.

1. What would happen if you accidentally leave the lights on in an empty room?

   Ans. *If I accidentally leave the lights on in an empty room,Then electricity will be wasted and the electricity bill may increase.*

2. What would happen if you misplace your house keys?

   Ans. *If I misplace my house keys,Then I will look for them carefully or ask for help to find them.*

3. What would happen if you accidentally delete an important email?

   Ans. *If I accidentally delete an important email,Then I will check the trash or recovery folder to restore it.*

4. What would happen if you forget to water your plants for an extended period of time?

   Ans. *If I forget to water my plants for an extended period of time,Then the plants may dry up and start dying.*

B. Answer the following:

1.

```
If (you are a boy) AND (you go to school)
Then
        Print "True"
Else
        Print "False"
```

Do it yourself.

2.

```
If (you are a boy) OR (you go to school)
Then
        Print "Any one"
Else
        Print "False"
```

Do it yourself.

C. Examine the given programs and write the output that should be printed.

1.

```
If (P × 3 < 20)
Then
        Print "Greater than 20"
Else
        Print "Less than 20"
```

Write the output if the values of P are:

P = 8	P = 4	P = 10
Less than 20	Greater than 20	Greater than 20

2.

```
If number is divisible by 2
Then
        Print "Divisible by 2"
Else
        Print "Not divisible by 2"
```

Write the output if the values are:

Number = 28	Number = 81	Number = 54
Divisible by 2	Not divisible by 2	Divisible by 2

3.

```
If X is divided by 5 and remainder is 0
Then
        Print "X is divisible by 5"
Else
        Print "X is not divisible by 5"
```

Write the output if the values of X are:

18	30	25
X is not divisible by 5	X is divisible by 5	X is divisible by 5

4.

```
If number ends with 1
Then
        Print "I will go."
Else
        Print "I will not go."
```

Write the output for:

2 × 8	11 × 11	9 × 6
I will not go.	I will go.	I will not go.

D. Write an if condition to print "Yes" or "No" if today is Saturday and you have a holiday.

```
If today is Saturday AND you have a holiday
Then
        Print "Yes"
Else
        Print "No"
```

E. Write an if condition to print "Yes" or "No" if you were sleeping or you got late.

```
If you were sleeping OR you got late
Then
        Print "Yes"
Else
        Print "No"
```

F. *Write an if condition to print "Yes" or "No" if you want to go to a picnic and you are sick.*

```
If you want to go to a picnic AND you are not sick
Then
        Print "Yes"
Else
        Print "No"
```

G. *Write the printed result for the following conditions if P is 150 and Q is 300.*

1.
```
If (P < 200)
Then
        Print "Stand"
Else
        Print "Sit"
```

Stand

2.
```
If (Q < 200)
Then
        Print "Run"
Else
        Print "Relax"
```

Relax

3.

```
If (P > 100) AND (Q > 100)
Then
        Print "Stay"
Else
        Print "Leave"
```

Stay

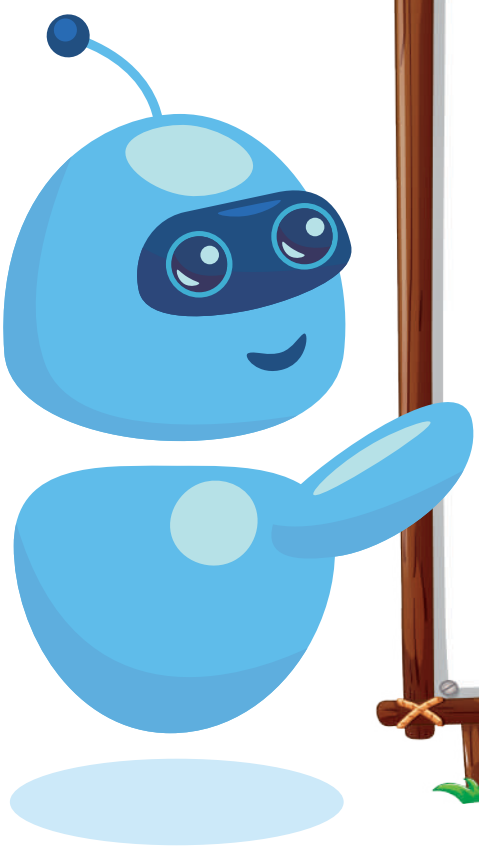
4.

```
If (P > 200) OR (Q > 200)
Then
        Print "Hi"
Else
        Print "Bye"
```

