

LESSON PLANS FOR JUNIOR HIGH SCHOOLS

MATHEMATICS

BASIC

9

TERM

1

- Weekly forecast
- Detailed lesson plans



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FIRST TERM MATHEMATICS LESSON NOTES – BASIC 9

SCHEME OF LEARNING – TERM I

WEEKS	STRAND	SUB STRAND	INDICATORS	RESOURCES
1	Number	Number & Numeration System	B9.1.1.1-2	Counters, bundle and loose straws.
2	Number	Number & Numeration System	B9.1.1.2.1-2	Counters, bundle and loose straws.
3	Number	Number Operations	B9.1.2.1.1-2	Counters, bundle and loose straws.
4	Number	Number Operations	B9.1.2.1.3-4	Counters, bundle and loose straws.
5	Number	Number Operations	B9.1.2.2.1-2	Counters, bundle and loose straws.
6	Algebra	<p>Patterns and Relations</p> <ul style="list-style-type: none"> B9.2.1.1 Demonstrate the ability to construct tables of values for pairs of linear relations, graph the relations in a number plane and determine the intersection of the lines to solve simultaneous linear equations. 	<p>B9.2.1.1.1-2</p> <ul style="list-style-type: none"> Construct a table of values for two linear relations and graph the relation Use graphs of two linear relations to determine subsequent missing elements in ordered pairs of the relation 	Counters, bundle and loose straws.
7	Algebra	<p>Patterns and Relations</p> <ul style="list-style-type: none"> B9.2.1.1 Demonstrate the ability to construct tables of values for pairs of linear relations, graph the relations in a number plane and determine the intersection of the 	<p>B9.2.1.1.3</p> <ul style="list-style-type: none"> Use graphs to solve equations involving two linear relations. 	Counters, bundle and loose straws.



		lines to solve simultaneous linear equations.		
8	Algebra	<p>Algebraic Expressions</p> <ul style="list-style-type: none"> B9.2.2.1 Demonstrate an understanding of (i) change of subject (ii) substituting values to evaluate expressions, and (iii) factorize expressions that have simple binomial as a factor 	<p>B9.2.2.1.1-2</p> <ul style="list-style-type: none"> Perform change of subject of a given formula and use it to solve problems. Substitute values into given formulae to evaluate it and use it to solve problems. 	Counters, bundle and loose straws.
9	Algebra	<p>Algebraic Expressions</p> <ul style="list-style-type: none"> B9.2.2.1 Demonstrate an understanding of (i) change of subject (ii) substituting values to evaluate expressions, and (iii) factorize expressions that have simple binomial as a factor 	<p>B9.2.2.1.3-4</p> <ul style="list-style-type: none"> Factorize expressions that have simple binomial Use the knowledge of simplifying and factorizing expressions to solve real world problems. 	Counters, bundle and loose straws.
10	Geometry & Measurement	<p>Shapes and Space</p> <ul style="list-style-type: none"> B9.3.1.1 Apply the properties of angles at a point, angles on a straight line, vertically opposite angles, corresponding, angles to solve problems. 	<p>B9.3.1.1.1-2</p> <ul style="list-style-type: none"> Derive the formula for calculating the sum of angles in any polygon and use this to calculate the value of missing angles in polygons Identify similar and congruent triangles and use the knowledge to solve related problems <p>B9.3.1.2.1</p> <ul style="list-style-type: none"> Draw inscribed and circumscribed circles for triangles under given conditions <p>B9.3.1.2.2</p> <ul style="list-style-type: none"> Construct parallelograms (i.e. square, rectangle, and 	Rule, pencils



			rhombus) under given conditions.	
11	Handling Data		B9.4.1.1.1 Select and justify a method to collect data (quantitative and qualitative) to answer a given question.	Rule, pencils
12	Handling Data	<p>Data</p> <ul style="list-style-type: none"> B9.4.1.1 Select, justify, and use appropriate methods of collecting data (grouped/ungrouped), use the data to construct and interpret frequency tables and histogram and use it to determine the mode and to solve and/or pose problems. 	<p>B9.4.1.1.2-3 Organize data (grouped/ungrouped) present it in frequency tables, line graphs, pie graphs, bar graphs and/or pictographs and analyze it to solve and/or pose problems.</p> <p>Use a histogram to determine the mode of a given data to solve and/or pose real life cases.</p> <p>B9.4.1.2.1-2 Select a method for collecting data (quantitative and qualitative), taking into consideration how bias (use of language, ethics, cost, time and timing, privacy or cultural sensitivity) may influence data.</p> <p>Organize and analyze data and interpret the results using the descriptive statistics (i.e. minimum, maximum, measures of central tendency and range) to answer a given question.</p>	Rule, pencils



FIRST TERM
WEEKLY LESSON NOTES
WEEK 1

Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number and Numeration System
Content Standard: B9.1.1.1 Apply the understanding of place value in solving real life problems involving integers of any size, rounding this to given decimal places and significant figures		Indicator: B9.1.1.1.1 Express integers to a given number of significant and decimal places
		Lesson: 1 of 1
Performance Indicator: Learners can express integers to a given number of significant and decimal places		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 165		
New words: Integers, Significant figures, Decimal places, Precision		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Present students with a real-world scenario: "Imagine you're a scientist measuring the length of a newly discovered insect, and you need to be very precise. How would you ensure your measurements are both accurate and precise?"</p> <p>Allow students to discuss.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Introduce the concept of significant figures.</p> <p>Work through a series of examples demonstrating how to express integers to a set number of significant figures.</p> <p>E.g. 1. Express integers to a number of significant figures.</p> <p>(i) 857,386,321 -five significant figures -four significant figures -three significant figures.</p> <p>(i) <i>To Five Significant Figures:</i> Look at the first 6 digits of the number: 857,386 Since the sixth digit (8) is greater than or equal to 5, we round up the fifth digit (3) by 1. Result: 857,390,000</p> <p>(ii) <i>To Four Significant Figures:</i> Look at the first 5 digits of the number: 857,38 Since the fifth digit (8) is greater than or equal to 5, we round up the fourth digit (7) by 1. Result: 857,400,000</p> <p>(iii) <i>To Three Significant Figures:</i> Look at the first 4 digits of the number: 857,3 Since the fourth digit (7) is greater than or equal to 5, we round up the third digit (5) by 1. Result: 858,000,000</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks



Allow students to practice with various integers, working in pairs or small groups.

Explain the importance of expressing decimal numbers to a specific number of decimal places, especially in scientific or financial contexts.

Have students practice expressing various decimal numbers to a set number of decimal places, encouraging peer checks for accuracy.

E.g.2. Express decimal numbers to a given number of decimal places.

(i) Write 98745.9674 correct to -three decimal places -two decimal places -one decimal place

(i) To Three Decimal Places:

Look at the number up to the fourth decimal place: 98745.9674

Since the fourth decimal digit (4) is less than 5, we keep the third decimal digit (7) as it is.

Result: 98745.967

(ii) To Two Decimal Places:

Look at the number up to the third decimal place: 98745.967

Since the third decimal digit (7) is greater than or equal to 5, we round up the second decimal digit (6) by 1.

Result: 98745.97

(iii) To One Decimal Place:

Look at the number up to the second decimal place: 98745.97

Since the second decimal digit (7) is greater than or equal to 5, we round up the first decimal digit (9) by 1.

Result: 98746.0

Assessment

1. Given the number: 12345.6789

(i) Write it correct to:

- three decimal places
- two decimal places
- one decimal place

2. Given the number: 54321.2345

(i) Write it correct to:

- three decimal places
- two decimal places
- one decimal place

3. Given the number: 6789.0123

(i) Write it correct to:

- three decimal places
- two decimal places
- one decimal place

4. Given the number: 4321.0987

(i) Write it correct to:

- three decimal places
- two decimal places



	- one decimal place	
PHASE 3: REFLECTION	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	



Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number and Numeration System
Content Standard: B9.1.1.1 Apply the understanding of place value in solving real life problems involving integers of any size, rounding this to given decimal places and significant figures		Indicator: B9.1.1.1.2. Use knowledge and understanding of place value to solve real life problems
Performance Indicator: Learners can understand of place value to solve real life problems		Lesson: 1 of 1
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)		
References: Mathematics Curriculum Pg. 165		
New words: Place Value, Standard Form, Real-life Problem, Decimal Point		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Begin with a relatable scenario: "Imagine you're collecting recyclable bottles for a school fundraiser. Each class has a different number of bottles, and you need to total them.</p> <p>How would you do that? Think about the place values when adding the numbers." Allow students to briefly discuss.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Divide students into small groups and distribute pre-made cards, each containing a unique real-life situation (e.g., shopping scenarios with item costs, trip planning with distances).</p> <p>Instruct each group to analyze their given situation and craft a mathematical problem that requires understanding of place value to solve.</p> <p>After formulating their problems, groups will exchange their scenarios with another group to solve.</p> <p>E.g. 1. (I) I am a 6-digit number. My first digit is 5 more than the last digit, but 2 less than my second digit. My second digit is the third multiple of 3, while my fourth digit is the second multiple of 3. My third digit is the quotient when the fourth digit is divided by my last digit. However, my fourth and fifth digits are consecutive numbers. What number am I?</p> <p>Solution Let the 6-digit number be represented as ABCDEF.</p> <p>1. "My first digit is 5 more than the last digit, but 2 less than my second digit." $A = F + 5$ and $A = B - 2$</p> <p>2. "My second digit is the third multiple of 3" $B = 3 * 3 = 9$</p> <p>3. "My fourth digit is the second multiple of 3."</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks



	<p>$D = 3 * 2 = 6$</p> <p>4. "My third digit is the quotient when the fourth digit is divided by my last digit." $C = D / F$ $C = 6 / F$</p> <p>5. "My fourth and fifth digits are consecutive numbers." $E = D + 1$ $E = 6 + 1 = 7$</p> <p>Let's solve for A and F using the information from step 1: Given $B = 9$, $A = 9 - 2 = 7$</p> <p>$A = F + 5$ So, $F = 7 - 5 = 2$</p> <p>Plugging this into $C = 6 / F$: $C = 6 / 2 = 3$</p> <p>So the number is 793652.</p> <p>Once solved, answers should be written in standard form. Groups present both the problem and solution to the class for discussion.</p> <p>Example: So, the number is $793652 = 7.93652 \times 10^5$</p> <p><u>Assessment</u></p> <p>I am in a library looking for a book, and I remember it's in a 4-digit aisle number. The first digit is thrice the last digit but 2 less than the second digit. The second digit is the third multiple of 2. The third digit is the quotient when the second digit is divided by the first. In which aisle should I search for my book?</p> <p>I have a safe with a 6-digit code. The first digit is twice the third digit but 1 less than the fifth digit. The third digit is half the last digit. The fourth digit is the third multiple of 2. The fifth digit is the first multiple of 5, and the second digit is the fourth digit minus 1. Can you decode the safe for me?</p> <p>I am at a train station with a platform number that's a 5-digit number. The first digit is one more than the third digit and two less than the fourth digit. The third digit is twice the last digit. The fourth digit is the first multiple of 4, and the second digit is half the fourth digit. At which platform am I waiting?</p>	
<p>PHASE 3: REFLECTION</p>	<p>Emphasize the real-world applications of place value. Understanding and applying place value helps ensure accuracy, especially in situations involving money, measurements, or data analysis.</p> <p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number and Numeration System
Content Standard: B9.1.1.2 Demonstrate an understanding of the relationship between members of the rational number system and solve real life problems involving union and intersection of three sets		Indicator: B9.1.1.2.1 Solve problems on relationship between members of the rational number system using knowledge and understanding of the concept of union and intersection of two sets
Performance Indicator: Learners can demonstrate the relationship between members of the rational number system using the concepts of union and intersection of sets.		Lesson: 1 of 2
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)		
References: Mathematics Curriculum Pg. 165		
New words: Rational numbers, Union, Intersection, Venn diagram, Sets		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Present learners with two sets: one containing even numbers up to 10 and the other containing prime numbers up to 10.</p> <p>Ask, "Which numbers belong to both sets?" and "Which numbers belong to just one set?"</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Begin with a discussion on what constitutes a real number, and then break it down further into rational and irrational numbers.</p> <p>Draw a series of nested sets to represent the relationship between N, W, Z, Q, and QI.</p> <p>Label each set and give examples of numbers that fall into each category.</p> <p><i>1. Irrational Numbers (QI)</i> Numbers that cannot be expressed as a fraction a/b where a and b are integers, and $b \neq 0$. Their decimal expansions are non-repeating and non-terminating. - Examples: - $\sqrt{2}$ (the square root of 2) - π (pi, the ratio of the circumference of a circle to its diameter) - e (the base of the natural logarithm)</p> <p><i>2. Rational Numbers (Q)</i> Numbers that can be expressed as a fraction a/b where a and b are integers, and $b \neq 0$. Their decimal expansions are either terminating or repeating. - Examples: $\{7/3, 1.25, 0\}$</p> <p><i>3. Integers (Z)</i> All whole numbers, both positive and negative, including zero. - Examples: $\{-3, -2, -1, 0, 1, 2, 3, 4\}$</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks



4. Whole Numbers (W)

All non-negative integers. This includes 0 and all positive integers but does not include any negative numbers.

- Examples: {0, 1, 100, 210, 350, 800}

5. Natural or Counting Numbers (N)

All positive integers. They do not include zero or any negative numbers.