Hi

H. *Read the given conditions and write the output according to the values given in the table.*

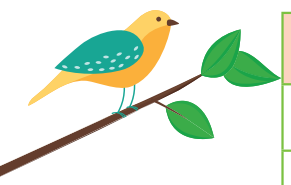
```
If (Number is divisible by 3)
Then
        Display "Divisible by 3"
Else If (Number is divisible by 4)
        Display "Divisible by 4"
Else
        Display "Not Divisible"
```

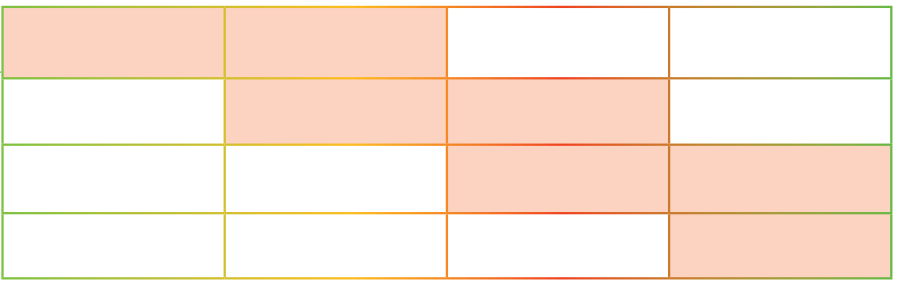


Number	Print
31	Not Divisible
15	Divisible by 3
18	Divisible by 3
10	Not Divisible
20	Divisible by 4
27	Divisible by 3
19	Not Divisible
28	Divisible by 4
16	Divisible by 4
9	Divisible by 3

4.3 Programs: Loops

A. Write the program to help the bird reach its nest.





Program without a loop

```
Move one step
Move one step
Turn right
Move one step
Turn left
Move one step
Turn right
Move one step
Turn left
Move one step
Turn right
Move one step
```

Program with a loop

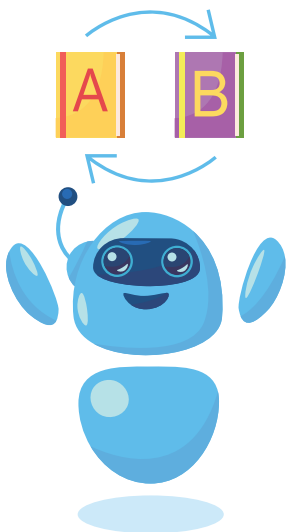
```
Repeat 2 times
{
    Move one step
}

Repeat 3 times
{
    Turn right
    Move one step
    Turn left
    Move one step
}
```

B. *Write the output of the programs given below.*

```
Repeat 3 times
{
        Read marks
If marks are > 35
Then
        Print "pass"
Else
        Print "fail"
}
```

Marks	45	26	52	14	38
Result	pass	fail	pass	fail	pass

```
        Repeat 2 times
{
        Read number
If A < B
Then
        Print "A is smaller"
Else
        Print "B is smaller"
}
```



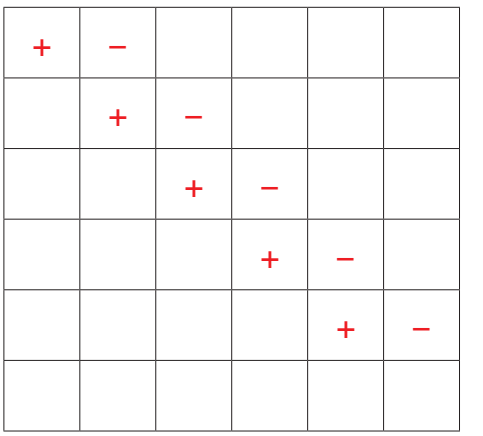
A	24	47	61	83	72
B	69	35	40	98	82
Print	A is smaller	B is smaller	B is smaller	A is smaller	A is smaller

C. *Read the given program and do as instructed.*

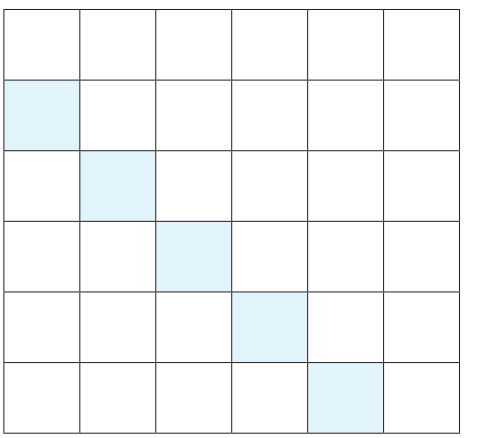
```
Repeat 4 times
{
    Display "I am a student"
    Move to next line
    Display "I am 9 years old"
}
```