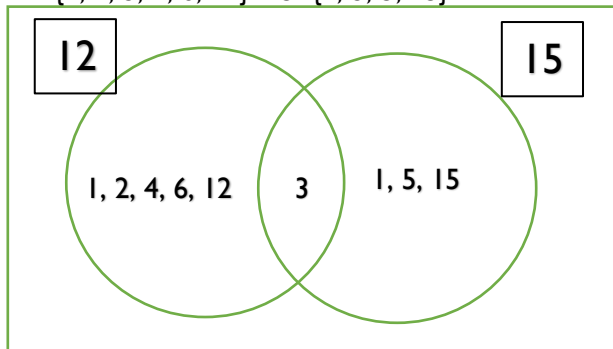
- Examples: {1, 2, 3, 4, 5, 6, 7, 8, 9}

Discuss the concept of union (the combination of two sets) and intersection (the common elements of two sets).

Begin with a quick review of factors and provide examples.

Divide the class into pairs or small groups and give each a pair of numbers (e.g., 12 and 15).

$12 = \{1, 2, 3, 4, 6, 12\}$ $15 = \{1, 3, 5, 15\}$



Their task is to list out the factors of each number and represent them on a Venn diagram, showing the intersection of common factors.

Have a few groups share their Venn diagrams with the class.

Assessment

Write the factors of these numbers and represent them on a Venn diagram.

1. 10 and 20
2. 18 and 24
3. 14 and 28
4. 8 and 16

PHASE 3:
REFLECTION

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number and Numeration System
Content Standard: B9.1.1.2 Demonstrate an understanding of the relationship between members of the rational number system and solve real life problems involving union and intersection of three sets		Indicator: B9.1.1.2.2 Apply the concept of sets to solve problems on relationship between members of rational number system and solve real life problems involving union and intersection of two sets
		Lesson: 2 of 2
Performance Indicator: Learners can		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 166		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Present two seemingly unrelated groups of items (e.g., types of fruits and colors). Ask learners how they might sort these into different categories or "sets."</p> <p>Introduce the idea that in mathematics, we use sets to categorize and understand relationships between different types of numbers.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Discuss what sets are in a mathematical context. Use Venn diagrams to illustrate the basic ideas of union (everything in both sets) and intersection (only what's common in both sets).</p> <p>Display a Venn diagram with two overlapping circles, one for integers and one for fractions.</p> <p>Ask learners to place various numbers (provided on cards or written on the board) into the correct part of the Venn diagram.</p> <p>Discuss the concept of rational numbers being the "union" of integers and fractions.</p> <p>Have learners break into small groups. Each group gets a real-life scenario where they have to identify two sets and then determine the union and intersection. Example: "At a music concert, 50 people like pop music, 40 like rock music, and 20 like both. Represent these fans in a Venn diagram and determine how many people like only rock, only pop, and both types of music."</p> <p>Groups present their scenarios and Venn diagrams. As a class, discuss the conclusions derived from each Venn diagram.</p> <p><u>Assessment</u></p> <p>1. If Set A contains all even numbers below 10 and Set B contains all odd numbers below 10, what is the intersection of Sets A and B?</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks



	<p>2. In a survey, 30 learners liked chocolate ice cream, 25 learners liked vanilla, and 10 liked both. How many learners only liked vanilla?</p> <p>3. What is the union of Set $A = \{1, 2, 3\}$ and Set $B = \{3, 4, 5\}$?</p> <p>4. There are 80 farmers in a certain village who grow either maize or beans. Fifty of them grow beans while sixty grow maize. If each farmer grows at least one of the two crops, represent the information on a Venn diagram and hence find the number of farmers who grow: a. both crops. b. only one crop.</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number Operations
Content Standard: B.9.1.2.1 Apply mental mathematics and properties to determine answers for addition and subtraction of basic facts.		Indicator: B9.1.2.1.1 Multiply and divide given numbers by powers of 10 including decimals and benchmark fractions
		Lesson: 1 of 1
Performance Indicator: Learners can multiply and divide given numbers by powers of 10		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 168		
Key words: Decimal, Benchmark Fractions, Percentage, and Product.		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Ask learners to think of a two-digit number.</p> <p>Ask them to multiply that number by 10 and observe what happens. Discuss as a class</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Remind learners of the importance of knowing multiplication facts and related division facts.</p> <p>Give learners a quick multiplication quiz, asking them to solve multiplication problems mentally or with the help of multiplication tables.</p> <p>Discuss the correct answers and address any questions or difficulties that arise.</p> <p>Explain the concept of multiplying or dividing by powers of 10 by using examples and real-world scenarios.</p> <p>Write this on the Multiply 0.25 by 10 and guide learners provide a step by step solution.</p> <p>Step 1: Understand the decimal places. <i>0.25 is read as twenty-five hundredths. It means there are two digits after the decimal point.</i></p> <p>Step 2: Multiplying by 10 effectively shifts each digit in the number to the left by one place. This is equivalent to moving the decimal point one place to the right. The number of the zeros determines the number of shift.</p> <p>Step 3: Let's do the shifting. <i>Original number: 0.25</i> <i>Shift the decimal point to the left by one place: 2.5</i></p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks



	<p>Therefore when you multiply 0.25 by 10, you get 2.5.</p> <p>Demonstrate how moving the decimal point in a number corresponds to multiplying or dividing by powers of 10.</p> <ul style="list-style-type: none"> • $(1.00 \times 10 = 10.00)$. Note how the decimal point moved one place to the right. • $(1.00 \times 100 = 100.00)$. Note how the decimal point moved two places to the right. • $(1.00 \div 10 = 0.10)$. Note how the decimal point moved one place to the left. • $(1.00 \div 100 = 0.01)$. Note how the decimal point moved two places to the left. <p>Provide a simple practice problems on the board.</p> <p>Introduce benchmark fractions such as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{10}$, etc., and their decimal and percentage equivalents.</p> <p>Show benchmark fraction cards with their corresponding decimals or percentages and discuss their significance and uses.</p> <p>Give learners opportunities to practice converting benchmark fractions to decimals or percentages, and vice versa.</p> <p><u>Assessment</u></p> <ol style="list-style-type: none"> Multiply 0.25 by 10. Convert $\frac{3}{5}$ into a decimal. Divide 120 by 10. Express 40% as a decimal. 	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number Operations
Content Standard: B.9.1.2.1 Apply mental mathematics and properties to determine answers for addition and subtraction of basic facts.	Indicator: B.9.1.2.1.2 Demonstrate the ability to determine commutative properties of addition and multiplication	Lesson: 1 of 1
Performance Indicator: Learners can apply the commutative property of addition by recognizing that for any two numbers a and b, $a + b = b + a$.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 168		
New words: Commutative, Property, Addition, Multiplication		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Announce two numbers (e.g., 4 and 7). Ask the class to quickly add the numbers in the order given ($4 + 7$). Write the result on the board.</p> <p>Challenge them to reverse the numbers and add again ($7 + 4$). Write this result beside the first. Repeat the activity with multiplication.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Display the commutative property of addition on the chart paper or board: $a + b = b + a$.</p> <p>Explain that the commutative property of addition tells us that when we add two numbers, it doesn't matter which order they're added in; the sum remains the same.</p> <p>Provide a few examples on the board to illustrate the commutative property, such as adding $2 + 3$ and $3 + 2$, or $7 + 4$ and $4 + 7$.</p> <p>Emphasize that the sum stays the same regardless of the order.</p> <p>Write simple addition problems on the board, such as $3 + 5$, $6 + 2$, $9 + 1$, and $4 + 7$.</p> <p>Learners in groups to solve the problems and determine if the commutative property holds true by swapping the order of the addends.</p> <p>Circulate the classroom to provide assistance and monitor progress.</p> <p>Create few additional problems on the board. Ask learners to solve the problems individually and write a sentence for each problem, explaining how they know the commutative property is true.</p> <p>Encourage them to use mathematical language and clear reasoning in their explanations.</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks



	<p><u>Assessment</u></p> <ol style="list-style-type: none"> 1. Evaluate the commutative property of addition for the numbers 8 and 6. 2. True or false: The order of the addends affects the sum in addition. 3. Solve $12 + 4$. Is the sum the same as $4 + 12$? Explain why. 4. Create an addition problem that obeys the commutative property. Solve it and explain your thinking. 	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



FIRST TERM
WEEKLY LESSON NOTES
WEEK 2

Week Ending:	DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number Operations
Content Standard: B.9.1.2.1 Apply mental mathematics and properties to determine answers for addition and subtraction of basic facts.		Indicator: B9.1.2.1.3 Use the associative property of addition and multiplication
		Lesson: 1 of 3
Performance Indicator: Learners can apply the associative property of addition and multiplication.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 168		
New words: Associative, Addition, Grouping, Equality		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Begin by presenting a simple addition problem on the board with more than two numbers, e.g., $2 + 3 + 4$.</p> <p>Ask learners, "Does it matter which numbers we add together first?" Allow a few learners to solve, demonstrating different groupings.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Display the Associative Property of addition on the chart paper or board: $a + (b + c) = (a + b) + c$ or $a + (b + c) = (a + c) + b$</p> <p>Present multiple problems, letting learners solve in pairs. For each problem, ask learners to solve by grouping the numbers differently.</p> <p>Discuss as a class. For every problem, the result should remain the same regardless of the grouping. Example: $15 + (6 + 9) = (15 + 6) + 9 = 30$</p> <p>Provide learners with number cards or dice. Ask learners to roll or draw three numbers and write down an addition equation.</p> <p>Learners should then rewrite the equation with a different grouping to demonstrate the associative property.</p> <p>Briefly introduce the associative property of multiplication $(a \times b) \times c = a \times (b \times c)$, demonstrating with an example, e.g., $(12 \times 5) \times 4 = 12 \times (5 \times 4) = 240$.</p> <p>Ask learners to pair up and come up with their own multiplication examples, testing different groupings.</p> <p>Share a few examples with the class, confirming the property holds true for multiplication as well.</p>	Number cards or dice for activities



	<u>Assessment</u> 1. $4 + (6+2) = ?$ 2. $7 + (5+3) = ?$ $7 + (5+3) = ?$ 3. $3 \times (2 \times 4) = ?$ $3 \times (2 \times 4) = ?$ 4. $5 \times (3 \times 2) = ?$ $5 \times (3 \times 2) = ?$ 5. $6 + (7+5) = ?$ $6 + (7+5) = ?$	
PHASE 3: REFLECTION	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	



Week Ending:	DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number Operations
Content Standard: B.9.1.2.1 Apply mental mathematics and properties to determine answers for addition and subtraction of basic facts.		Indicator: B9.1.2.1.4 Use the distributive property in solving problems
		Lesson: 2 of 3
Performance Indicator: Learners can apply the distributive property in arithmetic problems and solve problems using the distributive property and recognize its application in real-world scenarios.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 168		
New words: Distribute, Multiply, Addition, Subtraction.		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Present a simple problem on the board, e.g., $5 \times (2+3)$.</p> <p>Ask learners, "How might we solve this without directly calculating the numbers inside the parentheses first?" Wait for some responses. Then, demonstrate the distributive property to solve.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Display the Distributive Property on the chart paper or board.</p> <p>Guide learners to recognize that for any three numbers a, b and c;</p> <p>i. $a \times (b + c) = (a \times b) + (a \times c)$</p> <p>ii. $a \times (b - c) = (a \times b) - (a \times c)$</p> <p>Use the board to present a few more examples, letting learners solve them in pairs.</p> <p>Discuss the solutions, ensuring everyone understands the process.</p> <p>Divide learners into small groups and provide each group with cards containing problems that require the distributive property to solve.</p> <p>Ask learners to solve each problem as a team, discussing the steps they're taking.</p> <p>Example: $5 \times (10 + 7) = (5 \times 10) + (5 \times 7) = 85$ $5 \times (10 - 7) = (5 \times 10) - (5 \times 7) = 15$</p> <p>After a set duration, review the solutions as a class. Encourage groups to explain their approaches.</p> <p>Discuss real-world scenarios where the distributive property might be applied. For instance, if a student buys 3 pencils and 2 erasers where each pencil costs ₦a and each eraser costs ₦b, the total cost would be $3a+2b$</p> <p><u>Assessment</u></p>	Pre-prepared cards with arithmetic problems for group activities



	<ol style="list-style-type: none"> 1. Solve: $4 \times (3+6) = ?$ 2. Solve: $7 \times (5-2) = ?$ 3. If $a=2$, $b=4$, and $c=3$, what is $a \times (b-c)$? 4. Why is the distributive property useful in simplifying arithmetic problems? 	
PHASE 3: REFLECTION	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number Operations
Content Standard: B.9.1.2.1 Apply mental mathematics and properties to determine answers for addition and subtraction of basic facts.	Indicator: B9.1.2.1.4 Use the distributive property and associative property of addition and multiplication in solving problems	Lesson: 3 of 3
Performance Indicator: Learners can apply the distributive property in arithmetic problems and solve problems using the distributive property and recognize its application in real-world scenarios.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 168		
New words: Distribute, Multiply, Addition, Subtraction.		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Present a simple problem on the board, e.g., $5 \times (2+3)$.</p> <p>Ask learners, "How might we solve this without directly calculating the numbers inside the parentheses first?" Wait for some responses. Then, demonstrate the distributive property to solve.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Guide learners to use the distributive property and associative property of addition and multiplication in solving problems.</p> <p>Let learners do this activity in pairs. Invite pairs randomly to share their solutions on the board</p> <p>1. Problem: $6 \times (4+7)$</p> <p>Solution: Using the distributive property: $6 \times 4 + 6 \times 7$ $= 24 + 42$ $= 66$</p> <p>2. Problem: $3 \times (5+9)$</p> <p>Solution: Using the distributive property: $3 \times 5 + 3 \times 9$ $= 15 + 27$ $= 42$</p> <p>3. Problem: $4 \times (8-3)$</p> <p>Solution: Using the distributive property: $4 \times 8 - 4 \times 3$</p>	Pre-prepared cards with arithmetic problems for group activities



$$=32-12$$
$$=20$$

4. Problem: $7 \times (6+2)$

Solution:

Using the distributive property:

$$7 \times 6 + 7 \times 2$$

$$=42+14$$

$$=56$$

5. Problem: $5 \times (7-4)$

Solution:

Using the distributive property:

$$5 \times 7 - 5 \times 4$$

$$=35-20$$

$$=15$$

1. Problem: Solve for x where

$$x = (3+4)+5$$

Solution:

Using the associative property of addition,

$$x = 3+(4+5)$$

$$x = 3+9$$

$$x = 12$$

2. Problem: Solve for y where

$$y = 2 \times (3 \times 4)$$

Solution:

Using the associative property of multiplication,

$$y = (2 \times 3) \times 4$$

$$y = 6 \times 4$$

$$y = 24$$

3. Problem:

Evaluate z given

$$z = (8+7)+6$$

Solution:

Using the associative property of addition,

$$z = 8+(7+6)$$

$$z = 8+13$$

$$z = 21$$

4. Problem: Determine w where

$$w = 5 \times (6 \times 2)$$

Solution:

Using the associative property of multiplication,



	$w=(5 \times 6) \times 2$ $w=30 \times 2$ $w=60$ 5. Problem: Evaluate p given $p=(10+9)+11$ Solution: Using the associative property of addition, $p=10+(9+11)$ $p=10+20$ $p=30$	
PHASE 3: REFLECTION	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	



FIRST TERM
WEEKLY LESSON NOTES
WEEK 3

Week Ending:	DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number Operations
Content Standard: B9.1.2.2 Apply the understanding of addition, subtraction, multiplication and division of decimal numbers to solve problems, and round answers to given decimal places and significant figures		Indicator: B9.1.2.2.1 Solve operations involving addition, subtraction, multiplication and division using word problems.
		Lesson: 1 of 2
Performance Indicator: Learners can apply a combination of basic operations (addition, subtraction, multiplication, division) to solve these word problems.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 169		
New words: Word Problem, Operations, Solution, Interpretation		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Present a relatable scenario such as: "Imagine you went to a store with ₦50. You bought a book for ₦15 and a shirt for ₦20. How much money do you have left?" Then, ask, "What mathematical operations did you use to solve that?"</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Guide learners to create word problems involving a combination of two or more basic operations. Divide learners into pairs or small groups.</p> <p>Each group creates their own word problems that involve at least two of the basic operations.</p> <p>Encourage creativity, asking learners to frame problems around real-life scenarios they might encounter.</p> <p>Solve the created story problems. Swap the created problems between groups. Each group now attempts to solve the word problems created by their peers. Example: A trader sells oranges from two baskets, A and B. Basket A contained 85 oranges and she sold 48. She sold 59 oranges from basket B and was left with the same number of oranges as in Basket A. How many oranges were originally in Basket B?</p> <p><u>Solution</u> From Basket A: She originally had 85 oranges. She sold 48 oranges.</p> <p>Therefore, the number of oranges left in Basket A = $85 - 48 = 37$ oranges.</p>	Number cards



	<p>From the problem, we know she sold 59 oranges from Basket B and was then left with the same number of oranges as in Basket A after she sold some.</p> <p>Thus, the number of oranges left in Basket B after selling 59 = 37 oranges.</p> <p>Let x be the original number of oranges in Basket B.</p> <p>Therefore, $x - 59 = 37$.</p> <p>Adding 59 to both sides of the equation, we get: $x = 37 + 59$ $x = 96$.</p> <p>So, Basket B originally contained 96 oranges.</p> <p>During this time, move around the room to guide and assist where necessary.</p> <p>After a set time, have each group present the problem they received and their solution, allowing for a discussion and clarification if answers vary.</p> <p><u>Assessment</u></p> <ol style="list-style-type: none"> 1. Lisa had 20 apples. She gave 5 apples to her friend and then bought 10 more. How many apples does Lisa have now? 2. A factory produces 200 toys every day. After a week, they sent 800 toys to a retailer. How many toys are left in the factory? 3. Mike read 50 pages of a book on Monday. On Tuesday, he read twice the number of pages he read on Monday. How many pages has he read in total by the end of Tuesday? 4. Sarah baked 100 cookies for a bake sale. She sold $\frac{3}{4}$ of the cookies and gave 10 cookies to her friends. How many cookies does she have left? 	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: Number Operations
Content Standard: B9.1.2.2 Apply the understanding of addition, subtraction, multiplication and division of decimal numbers to solve problems, and round answers to given decimal places and significant figures		Indicator: B9.1.2.2.2 Solve word problems involving the four basic operations and round the answers to the nearest two decimal figures or to some significant figures
Performance Indicator: Learners can apply the four basic operations to solve these word problems and round their answers to the nearest two decimal figures or to the appropriate significant figures.		Lesson: 2 of 2
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)		
References: Mathematics Curriculum Pg. 169		
New words: Word Problem, Operations, Rounding, Significant Figures		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Display a word problem like: "A pizza slice costs ₵2.37, and a drink costs ₵1.28. How much will 2 slices of pizza and 2 drinks cost together?" Solve the problem and then ask, "If we needed to give a rounded estimate, what would the total cost be when rounded to the nearest dollar?"</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Guide learners to solve word problems and practice rounding. Provide learners with a set of word problems that require a combination of the four basic operations to solve.</p> <p>After solving each problem, learners should round their answer to the nearest two decimal figures or as the question specifies.</p> <p>Allow learners to collaborate in pairs, discussing their approach and solution to each problem.</p> <p>Engage learners to review and discuss solutions. Choose a few problems from the set and solve them on the board, ensuring learners understand each step.</p> <p>Example: The price of a jacket is three times that of a shirt. The price of a jacket is GH₵560.65. Mr Mensa bought two of the jackets and four shirts for his twin sons. Calculate the total amount Mr Mensa paid for the items, correct your answer to: α) two decimal places β)three significant figures</p> <p>Solution Given that the price of a jacket is GH₵560.65 and it is three times the price of a shirt, we can determine the price of the shirt: Let the price of the shirt be x.</p>	Number cards



	<p>Given: $3x = \text{GH}\text{¢}560.65$ To find x, divide both sides by 3: $x = \text{GH}\text{¢}560.65 / 3$ $x = \text{GH}\text{¢}186.88$ (rounded to two decimal places)</p> <p>So, the price of a shirt is approximately $\text{GH}\text{¢}186.88$.</p> <p>Total Amount Mr. Mensa Paid: He bought two jackets and four shirts. Total for jackets = $2 * \text{GH}\text{¢}560.65 = \text{GH}\text{¢}1,121.30$ Total for shirts = $4 * \text{GH}\text{¢}186.88 = \text{GH}\text{¢}747.52$</p> <p>Combine the two amounts: Total amount = $\text{GH}\text{¢}1,121.30 + \text{GH}\text{¢}747.52$ Total amount = $\text{GH}\text{¢}1,868.82$</p> <p><i>α) Two Decimal Places:</i> The total amount is already given to two decimal places as $\text{GH}\text{¢}1,868.82$.</p> <p><i>β) Three Significant Figures:</i> To round $\text{GH}\text{¢}1,868.82$ to three significant figures, we consider the first three non-zero digits from the left and round accordingly. So, $\text{GH}\text{¢}1,868.82$ becomes $\text{GH}\text{¢}1,870$ when rounded to three significant figures.</p> <p>Thus: <i>α) Mr. Mensa paid $\text{GH}\text{¢}1,868.82$.</i> <i>β) Mr. Mensa paid approximately $\text{GH}\text{¢}1,870$ to three significant figures.</i></p> <p>Emphasize the rounding process, showcasing how to round to the nearest two decimal figures or to other significant figures as needed.</p> <p><u>Assessment</u></p> <ol style="list-style-type: none"> John has $\text{¢}45.78$. He spends $\text{¢}12.32$ on a book and $\text{¢}18.65$ on a shirt. How much does he have left, rounded to the nearest dollar? A factory produces 135.45 toys every day. How many toys would it produce in a week (7 days), rounded to two decimal places? Mary's garden has an area of 250.75 square meters. She wants to divide it into 3 equal sections. How big will each section be, rounded to two decimal places? Tom drives 167.85 miles on Monday and 152.48 miles on Tuesday. If he divides the total distance by 2 to find the average, what is the average distance he drives per day, rounded to the nearest mile? 	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



FIRST TERM
WEEKLY LESSON NOTES
WEEK 4

Week Ending:	DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: SURDS
Content Standard: B9.1.2.4 Demonstrate understanding of surds as real numbers, the process of adding and subtracting of surds		Indicator: B9.1.2.4.1 Identify simple and compound surds.
		Lesson: 1 of 2
Performance Indicator: Learners can identify and simplify simple and compound surds.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 169		
New words: Surds, Simple Surd, Compound, Radicand		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Display the following numbers on the board: $\sqrt{3}$, $\sqrt{18}$, $\sqrt{2}$, $\sqrt{50}$.</p> <p>Ask learners, "What do these numbers have in common, and how might they be different from each other?"</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Briefly discuss what surds are (numbers that can't be simplified to remove a square root).</p> <p>Explain the terminology: the number under the square root sign is called the 'radicand'.</p> <p>Define a simple surd as a square root whose radicand cannot be further simplified.</p> <p>Provide examples, such as $\sqrt{2}$ or $\sqrt{3}$, and explain why these are simple surds (because they don't have factors which are perfect squares, apart from 1).</p> <p>Define a compound surd as a square root whose radicand can be simplified further by factoring out perfect squares.</p> <p>Use examples to illustrate. For instance, $\sqrt{18}$ can be written as $\sqrt{9 \times 2}$ or $3\sqrt{2}$.</p> <p>Guide learners through the process of simplifying a few compound surds. Example: Simplify the compound surd: $\sqrt{72}$.</p> <p>Solution To simplify the compound surd $\sqrt{72}$, you can simplify it as follows: $\sqrt{72} = \sqrt{36 * 2}$ Now, simplify the square root of 36, which is 6: $\sqrt{6 * 2} = 6\sqrt{2}$</p>	Number cards



	<p>So, the simplified form of $\sqrt{72}$ is $6\sqrt{2}$.</p> <p>Distribute a set of cards to each student or small groups, where each card has a surd written on it. Example: $\sqrt{50}$, $\sqrt{18}$, $\sqrt{98}$, $\sqrt{54}$, $\sqrt{75}$, etc.</p> <p>Ask learners to sort these cards into two piles: simple surds and compound surds.</p> <p>After sorting, encourage learners to pick a compound surd and simplify it. Example: Simplify $\sqrt{162}$ <u>solution</u> $\sqrt{162} = \sqrt{(9 * 18)}$ We can start by factoring 162 as $= \sqrt{9}=3$ and $\sqrt{18}=(9*2)$ $= 3*3\sqrt{2}$</p> <p>So, the simplified form of $\sqrt{162}$ is $9\sqrt{2}$</p> <p><u>Assessment</u></p> <ol style="list-style-type: none"> 1. Simplify the compound surd: $\sqrt{72}$. 2. Is $\sqrt{5}$ a simple or compound surd? Explain your answer. 3. Simplify $\sqrt{45}$. 4. Simplify $\sqrt{80}$. 5. Simplify $\sqrt{28}$. 6. Simplify $\sqrt{63}$. 7. Simplify $\sqrt{112}$. 8. Simplify $\sqrt{200}$. 	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: SURDS
Content Standard: B9.1.2.4 Demonstrate understanding of surds as real numbers, the process of adding and subtracting of surds		Indicator: B9.1.2.4.2 Explain the identities/rules of surds
Performance Indicator: Learners can understand the fundamental identities and rules of surds and apply them in mathematical expressions.		Lesson: 1 of 2
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)		
References: Mathematics Curriculum Pg. 169		
New words: Surds, Simple Surd, Rationalizing, Radicand		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Begin with a math puzzle. Display the following expressions on the board: $\sqrt{4}$, $\sqrt{9}$, $\sqrt{16}$, and $\sqrt{25}$.</p> <p>Ask learners, "What do you notice about these numbers, and how can you describe this pattern?"</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Revise with learners on the definition of surds as square roots that cannot be simplified to whole numbers.</p> <p>Explain that the number under the square root sign is called the 'radicand.'</p> <p><u>Identity: Rule 1-</u> $\sqrt{a} * \sqrt{b} = \sqrt{a * b}$:</p> <p>Introduce the product rule, explaining that when you multiply two surds with the same index (e.g., both \sqrt{a}), you can simplify them by multiplying the radicands.</p> <p>Provide examples and guide learners through the process: $\sqrt{3} * \sqrt{5} = \sqrt{3 * 5} = \sqrt{15}$.</p> <p><u>Identity: Rule 2-</u> $\sqrt{a} / \sqrt{b} = \sqrt{a / b}$:</p> <p>Introduce the quotient rule, explaining that when you divide two surds with the same index, you can simplify them by dividing the radicands.</p> <p>Provide examples and guide learners: $\sqrt{12} / \sqrt{3} = \sqrt{12 / 3} = \sqrt{4} = 2$.</p> <p><u>Identity: Rule 3 -</u> $\frac{b}{\sqrt{a}} = \frac{b}{\sqrt{a}} * \frac{\sqrt{a}}{\sqrt{a}} = \frac{b\sqrt{a}}{a}$</p> <p>Introduce Rule 3, explaining that it's used when you have a surd in the denominator of a fraction.</p>	Number cards



Walk through the steps: $b/\sqrt{a} = b/(\sqrt{a}) * (\sqrt{a})/(\sqrt{a}) = (b\sqrt{a})/a$.
Provide examples and let students practice.

Example 1:

Simplify $5 / \sqrt{3}$.

Solution:

$$5 / \sqrt{3} = 5 / \sqrt{3} * \sqrt{3} / \sqrt{3} = (5\sqrt{3}) / 3$$

Example 2:

Simplify $2 / \sqrt{6}$.

Solution:

$$2 / \sqrt{6} = 2 / \sqrt{6} * \sqrt{6} / \sqrt{6} = (2\sqrt{6}) / 6 = \sqrt{6} / 3$$

Identity: Rule 4 - $a\sqrt{c} + b\sqrt{c} = (a + b)\sqrt{c}$:

Introduce Rule 4, explaining that it's used when adding or subtracting surds with the same index and radicand.

Walk through the steps: $a\sqrt{c} + b\sqrt{c} = (a + b)\sqrt{c}$. Provide examples and let students practice.

Example 1:

Simplify $4\sqrt{5} + 3\sqrt{5}$ using Rule 4.

Solution:

$$4\sqrt{5} + 3\sqrt{5} = (4 + 3)\sqrt{5} = 7\sqrt{5}$$

Example 2:

Simplify $\sqrt{7} + 2\sqrt{7}$ using Rule 4.

Solution:

$$\sqrt{7} + 2\sqrt{7} = (1 + 2)\sqrt{7} = 3\sqrt{7}$$

Identity: Rule 5 - : $\frac{c}{a+b\sqrt{n}} = \frac{c}{a+b\sqrt{n}} * \frac{a-b\sqrt{n}}{a-b\sqrt{n}}$

Introduce Rule 5, explaining that it's used for rationalizing the denominator when the denominator contains a sum.

Walk through the steps: $c/(a+b\sqrt{n}) = c/(a+b\sqrt{n}) * (a-b\sqrt{n})/(a-b\sqrt{n})$.
Provide examples and let students practice.

Example 1:

Rationalize the denominator in the expression $5 / (3 + \sqrt{2})$.

Solution:

$$5 / (3 + \sqrt{2}) = 5 / (3 + \sqrt{2}) * (3 - \sqrt{2}) / (3 - \sqrt{2}) = (5 * (3 - \sqrt{2})) / (3^2 - (\sqrt{2})^2) = (15 - 5\sqrt{2}) / (9 - 2) = (15 - 5\sqrt{2}) / 7$$

Example 2:

Rationalize the denominator in the expression $2 / (1 + \sqrt{5})$.

Solution:



$$2 / (1 + \sqrt{5}) = 2 / (1 + \sqrt{5}) * (1 - \sqrt{5}) / (1 - \sqrt{5}) = (2 * (1 - \sqrt{5})) / (1^2 - (\sqrt{5})^2) = (2 - 2\sqrt{5}) / (1 - 5) = (2 - 2\sqrt{5}) / -4 = -(1/2) + (1/2)\sqrt{5}$$

Identity: Rule 6 - $\frac{c}{a-b\sqrt{n}} = \frac{c}{a-b\sqrt{n}} * \frac{a+b\sqrt{n}}{a+b\sqrt{n}}$:

Introduce Rule 6, explaining that it's used for rationalizing the denominator when the denominator contains a difference.

Walk through the steps: $c/(a-b\sqrt{n}) = c/(a-b\sqrt{n}) * (a+b\sqrt{n})/(a+b\sqrt{n})$.
Provide examples and let students practice

Example 1:

Rationalize the denominator in the expression $3 / (2 - \sqrt{3})$

Solution:

$$3 / (2 - \sqrt{3}) = 3 / (2 - \sqrt{3}) * (2 + \sqrt{3}) / (2 + \sqrt{3}) = (3 * (2 + \sqrt{3})) / (2^2 - (\sqrt{3})^2) = (6 + 3\sqrt{3}) / (4 - 3) = (6 + 3\sqrt{3}) / 1 = 6 + 3\sqrt{3}$$

Example 2:

Rationalize the denominator in the expression $4 / (1 - \sqrt{2})$.

Solution:

$$4 / (1 - \sqrt{2}) = 4 / (1 - \sqrt{2}) * (1 + \sqrt{2}) / (1 + \sqrt{2}) = (4 * (1 + \sqrt{2})) / (1^2 - (\sqrt{2})^2) = (4 + 4\sqrt{2}) / (1 - 2) = (4 + 4\sqrt{2}) / -1 = -4 - 4\sqrt{2}$$

Provide learners with a set of surd expressions to simplify using the rules discussed.

Encourage group work and peer learning. Allow learners to check their work collaboratively.

Assessment

1. Apply the product rule to simplify $\sqrt{2} * \sqrt{8}$.
2. Use the quotient rule to simplify $\sqrt{15} / \sqrt{5}$.
3. Rationalize the denominator in the expression $1 / \sqrt{2}$.
4. Simplify the expression $4\sqrt{7} / \sqrt{2}$ using the surd rules.
5. What is the result of applying Rule 4 to $5\sqrt{3} + 2\sqrt{3}$?
6. Use Rule 5 to rationalize the denominator in the expression $7 / (1 + \sqrt{5})$.
7. Apply Rule 6 to rationalize the denominator in $3 / (2 - \sqrt{6})$.

**PHASE 3:
REFLECTION**

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.



FIRST TERM
WEEKLY LESSON NOTES
WEEK 5

Week Ending:		DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number	
Class: B9	Class Size:		Sub Strand: SURDS
Content Standard: B9.1.2.4 Demonstrate understanding of surds as real numbers, the process of adding and subtracting of surds		Indicator: B9.1.2.4.3 Simplify given surds	Lesson: 1 of 2
Performance Indicator: Learners can simplify surds and provide practice opportunities for simplifying various surd expressions.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 170			
New words: Surds, Simple Surd, Compound, Radicand			
Phase/Duration	Learners Activities		Resources
PHASE 1: STARTER	<p>Begin with a visual starter. Display the following surds on the board: $\sqrt{12}$, $\sqrt{27}$, $\sqrt{18}$, $\sqrt{20}$.</p> <p>Ask learners to identify any patterns or similarities they notice in these surds.</p> <p>Share performance indicators and introduce the lesson.</p>		
PHASE 2: NEW LEARNING	<p>Begin by simplifying surds with perfect square factors. Explain that if a radicand contains a perfect square factor, it can be simplified.</p> <p>Provide examples and demonstrate the process: $\sqrt{12} = \sqrt{(4 * 3)} = 2\sqrt{3}$ $\sqrt{27} = \sqrt{(9 * 3)} = 3\sqrt{3}$</p> <p>Move on to more complex surds that require factoring and simplification.</p> <p>Provide examples of surds like $\sqrt{18}$ and $\sqrt{20}$ and guide learners through the simplification process: $\sqrt{18} = \sqrt{(9 * 2)} = 3\sqrt{2}$ $\sqrt{20} = \sqrt{(4 * 5)} = 2\sqrt{5}$</p> <p>Distribute a set of surd expressions to learners, including both simple and complex surds.</p> <p>Encourage learners to work individually or in pairs to simplify these surds.</p> <p>Provide opportunities for peer teaching and collaborative problem-solving.</p> <p><u>Assessment</u></p> <ol style="list-style-type: none"> Simplify $\sqrt{48}$. What is the simplified form of $\sqrt{75}$? 		Number cards



	3. If $\sqrt{45} = a\sqrt{5}$, find the value of 'a.' 4. Simplify the surd $\sqrt{98}$.	
PHASE 3: REFLECTION	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	



Week Ending:	DAY:	Subject: Mathematics
Duration: 100MINS		Strand: Number
Class: B9	Class Size:	Sub Strand: SURDS
Content Standard: B9.1.2.4 Demonstrate understanding of surds as real numbers, the process of adding and subtracting of surds		Indicator: B9.1.2.4.4 Approximate the square roots of non-perfect squares with calculators/tables
		Lesson: 1 of 2
Performance Indicator: Learners can approximate the square roots of non-perfect square numbers using calculators or reference tables.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 171		
New words: Surds, Simple Surd, Approximate, Radicand		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Begin with a math challenge. Write the following non-perfect square numbers on the board: 10, 15, 20, 25, 30.</p> <p>Ask learners to estimate the square roots of these numbers without using calculators. Discuss their estimates and methods.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Begin by reviewing what square roots are and how they are related to squaring a number.</p> <p>Explain that not all numbers have whole number square roots, and we need to approximate the square roots of non-perfect squares.</p> <p>Introduce the use of calculators for approximating square roots. Explain the square root function (\sqrt{x}) on calculators and how to use it.</p> <p>Provide examples of non-perfect squares, and demonstrate how to use calculators to find their approximate square roots: $\sqrt{10} \approx 3.16$ $\sqrt{15} \approx 3.87$ $\sqrt{20} \approx 4.47$</p> <p>Explain the concept of reference tables, which are pre-calculated values of square roots for common numbers.</p> <p>Provide learners with a reference table for square roots of non-perfect squares.</p> <p>Have learners use the table to find the approximate square roots of numbers.</p> <p>Provide learners with a list of non-perfect square numbers and ask them to approximate the square roots using calculators and reference tables.</p>	Number cards



	<p>Encourage peer discussion and sharing of methods for accurate approximation.</p> <p><u>Assessment</u></p> <ol style="list-style-type: none"> 1. Approximate the square root of 17 using a calculator. 2. Use the reference table to find the approximate square root of 28. 3. Estimate the square root of 40 without a calculator and then check your estimate using a calculator. 	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



FIRST TERM
WEEKLY LESSON NOTES
WEEK 6

Week Ending:	DAY:	Subject: Mathematics																	
Duration: 60MINS		Strand: Algebra																	
Class: B9	Class Size:	Sub Strand: Patterns and Relations																	
Content Standard: B9.2.1.1 Demonstrate the ability to construct tables of values for pairs of linear relations, graph the relations in a number plane and determine the intersection of the lines to solve simultaneous linear equations		Indicator: B9.2.1.1.1 Construct a table of values for two linear relations and graph the relation.	Lesson: 1 of 1																
Performance Indicator: Learners can o graph linear relations on a coordinate plane and interpret the slope and y-intercept of a graph.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)																	
References: Mathematics Curriculum Pg. 180																			
New words: values, relation, linear, relations, graph																			
Phase/Duration	Learners Activities	Resources																	
PHASE 1: STARTER	<p>Review the concept of linear relationships, emphasizing that they represent a constant rate of change.</p> <p>Introduce the terms "table of values" and "graph of a linear relation."</p> <p>Share performance indicators and introduce the lesson.</p>																		
PHASE 2: NEW LEARNING	<p>Explain how to create a table of values by choosing input values (x) and calculating corresponding output values (y) using the given equation or rule.</p> <p>Demonstrate with an example, such as $y = 2x + 1$.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>x</th> <th>2x-3</th> <th>y</th> <th>Ordered pairs</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>2(-1) -3</td> <td>-5</td> <td>(-1,-5)</td> </tr> <tr> <td>1</td> <td>2(1) -3</td> <td>-1</td> <td>(1,-1)</td> </tr> <tr> <td>3</td> <td>2(3) -3</td> <td>3</td> <td>(3,3)</td> </tr> </tbody> </table> <p>Three solutions to the equation $y = 2x + 1$ are; (-1,-5) (1,-1) (3,3)</p>	x	2x-3	y	Ordered pairs	-1	2(-1) -3	-5	(-1,-5)	1	2(1) -3	-1	(1,-1)	3	2(3) -3	3	(3,3)	Graph paper, Rulers, Real-world examples of linear relationships (e.g., distance vs. time, cost vs. quantity)	
x	2x-3	y	Ordered pairs																
-1	2(-1) -3	-5	(-1,-5)																
1	2(1) -3	-1	(1,-1)																
3	2(3) -3	3	(3,3)																



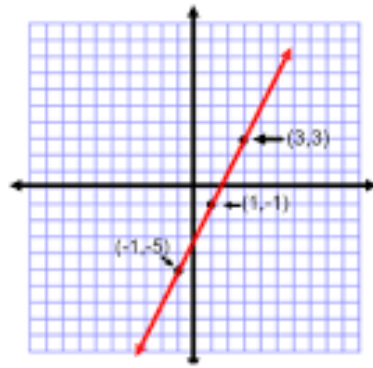
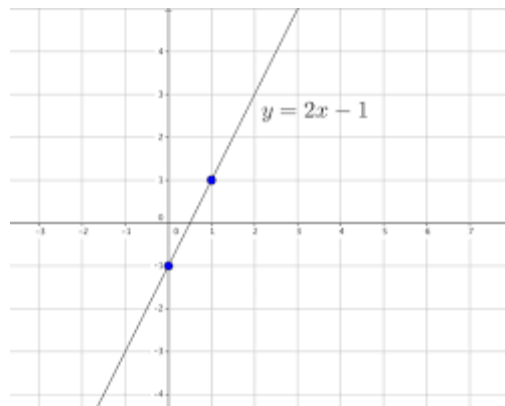


table of values for $y = 2x + 1$

Guide learners through the process of graphing linear relations on a coordinate plane.

Emphasize labeling the axes and choosing appropriate scales. Demonstrate how to plot points from a table of values and connect them with a straight line.



Discuss the characteristics of graphs of linear relations (always straight lines).

Introduce the concept of slope as the "steepness" of the line and the y-intercept as the point where the line crosses the y-axis.

Demonstrate how to calculate slope using the rise-over-run formula ($m = (y_2 - y_1) / (x_2 - x_1)$).

Explain how the y-intercept can be found by setting $x = 0$ in the equation.

Provide learners with various equations and real-world scenarios involving linear relations.