I am a student
I am 9 years old
I am a student
I am 9 years old
I am a student
I am 9 years old
I am a student
I am 9 years old

```
Repeat 5 times
{
    Put a plus sign
    Move 1 step right
    Put a minus sign
    Move 1 step down
}
```

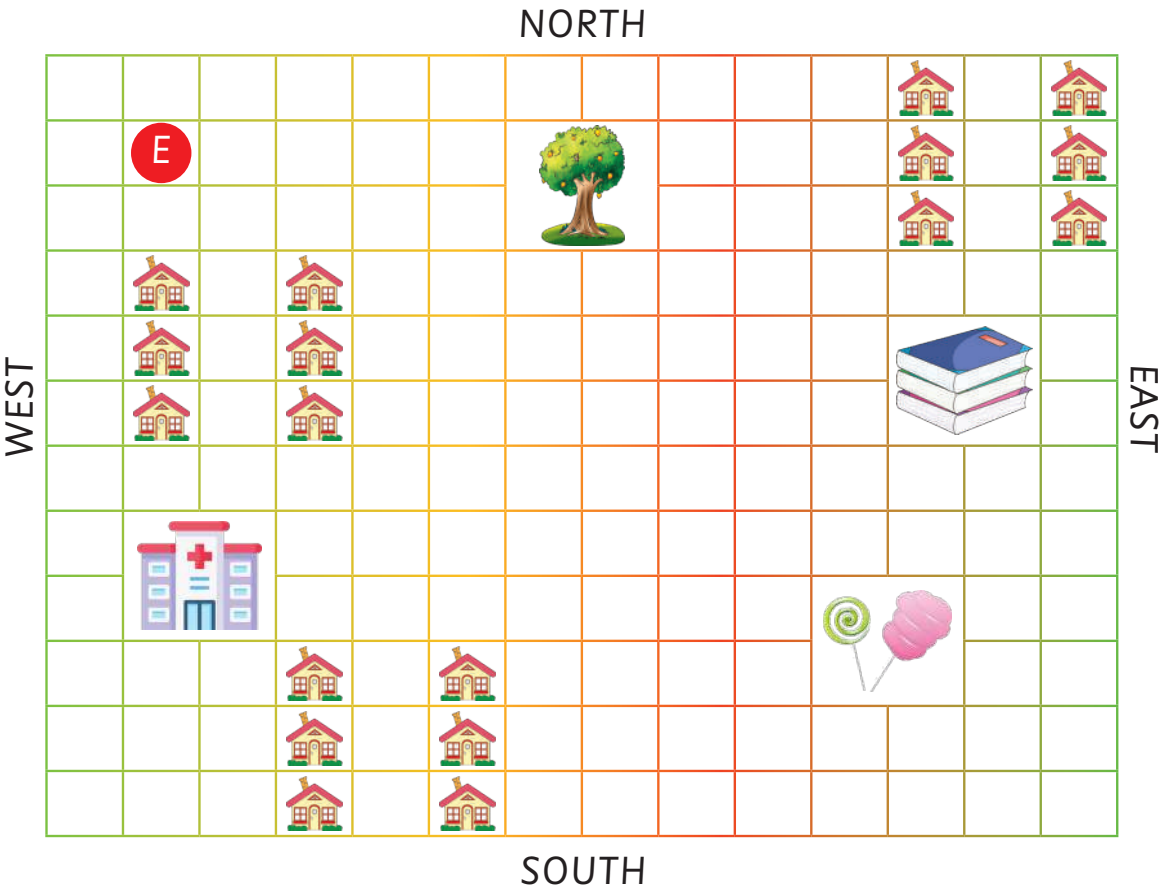



```
Repeat 5 times
{
    Move 1 step down
    Shade the box
    Move 1 step right
}
```



Coding Challenge-4

Where is Esi?



Esi stand facing towards the rising sun.

She goes straight for 4 blocks.

Then 3 blocks right from the park and takes a left turn and goes straight for 5 blocks and then takes a right turn and goes 4 blocks.

Where has Esi reached? Esi reaches the Candy Shop.

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Facilitator's Guide

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The ESSENTIAL **Coding Basic 6 Facilitator's Guide** provides:

- Clear, step-by-step teaching support for every lesson
- Structured lesson delivery with guided teacher–learner interaction
- **Coding Link** sections that explain how each activity connects to real coding
- Strong focus on computational thinking and problem-solving
- Classroom-ready strategies for engaging young learners
- Progress tracking and assessment support

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