Have them create tables of values, graph the relations, and interpret the slope and y-intercept.

Example 1: Copy and complete the table of values for the relations

$$y_1 = -x + 5 \text{ and } y_2 = \frac{1}{2}x - 3 \text{ for } x \text{ from } 4 \text{ to } 3$$

x	-3	-2	-1	0	1	2	3
$y_1 = -x + 5$	8				4		
$y_2 = \frac{1}{2}x - 3$		-4					-1.5

Solution

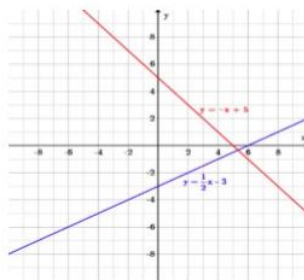
x	-3	-2	-1	0	1	2	3
$y_1 = -x + 5$	8	7	6	5	4	3	2
$y_2 = \frac{1}{2}x - 3$	-4.5	-4	-3.5	-3	-2.5	-2	-1.5

Assessment

- Copy and complete the table of values for the relations $x - 2y = -2$ and $x - 2y = 2$ for x from -2 to 2

x	x	-2	-1	0	1
$x - 2y = -2$	$y_1 = -x + 5$	0			4
$x - 2y = 2$	$= (x - 2)/2$		$-1\frac{1}{2}$		

- Draw graph for two linear relations



PHASE 3: REFLECTION

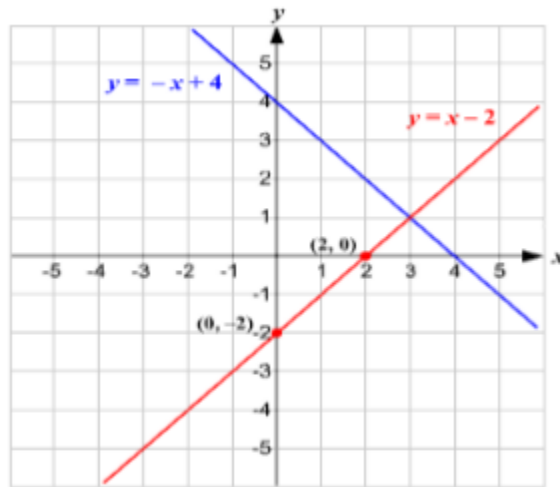
Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

Week Ending:	DAY:	Subject: Mathematics	
Duration: 60MINS		Strand: Algebra	
Class: B9	Class Size:	Sub Strand: Patterns and Relations	
Content Standard: B9.2.1.1 Demonstrate the ability to construct tables of values for pairs of linear relations, graph the relations in a number plane and determine the intersection of the lines to solve simultaneous linear equations		Indicator: B9.2.1.1.2 Use graphs of two linear relations to determine subsequent missing elements in ordered pairs of the relation	Lesson: 1 of 1
Performance Indicator: Learners can interpret and analyze graphs of linear relations to determine missing elements in ordered pairs.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 181			
New words:			
Phase/Duration	Learners Activities	Resources	
PHASE 1: STARTER	Briefly review key concepts from previous lessons: linear relationships, tables of values, graphs, slope, and y-intercept. Engage learners with a quick graphing activity to refresh their skills. Share performance indicators and introduce the lesson.		
PHASE 2: NEW LEARNING	Display a graph of a linear relation with several ordered pairs plotted, but some missing elements (e.g., (2, ?), (?, 6)). Challenge learners to determine the missing values using only the graph's information. Guide learners to use the graph's patterns and characteristics to predict missing elements: <ul style="list-style-type: none"> • Emphasize the constant rate of change (slope). • Encourage them to visualize the line extending beyond plotted points. • Demonstrate how to use slope to "count up" or "count down" to find missing y-values. • Show how to trace back to the y-axis to find missing x-values. Provide opportunities for learners to practice with various graphs and missing elements. Divide learners into pairs or small groups. Distribute a set of graphs with different missing elements to each group. Task them with working together to determine the missing values and justify their reasoning.	Graph paper, Rulers	



Example: Find the missing elements of ordered pairs on graphs of two linear relations.



The graph below is drawn from two linear relations:

$$y = -x + 4$$

$$y = x - 2$$

- i. Determine the coordinates for the intersection of the two lines.
- ii. Determine the corresponding values for y for both straight lines if $x = -1$.
- iii. Use the graph to find the values for y for the two relations

X	6-3	7-2	8-1	9-0	1	2
$y = -x + 4$						
$y = x - 4$						

**PHASE 3:
REFLECTION**

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

FIRST TERM
WEEKLY LESSON NOTES
WEEK 7

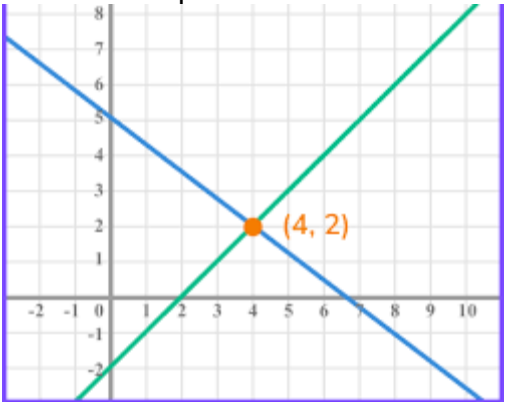
Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Algebra
Class: B9	Class Size:	Sub Strand: Patterns and Relations
Content Standard: B9.2.1.1 Demonstrate the ability to construct tables of values for pairs of linear relations, graph the relations in a number plane and determine the intersection of the lines to solve simultaneous linear equations		Indicator: B9.2.1.1.3 Use graphs to solve equations involving two linear relations
Performance Indicator: Learners can identify the variables and coefficients in linear equations.		Lesson: 1 of 1
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)		
References: Mathematics Curriculum Pg. 182		
New words: graphs, equations, linear, relations		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Begin by discussing situations where two linear relations might intersect in real life (e.g., paths of two moving objects).</p> <p>Connect the concept of intersections to solutions of systems of linear equations.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Review the structure of linear equations (e.g., $y = mx + b$).</p> <p>Identify variables, coefficients, and constants in sample linear equations.</p> <p>Discuss the importance of having two equations to find a unique solution.</p> <p>Demonstrate graphing linear equations on a coordinate plane.</p> <p>Use simple examples and guide learners through plotting points and drawing lines.</p> <p>Emphasize labeling axes, choosing appropriate scales, and representing equations visually.</p> <p>Provide practice problems involving systems of linear equations.</p> <p>Guide learners in graphing the equations and finding the point(s) of intersection.</p> <p>Discuss different scenarios based on the number of intersections (one, none, or infinite solutions).</p>	Graphing paper or access to online graphing tools



	<p>Present real-world problems that can be modeled with systems of linear equations.</p> <p>Guide learners in translating problems into equations, graphing, and interpreting solutions.</p> <p>Encourage discussions on the significance of intersection points in practical scenarios.</p> <p>Distribute worksheets with problems of varying difficulty levels.</p> <p>Allow learners to independently graph equations and find solutions.</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics	
Duration: 60MINS		Strand: Algebra	
Class: B9	Class Size:	Sub Strand: Patterns and Relations	
Content Standard: B9.2.1.1 Demonstrate the ability to construct tables of values for pairs of linear relations, graph the relations in a number plane and determine the intersection of the lines to solve simultaneous linear equations		Indicator: B9.2.1.1.3 Use graphs to solve equations involving two linear relations	Lesson: 1 of 1
Performance Indicator: Learners can graph linear relations on a coordinate plane and interpret the coordinates of the intersection point as the solution to a system of equations.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 182			
New words: graphs, equations, linear, relations			

Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Display two graphs of linear relations intersecting at a single point.</p> <p>Ask learners to describe what they see and what the point of intersection represents.</p>  <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Review the process of graphing linear equations using slope and y-intercept.</p> <p>Emphasize that each point on a graph represents a solution to the equation.</p> <p>Demonstrate how to check solutions by substituting coordinates into the equations.</p> <p>Explain that the point where two graphs intersect represents a solution that satisfies both equations simultaneously.</p> <p>Guide learners through examples to identify intersection points and interpret their coordinates as solutions.</p> <p>Highlight that multiple intersection points indicate multiple solutions.</p>	Graph paper, Rulers



Discuss cases where graphs are parallel or coincident (infinite or no solutions).

Provide learners with pairs of linear equations and challenge them to:

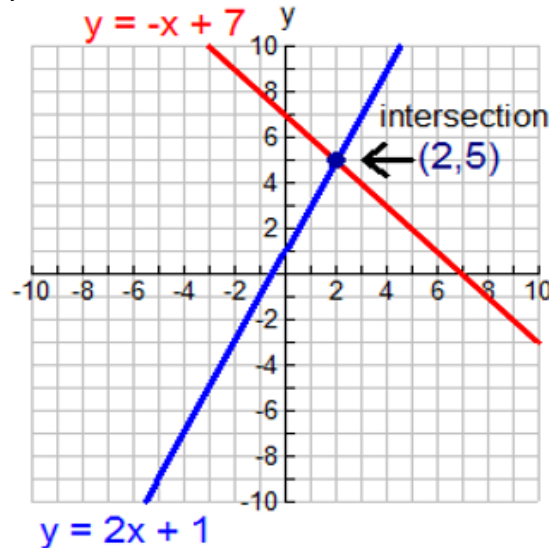
- Graph each equation on the same coordinate plane.
- Identify the point of intersection (if it exists).
- State the solution as an ordered pair.

Check the solution by substituting into the equations.

Example 1: Solve the following equations simultaneously using a graph.

$$y = -x + 7$$

$$y = 2x + 1$$



Hint: Draw the graph and find the coordinates for the intersection of the two lines

In the graph shown the values of $(x, y) = (2, 5)$

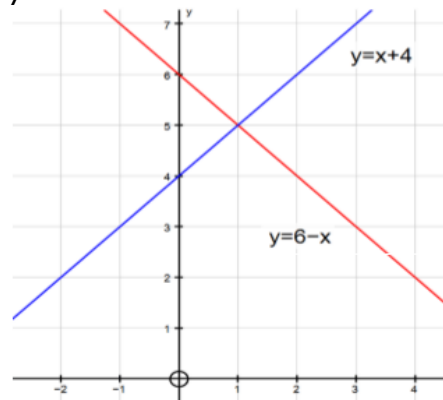
Assessment

Solve two linear equations simultaneously using the graph.

From the graph, determine the values of x and y that makes the linear equations true.

$$y = x + 4$$

$$y = 6 - x$$



PHASE 3: REFLECTION	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	



FIRST TERM
WEEKLY LESSON NOTES
WEEK 8

Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Algebra
Class: B9	Class Size:	Sub Strand: Algebraic Expressions
Content Standard: B9.2.2.1 Demonstrate an understanding of (i) change of subject (ii) substituting values to evaluate expressions, and (iii) factorize expressions that have simple binomial as a factor		Indicator: B9.2.2.1.1 Perform change of subject of a given formula and use it to solve problems.
		Lesson: 1 of 1
Performance Indicator: Learners can perform algebraic manipulations to isolate the desired variable and apply formula manipulation to solve problems in various contexts		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 184		
New words: formula, substituting, factorize, manipulations		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Begin by reviewing familiar formulas learners encounter in everyday life (e.g., area of a rectangle, perimeter of a triangle).</p> <p>Ask them to identify the variables involved and discuss why manipulating formulas might be useful.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Explain the concept of changing the subject of a formula as rearranging it to isolate a specific variable.</p> <p>Use a simple formula like distance = speed × time and visually demonstrate isolating each variable step-by-step.</p> <p>Emphasize the importance of balancing the equation throughout the process.</p> <p>Provide guided practice with problems involving formulas like:</p> <ul style="list-style-type: none"> • Area of a circle: πr^2 (isolate r) • Volume of a cylinder: $\pi r^2 h$ (isolate h) • Pythagorean theorem: $a^2 + b^2 = c^2$ (isolate a or b) <p>Encourage learners to verbalize their thought process at each step and explain the algebraic operations used.</p> <p>Provide differentiated problems of varying difficulty levels.</p> <p>Allow learners to apply their newly acquired skills independently and assess their understanding.</p> <p>Offer support and personalized feedback as needed.</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks



Example 1: Make x the subject of the following formulae

1) $q = x + 7$

$$x = 7 - q$$

2) $r = x - 3$

$$x = -3 - r$$

3) $5x = s$

$$x = \frac{s}{5}$$

Assessment

1) $\frac{3x+1}{2} = h$

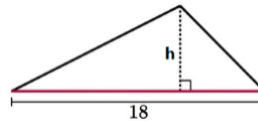
2) $3z = \frac{x}{4} + 1$

3) Use the concept of change of subject to solve problems involving formulae

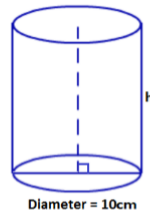
i. The area of a rectangle is 24cm^2 . If the length is 8cm , find the value of the width.

ii. The formula for calculating the area of a circle is given as πr^2 . If a circle has an area of 154cm^2 , what is its radius? [take $\pi = \frac{22}{7}$]

4) The triangle below has an area of 54cm^2 . Find the value of the height of the triangle.



5) The cylinder below has a volume of 330cm^3 . Find the value of the height of the cylinder. [take $\pi = \frac{22}{7}$]



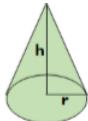
PHASE 3:
REFLECTION

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Algebra
Class: B9	Class Size:	Sub Strand: Algebraic Expressions
Content Standard: B9.2.2.1 Demonstrate an understanding of (i) change of subject (ii) substituting values to evaluate expressions, and (iii) factorize expressions that have simple binomial as a factor		Indicator: B9.2.2.1.2 Substitute values into given formulae to evaluate it and use it to solve problems
		Lesson: 1 of 1
Performance Indicator: Learners can substitute values into formulas correctly to evaluate them and apply formula evaluation to solve problems in various contexts		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 182		
New words:		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	Engage learners with a fun superhero-themed warm-up activity (e.g., create superhero identities based on mathematical powers). Review familiar formulas from previous lessons (e.g., area, perimeter, volume). Discuss the role of variables and values within formulas. Share performance indicators and introduce the lesson.	
PHASE 2: NEW LEARNING	Introduce the concept of substituting values into formulas to unlock their secrets. Provide a visual demonstration using a simple formula like area of a rectangle ($A = l \times w$). Emphasize the importance of matching variables with corresponding values. Provide guided practice with various formulas, encouraging student participation: <ul style="list-style-type: none"> • Area of a triangle ($A = 1/2 \times b \times h$) • Perimeter of a square ($P = 4s$) • Volume of a rectangular prism ($V = l \times w \times h$) Incorporate student whiteboards for individual practice and formative assessment. Present real-world scenarios requiring formula substitution and problem-solving: <ul style="list-style-type: none"> • Determining the cost of painting a rectangular wall given its dimensions and paint price per square meter. • Calculating the amount of fencing needed for a square garden. • Finding the volume of a gift box to ensure a present fits. 	Counters, bundle and loose straws base ten cut square, Bundle of sticks



	<p>Encourage learners to think critically, identify relevant formulas, and apply substitution skills.</p> <p>Provide differentiated worksheets with problems of varying difficulty levels.</p> <p>Allow learners to work independently, showcasing their formula-solving powers.</p> <p>Offer support and feedback as needed.</p> <p>Example 1: Find the value of $(x-b)^2 - 3(x-b)$ if $x=2$ and $b=-5$</p> <p><u>Solution</u> $(x-b)^2 - 3(x-b)$ if $x=2$ and $b=-5$ $= (2-(-5))^2 - 3(2-(-5))$ $= (7)^2 - 3(7)$ $= 49 - 21$ $= 28$</p> <p><u>Assessment</u></p> <p>1. Make k the subject of the formula $\frac{1}{n} = \sqrt{\left(\frac{k^2+a^2}{hg} \right)}$</p> <p>If $n = \frac{1}{n}$, $a = 3$, $h = 2$, $g = 32$, find the value of k.</p> <p>2. The formula for finding the volume of the shape below is given as $\frac{1}{n} \pi r^2 h$. find the volume if $r =$, $h = 21$</p> 	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	

FIRST TERM
WEEKLY LESSON NOTES
WEEK 9

Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Algebra
Class: B9	Class Size:	Sub Strand: Algebraic Expressions
Content Standard: B9.2.2.1 Demonstrate an understanding of (i) change of subject (ii) substituting values to evaluate expressions, and (iii) factorize expressions that have simple binomial as a factor		Indicator: B9.2.2.1.3 Factorize expressions that have simple binomial
		Lesson: 1 of 1
Performance Indicator: Learners can Identify common factors in expressions and apply the distributive property to factorize expressions with simple binomials.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 182		
New words: Factorize, distributive, property, binomials		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Capture attention with a secret code-breaking activity or a "factorization treasure hunt" around the classroom.</p> <p>Introduce factorization as a way to decode expressions and reveal hidden structures.</p> <p>Review basic terms like factors, product, and monomial.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Guide learners to identify common factors in expressions using examples: $6x + 4 = 2(3x + 2)$ $15y - 10 = 5(3y - 2)$</p> <p>Emphasize the distributive property as the key to "unlocking" common factors.</p> <p>Introduce factorization of simple binomials: $x^2 + 5x = x(x + 5)$ $6y - 4y^2 = 2y(3 - 2y)$</p> <p>Provide guided practice with various examples, encouraging student participation.</p> <p>Highlight patterns and strategies for efficient factorization.</p> <p>Present more complex expressions involving multiple binomials: Example 1: factorize completely $2x^2 + 6x - 4$</p> <p><u>Solution</u> $2x^2 + 6x - 4 = 2(x^2 + 3x - 2)$</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks



	<p>$= 2(x + 2)(x + 1)$</p> <p>Example 2: factorize completely $10y^2 - 5y - 15$</p> <p><u>Solution</u></p> $10y^2 - 5y - 15 = 5(2y^2 - y - 3)$ $= 5(2y + 1)(y - 3)$ <p>Encourage teamwork and problem-solving skills.</p> <p>Provide differentiated worksheets for individual practice. Offer support and feedback as needed.</p> <p><u>Assessment</u></p> <p>Factorize the following expressions</p> <p>i. $3x + 4xy = x(3 + 4y)$</p> <p>ii. $12ab + 16b = 4b(3a + 4)$</p> <p>iii. $-13xy + 39x = -13x(y - 3)$</p> <p>iv. $5y - 2y^2 + 3y = -3y + 3y$</p> <p>v. $8y - 2y^2 = 2y(4 - y)$</p> <p>vi. $-6x + 12 = -3(2x - 4)$</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



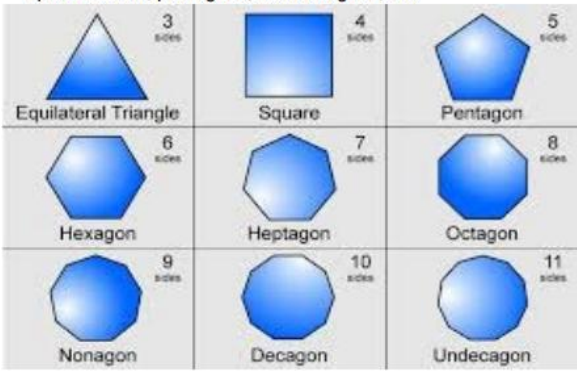
Week Ending:	DAY:	Subject: Mathematics	
Duration: 60MINS		Strand: Algebra	
Class: B9	Class Size:	Sub Strand: Algebraic Expressions	
Content Standard: B9.2.2.1 Demonstrate an understanding of (i) change of subject (ii) substituting values to evaluate expressions, and (iii) factorize expressions that have simple binomial as a factor		Indicator: B9.2.2.1.4 Use the knowledge of simplifying and factorizing expressions to solve real world problems	Lesson: 1 of 1
Performance Indicator: Learners can translate real-world scenarios into mathematical models using formulas and solve real-world problems involving simplification and factorization		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 182			
New words: real-world, scenarios, formulas, simplification, factorization			
Phase/Duration	Learners Activities	Resources	
PHASE 1: STARTER	<p>Begin by showcasing engaging images or scenarios highlighting applications of mathematics in everyday life (e.g., construction, sports, cooking).</p> <p>Discuss how formulas and calculations power these activities. Briefly review key simplification and factorization skills.</p> <p>Share performance indicators and introduce the lesson.</p>		
PHASE 2: NEW LEARNING	<p>Introduce the concept of translating real-world situations into mathematical expressions.</p> <p>Use a simplified example like calculating the total cost of buying fruits based on their price per kilogram.</p> <p>Guide learners through identifying relevant variables, writing expressions, and simplifying to obtain the final answer.</p> <p>Present a problem involving more complex calculations, requiring factorization for efficient solution. For example, calculating the area of a garden after combining rectangular sections with different dimensions.</p> <p>Demonstrate how factorization can simplify the expression and streamline the calculations.</p> <p>Encourage learners to explain their reasoning and steps.</p> <p>Provide a variety of real-world problem scenarios on worksheets or projected images.</p> <p>Each scenario should involve variables, formulas, and potential for simplification and/or factorization.</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks	



	<p>Encourage individual or group work, fostering collaboration and discussion.</p> <p>Offer support and guidance as needed.</p> <p>Example 1: You purchased 10 items from a shopping plaza, and now you need plastic bags to carry them home. If each bag can hold only 3 items, how many plastic bags will you need to accommodate the 10 items?</p> <p><u>Solution:</u> We use simple algebraic formula $\frac{x}{y}$ to calculate the number of bags. x = Number of items purchased = 10 y = Capacity of 1 bag = 3</p> <p>Hence, $\frac{10}{3} = 3.333$ bags = 4 bags So, we need 4 shopping bags to carry 10 items.</p> <p>Example 2: You have to buy two dozen of eggs priced at GH¢10, three loaves breads (each bread is GH¢5), and five bottles of juice (each bottle is GH¢8). How much money will you need to take to the grocery store?</p> <p><u>Solution</u> The prices are a = Price of two dozen eggs = GH¢10 b = Price of one bread = GH¢5 c = Price of one bottle of juice = GH¢8</p> <p>=> Money needed = a + 3b + 5c => Money needed = GH¢10 + 3(GH¢5) + 5(GH¢8) = GH¢10 + GH¢15 + GH¢40 = GH¢65</p> <p>Dedicate time for learners to share their solutions and approaches to different problems.</p> <p><u>Assessment</u> 1. The area of a rectangle is 72 cm². The length is twice its width. What is the length and width of the rectangle?</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



FIRST TERM
WEEKLY LESSON NOTES
WEEK 10

Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Geometry & Measurement
Class: B9	Class Size:	Sub Strand: Shapes and Space
Content Standard: B9.3.1.1 Apply the properties of angles at a point, angles on a straight line, vertically opposite angles, corresponding, angles to` solve problems		Indicator: B9.3.1.1.1 Derive the formula for calculating the sum of angles in any polygon and use this to calculate the value of missing angles in polygons
Performance Indicator: Learners can apply the formula to find missing angles and solve problems involving polygons.		Lesson: 1 of 1
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)		
References: Mathematics Curriculum Pg. 196		
New words: Polygon, Triangle, Quadrilateral, Pentagon, Hexagon, Interior Angle		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Play a quick "name the polygon" game. Show various shapes (triangles, squares, rectangles, etc.) and have learners identify them by name.</p> <p>Briefly introduce the concept of interior angles: the angles formed inside a polygon by its sides.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Review the characteristics of different polygons: triangles (3 sides, 180° interior angle sum), quadrilaterals (4 sides, varied interior angle sums), pentagons (5 sides), hexagons (6 sides), etc.</p> <p style="text-align: center;">quadrilaterals, pentagons, and hexagons, etc.</p>  <p>Create a visual chart on the board, classifying polygons by their number of sides and using different colors or shapes for each category.</p> <p>Engage learners in identifying and naming new examples of polygons.</p>	manipulatives like counters or algebra tiles



Introduce the concept of the angle sum formula for polygons: $(n - 2) \times 180^\circ$, where n is the number of sides.

Guide learners through the derivation of the formula using a simple triangle and gradually adding sides to form various quadrilaterals and pentagons.

Emphasize that the formula applies to any polygon, regardless of its shape or regularity.

Practice using the formula to calculate the sum of interior angles in different polygons. Provide examples with triangles, quadrilaterals, pentagons, and hexagons.

Challenge learners to find missing angles in polygons if given some angles and the number of sides.

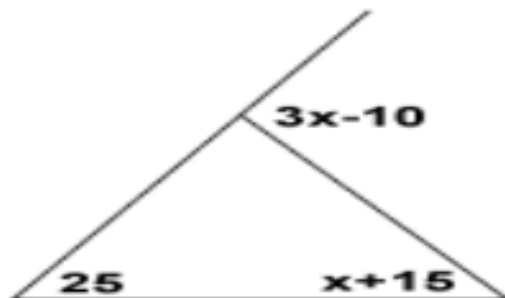
Encourage them to explain their reasoning and calculations clearly.

Present a more challenging problem involving a complex polygon with missing angles.

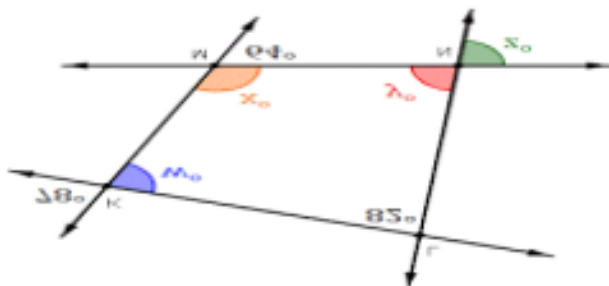
Have learners work in pairs or small groups to solve it using the formula and their understanding of interior angles.

Assessment

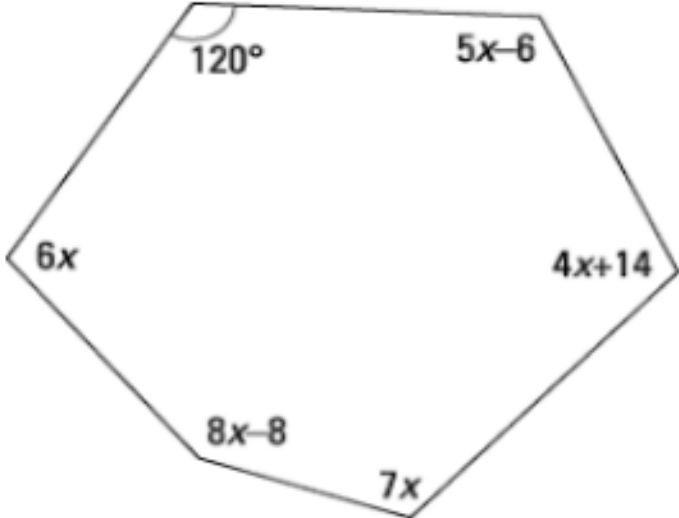
1: Derive and use the formula $(n - 2) \times 180^\circ$ and calculate the value of x (interior angles of a triangle)

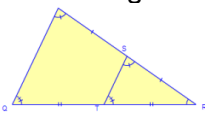
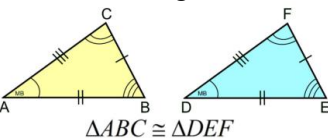
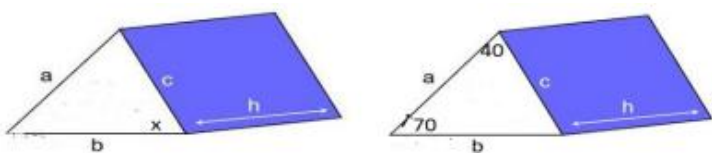


2: Derive and use the formula $(n - 2) \times 180^\circ$ and calculate the interior angles of a quadrilateral



3: Derive and use the formula $(n - 2) \times 180^\circ$ and calculate the interior angles of polygons, pentagons, hexagons,

	 <p>(i) Find the value of x and the various angles in the hexagon</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	

Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Geometry & Measurement
Class: B9	Class Size:	Sub Strand: Shapes and Space
Content Standard: B9.3.1.1 Apply the properties of angles at a point, angles on a straight line, vertically opposite angles, corresponding, angles to solve problems		Indicator: B9.3.1.1.2 Identify similar and congruent triangles and use the knowledge to solve related problems
Performance Indicator: Learners can apply the AA, SSS, and SAS similarity criteria to solve for missing angles in similar triangles.		Lesson: 1 of 1
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)		
References: Mathematics Curriculum Pg. 198		
New words: Triangle, Similar, Congruent, Corresponding Angles, Proportional Sides, AA Similarity,		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Play a "Guess the Triangle" game. Describe different triangles by their properties (number of sides, side lengths, angle measures) and have learners guess if they are similar, congruent, or neither.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Define and differentiate between similar and congruent triangles, emphasizing corresponding angles and proportional sides in similar triangles and identical side lengths and angles in congruent triangles.</p> <p>Explain the AA, SSS, and SAS similarity criteria with clear visuals and examples.</p> <p>Example 1: Recognise similar triangles and solve for the values of the indicated angles in the diagram below:</p>  <p>Example 2: Recognise congruent triangles and solve for the values of the indicated angles in the diagram below</p>  <p>Example 3: Determine the value of x (using knowledge in similarity and congruency).</p> 	manipulatives like counters or algebra tiles

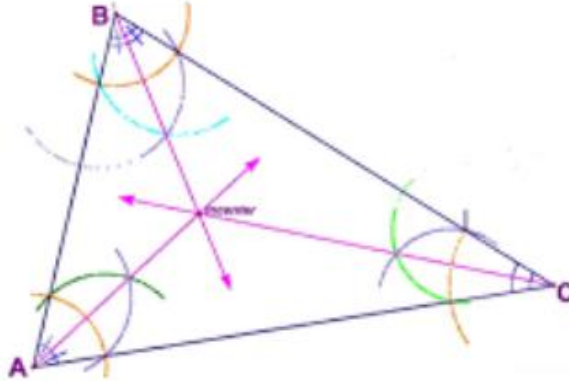
	<p>Briefly introduce the HL congruence rule, focusing on right triangles with hypotenuse and a leg having the same length.</p> <p>Practice recognizing similar and congruent triangles based on the given diagrams you mentioned. Guide learners through identifying corresponding angles and proportional sides to justify their answers.</p> <p>Ask learners to solve for missing angles in the similar triangles using the appropriate similarity criteria and proportional side ratios.</p> <p>For the congruent triangle, apply the HL congruence rule to find the missing angle based on the given hypotenuse and leg lengths.</p> <p>Present a real-world problem involving similar triangles, such as calculating the height of a tree based on its shadow and another object's height.</p> <p>Challenge learners to solve the problem using the AA similarity criteria and their understanding of proportional sides.</p> <p>Encourage them to think of other situations where similar or congruent triangles might be present in daily life.</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



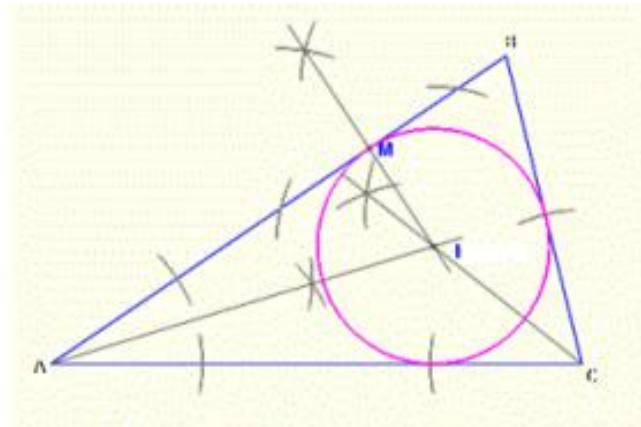
Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Geometry & Measurement
Class: B9	Class Size:	Sub Strand: Shapes and Space
Content Standard: B9.3.1.1 Apply the properties of angles at a point, angles on a straight line, vertically opposite angles, corresponding, angles to` solve problems		Indicator: B9.3.1.2.1 Draw inscribed and circumscribed circles for triangles under given conditions.
		Lesson: 1 of 1
Performance Indicator: Learners can apply the properties of inscribed circles to solve related problems.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 199		
New words: Inscribed circle, Incenter, Radius, Tangent		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Imagine you're a medieval geometer exploring hidden castles. Each room boasts a majestic triangular window.</p> <p>Can you draw a perfect circle inside each window, touching all three walls? How many ways can you do it?</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Briefly recap circles - center, radius, diameter, and circumference. Introduce the concept of inscribed circles in triangles - touching all three sides without going outside.</p> <p>Divide learners into pairs. Provide them with triangle templates of different shapes (equilateral, isosceles, scalene, right-angled).</p> <p>Challenge them to use compasses and rulers to draw inscribed circles in each triangle. Encourage them to observe and discuss their findings.</p> <p>Facilitate a class discussion to identify any patterns or similarities they observed. Guide them to discover:</p> <ul style="list-style-type: none"> • Some triangles cannot have an inscribed circle (acute triangles with very small angles). • Some triangles only have one possible inscribed circle. • Some triangles, like equilateral and isosceles, have multiple possible inscribed circle positions. <p>Once they've grasped the properties, introduce the formula for the radius of an inscribed circle (inradius) based on the triangle's semi-perimeter (s) and side lengths (a, b, c): $r = s - a - b - c / 2$. Show learners how to apply the formula to calculate the inradius of their triangles.</p> <p>Example 1: Use a pair of compasses and a ruler to construct a triangle (say $\triangle ABC$) under a given condition and locate the centre of the triangle (the centre is the point of concurrency of the three</p>	manipulatives like counters or algebra tiles



angle bisectors of a triangle); measure the shortest distance from the centre to the line segments AB, AC and BC. What do you observe about the lengths?



Example 2: Use a pair of compasses and a ruler to construct a triangle (say ABC) under a given condition, bisect at least any two angles (ΔBAC and ΔBCA); locate the intersection of the two angle bisectors (L) and draw a locus of points equidistant from the fixed point (L) to touch the edges of the triangle.



Present real-world scenarios where inscribed circles are used, like designing gears, building bridges, or calculating land area.

Ask learners to brainstorm other potential applications where knowing the inradius of a triangle could be useful.

**PHASE 3:
REFLECTION**

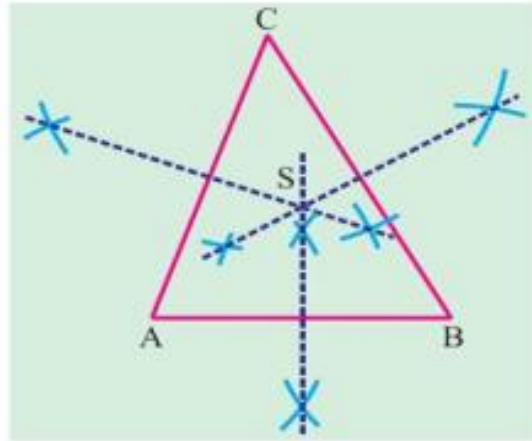
Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

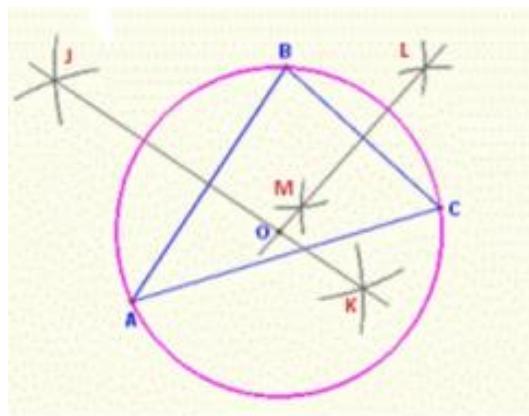
Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Geometry & Measurement
Class: B9	Class Size:	Sub Strand: Shapes and Space
Content Standard: B9.3.1.1 Apply the properties of angles at a point, angles on a straight line, vertically opposite angles, corresponding, angles to solve problems		Indicator: B9.3.1.2.1 Draw inscribed and circumscribed circles for triangles under given conditions.
Performance Indicator: Learners can apply the properties of circumscribed circles to solve related problems.		Lesson: 1 of 1
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)		
References: Mathematics Curriculum Pg. 199		
New words: Inscribed circle, Incenter, Radius, Tangent		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Imagine you're a medieval geometer exploring hidden castles. Each room boasts a majestic triangular window.</p> <p>Can you draw a perfect circle inside each window, touching all three walls? How many ways can you do it?</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Briefly recap the concept of inscribed circles and introduce the idea of circumscribed circles - touching all three vertices of a triangle without going inside.</p> <p>Show an example of a triangle with both inscribed and circumscribed circles.</p> <p>Divide learners into pairs. Provide them with the same triangle templates from the previous lesson.</p> <p>Challenge them to use compasses and rulers to draw circumscribed circles around each triangle. Encourage them to observe and discuss their findings.</p> <p>Facilitate a class discussion to identify any patterns or similarities they observed. Guide them to discover:</p> <ul style="list-style-type: none"> • Some triangles cannot have a circumscribed circle (triangles with very large angles). • Some triangles only have one possible circumscribed circle. • All equilateral triangles have a circumscribed circle that passes through its centroid (the point where the medians intersect). <p>Once they've grasped the properties, introduce the formula for the radius of a circumscribed circle (circumradius) based on the triangle's side lengths (a, b, c): $R = \frac{abc}{4\sqrt{s(s-a)(s-b)(s-c)}}$.</p> <p>Example 1: Construct a triangle (say ABC); bisect all three sides (i.e. line segments AB, AC and BB); locate the intersection (circumcenter) of the three perpendicular bisectors (SS); Measure</p>	manipulatives like counters or algebra tiles



the distance from the intersecting centre (S) to points A, B and C. What do you observe about the lengths?



Example 2: Perform a geometric construction of a triangle (say ABC) under a given condition; bisect at least any two sides (AB and BC); locate the intersection of the two perpendicular bisectors (O) and draw a locus of points equidistant from the fixed point (O) to circumscribe the triangle



Explain the concept of semi-perimeter (s) and guide learners through practice problems using the formula.

Present real-world scenarios where circumscribed circles are used, like designing telescopes, building trusses, or calculating the area of a teardrop-shaped object.

Ask learners to brainstorm other potential applications where knowing the circumradius of a triangle could be useful.

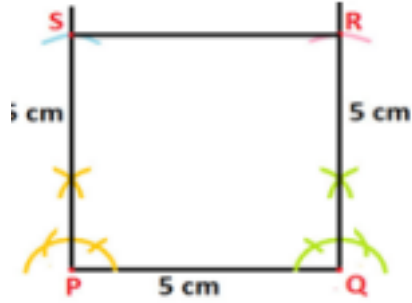
**PHASE 3:
REFLECTION**

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

Week Ending:	DAY:	Subject: Mathematics	
Duration: 60MINS		Strand: Geometry & Measurement	
Class: B9	Class Size:	Sub Strand: Shapes and Space	
Content Standard: B9.3.1.2 Construct inscribed and circumscribed triangles and parallelograms with given dimensions.		Indicator: B9.3.1.2.2 Construct parallelograms (i.e. square, rectangle, rhombus) under given conditions.	Lesson: 1 of 2
Performance Indicator: Learners can apply the properties of inscribed circles to solve related problems.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 201			
New words: Inscribed circle, Incenter, Radius, Tangent			
Phase/Duration	Learners Activities	Resources	
PHASE 1: STARTER	<p>Look around the classroom. Can you spot any parallelograms? How about squares and rectangles, their special cousins? Think pizza boxes, book covers, even floor tiles.</p> <p>What makes these shapes special?</p> <p>Share performance indicators and introduce the lesson.</p>		
PHASE 2: NEW LEARNING	<p>Display a square on the board and ask learners to share what they know about squares.</p> <p>Prompt them to discuss the properties and characteristics of squares. Encourage learners to think about how they might construct a square with a given side length and diagonal.</p> <p>Emphasize the relationships between the side length and diagonal of a square.</p> <p>Introduce the tools used in geometric constructions - a straightedge and compass. Briefly explain the basic constructions they've learned so far.</p> <p>Guide learners in the construction of squares with given side lengths and diagonals. Walk around the class to offer guidance and clarify any questions.</p> <p>Pair learners up and have them work together to construct a square with a given side length and diagonal. Encourage them to discuss and explain their construction process to each other.</p> <p>Demonstrate the step-by-step process of constructing a square with a given side length and diagonal on the board.</p> <p>Example 1: PQRS is a construction of a square with 5cm</p>	manipulatives like counters or algebra tiles	





Explain each step clearly and invite learners to ask questions.

Discuss the reasoning behind each construction step and highlight the geometric principles involved.

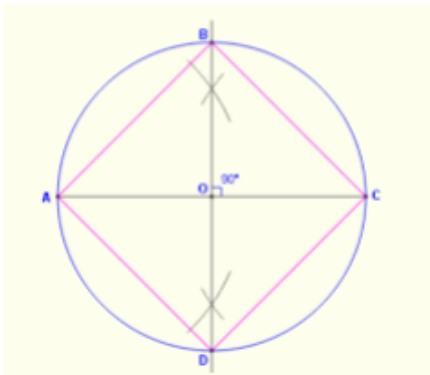
Assessment

Construct a square ABCD with AB=6.5cm. Measure and record the diagonal of the square.

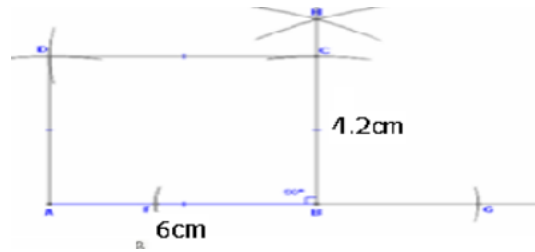
**PHASE 3:
REFLECTION**

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Geometry & Measurement
Class: B9	Class Size:	Sub Strand: Shapes and Space
Content Standard: B9.3.1.2 Construct inscribed and circumscribed triangles and parallelograms with given dimensions.		Indicator: B9.3.1.2.2 Construct parallelograms (i.e. square, rectangle, rhombus) under given conditions.
		Lesson: 2 of 2
Performance Indicator: Learners can use a straightedge and compass to construct rectangles, parallelograms, and regular compound plane shapes with given sides, diagonals, and angles.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 201		
New words: Parallelogram, Regular compound, Geometric, Straightedge, Compass		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Display an image of a rectangle, parallelogram, and regular compound shape on the board.</p> <p>Ask learners to discuss in pairs or small groups what they already know about these shapes, focusing on sides, angles, and relationships between sides and angles.</p> <p>Share performance indicators and introduce the lesson.</p>	
PHASE 2: NEW LEARNING	<p>Write a few problems on the board requiring the construction of rectangles with given side lengths and diagonals.</p> <p>Walk around the class to offer guidance and address questions.</p> <p>Pair learners and instruct them to construct parallelograms with given side lengths and angles.</p> <p>Encourage learners to discuss the construction process and reasoning behind each step.</p> <p>Example 1: construct the square ABCD with AC=10cm. what is the length of the sides?</p>	manipulatives like counters or algebra tiles
		

Example 2: Construct rectangle ABCD such that $AB=6\text{cm}$ and $BC=4.2\text{cm}$.

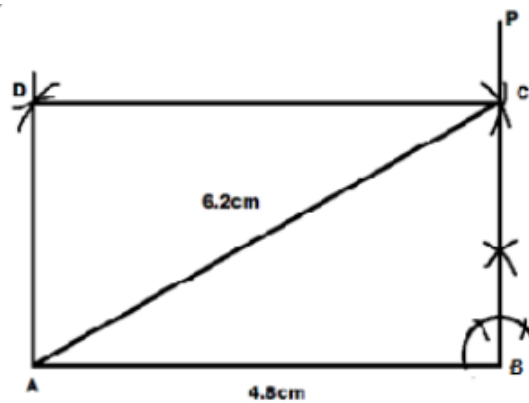


Present problems where learners need to construct regular compound shapes with given side lengths and angles.

Allow learners to work individually or in pairs, promoting collaborative problem-solving.

Demonstrate on the board the step-by-step process for constructing rectangles, parallelograms, and regular compound shapes.

Example 3: construct a rectangle ABCD with length $AB = 4.8\text{cm}$ and diagonal $AC = 6.2\text{cm}$



Explain the reasoning behind each construction step, emphasizing the relationships between sides and angles.

Assessment

Construct the parallelogram ABCD such that the line segments $AB=7\text{cm}$ and $AD=5\text{cm}$ and $\angle DAB=45^\circ$

**PHASE 3:
REFLECTION**

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

FIRST TERM
WEEKLY LESSON NOTES
WEEK 11

Week Ending:		DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Handling Data	
Class: B9	Class Size:		Sub Strand: Data
Content Standard: B9.4.1.1 Select, justify, and use appropriate methods of collecting data (grouped/ungrouped), use the data to construct and interpret frequency tables and histogram and use it to determine the mode and to solve and/or pose problems.		Indicator: B9.4.1.1.1 Select and justify a method to collect data (quantitative and qualitative) to answer a given question.	Lesson: 1 of 1
Performance Indicator: Learners can identify the type of data needed to answer a question (quantitative vs. qualitative).		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving.	
References: Mathematics Curriculum Pg.			
New words:			
Phase/Duration	Learners Activities		Resources
PHASE 1: STARTER	<p>Write "data" on the board and ask learners what it means. Encourage them to share examples of data they encounter in daily life (e.g., weather reports, sports scores, opinion polls).</p> <p>Briefly introduce the two study areas (Musa's book club and travel mode in schools). Ask learners: How can we find out the information needed for these studies?</p>		
PHASE 2: NEW LEARNING	<p>Present a real-life scenario where data is needed to make a decision (e.g., choosing a movie to watch with friends).</p> <p>Ask learners: What kind of information would be helpful to make a decision? (e.g., Reviews, genre preferences)</p> <p>Introduce the concept of data (quantitative - numerical, qualitative - descriptive) and its role in decision making.</p> <p>Divide learners into small groups. Assign each group one of the following case studies:</p> <p>Case Study A: Musa's Book Club (Quantitative and Qualitative Data) Question: What are the most popular books among Ayisha's friends?</p> <p>Case Study B: Travel Modes in Oyoko Schools (Quantitative Data) Question: What is the most common mode of travel used by learners in Oyoko Junior and Senior High Schools?</p> <p>Each group will discuss and answer the following questions for their assigned case study:</p>		Counters, bundle and loose straws base ten cut square, Bundle of sticks



	<ul style="list-style-type: none"> • What type of data is needed to answer the question (quantitative or qualitative)? Why? • Where/whom should we collect data from (target audience)? • What data collection methods would be most appropriate? Consider factors like efficiency, accuracy, and practicality. (e.g., Survey, Interview, Observation) <p>Each group will present their case study and choices for data collection methods.</p> <p>Facilitate a discussion on the reasoning behind their choices. Encourage justifications based on data type, target audience, and practicality.</p> <p>Introduce additional data collection methods like questionnaires and online polls.</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Handling Data
Class: B9	Class Size:	Sub Strand: Data
Content Standard: B9.4.1.1 Select, justify, and use appropriate methods of collecting data (grouped/ungrouped), use the data to construct and interpret frequency tables and histogram and use it to determine the mode and to solve and/or pose problems.		Indicator: B9.4.1.1.2 Organize data (grouped/ungrouped) present it in frequency tables, line graphs, pie graphs, bar graphs and/or pictographs and analyze it to solve and/or pose problems
Performance Indicator: Learners can construct frequency tables for grouped and ungrouped data.		Lesson: 1 of 1
Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving		
References: Mathematics Curriculum Pg.		
New words:		
Phase/Duration	Learners Activities	Resources
PHASE 1: STARTER	<p>Begin with a simple question like "What is your favorite color?" and collect responses from learners.</p> <p>Show how to organize the responses into a frequency table, counting the number of times each color is chosen.</p>	
PHASE 2: NEW LEARNING	<p>Present two data sets, one grouped (e.g., test scores grouped into ranges like 70-79, 80-89) and the other ungrouped (e.g., individual test scores).</p> <p>Ask learners to identify which data set shows individual values and which one groups the values together. Explain the terms "grouped data" and "ungrouped data."</p> <p>Provide learners with counters or small objects and ask them to create their own ungrouped data set (e.g., sorting the objects by color).</p> <p>Have them group the objects based on a certain criteria (e.g., size) and create a grouped data set. Discuss the difference in representation.</p> <p>Introduce the concept of a frequency table. Explain that it helps us organize and count data sets.</p> <p>Show learners an example of a frequency table with labeled columns (value/category, frequency).</p> <p>Provide a data set (e.g., ages of learners in the class) and guide learners in creating a frequency table.</p> <p>Explain how to determine the frequency of each data point and organize it in a table format.</p> <p>Solve an example together to ensure understanding.</p>	Data sets (e.g., heights of learners, temperatures over a week, sales data) Graph paper



Example 1: Thirty bulbs were life-tested and their lifespan to the nearest hour are as follows:

167 171 179 167 171 165 175 179 169 171
177 169 171 177 173 165 175 167 174 177
172 164 175 179 179 174 174 168 171 168

Present the raw data in a frequency table by completing the table below:

Lifespan of Bulbs (hours)	Tally	Frequency
164 - 167		
168 - 171		
172 - 175		
176 - 179		

What is the modal group? Justify your decision for that choice.

Write this on the board. Test Scores: 85, 78, 92, 88, 75, 82, 95, 80

Travel Time to School (minutes): 0-15 (5 learners), 16-30 (10 learners), 31-45 (3 learners)

Instruct learners to create frequency tables for their assigned data sets. Guide them through labeling the columns and tallying the occurrences of each value/category.

Have learners share their completed frequency tables with a partner. Encourage them to discuss what the data reveals (e.g., most common test score range, most popular travel time to school).

Introduce line graphs and their use in representing data trends over time or categories.

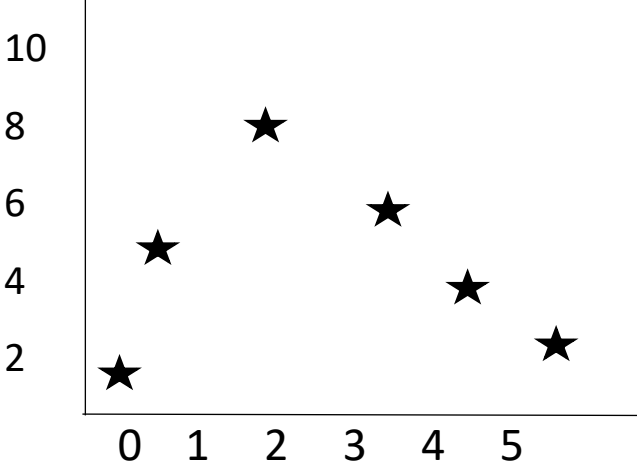
Demonstrate how to label the axes (x-axis for categories, y-axis for frequencies) and plot the data points.

Discuss the importance of a title and labeling units on the axes.

Use the frequency table below to create a line graph.

Number of Books	Frequency
0	2
1	5
2	8
3	6
4	4
5	3



	 <p style="text-align: center;">Number of books</p> <p>Guide learners to analyze the graph.</p> <ul style="list-style-type: none"> • The line graph shows that most learners read between 1 and 3 books per month, with fewer learners reading 0 or 4 books. • This data can be used to discuss reading habits and preferences among learners. <p>Have learners work in pairs or small groups to create their own frequency tables and line graphs using different data sets provided.</p> <p>Encourage them to choose data relevant to their interests or experiences (e.g., favorite sports, daily temperatures).</p> <p>Circulate to provide assistance and check understanding.</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics	
Duration: 60MINS		Strand: Handling Data	
Class: B9	Class Size:	Sub Strand: Data	
Content Standard: B9.4.1.1 Select, justify, and use appropriate methods of collecting data (grouped/ungrouped), use the data to construct and interpret frequency tables and histogram and use it to determine the mode and to solve and/or pose problems.		Indicator: B9.4.1.1.2 Organize data (grouped/ungrouped) present it in frequency tables, line graphs, pie graphs, bar graphs and/or pictographs and analyze it to solve and/or pose problems	Lesson: 1 of 1
Performance Indicator: Learners can construct stem and leaf plots, pie charts, bar graphs, and pictographs for data sets and analyze data represented in different formats and solve/pose problems based on the information.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving	
References: Mathematics Curriculum Pg.			
New words:			
Phase/Duration	Learners Activities	Resources	
PHASE 1: STARTER	<p>Show learners pie charts and bar graphs representing data on topics relevant to them (e.g., favorite movie genres, preferred music styles).</p> <p>Ask them to identify what information these graphs convey and how they differ from frequency tables. Introduce the concept of data visualization through various graphical methods.</p>		
PHASE 2: NEW LEARNING	<p>Introduce stem and leaf plots as an alternative way to organize data, especially for ungrouped numerical data.</p> <p>Explain how stems represent the leftmost digits and leaves represent the rightmost digits of the data points. Show an example of a stem and leaf plot with labeled stems and leaves.</p> <p>Distribute a sample ungrouped data set (prepared beforehand, see example below). Test Scores: 85, 78, 92, 88, 75, 82, 95, 80</p> <p>Guide learners through creating a stem and leaf plot for the data set.</p> <p>Explain how to arrange the data points by their stems and leaves, providing a clear visual representation of the distribution of scores.</p> <p>Introduce pie charts as a way to represent categorical data where slices of the pie represent the proportion of each category. Show an example of a pie chart with labeled slices and corresponding data percentages.</p> <p>Introduce bar graphs as a way to visually compare different categories or values.</p> <p>Explain how bars represent the frequency or quantity for each category/value.</p>	<p>Markers or pens Sample data sets</p>	



Show an example of a bar graph with labeled categories/values on the x-axis and frequency/quantity on the y-axis.

Introduce pictographs as a way to represent data using pictures. Explain that each picture symbol represents a certain quantity of data points.

Show an example of a pictograph with a legend explaining the symbol and its corresponding value.

Provide learners with a new data set; Favorite Movie Genres: Action (8 learners), Comedy (10 learners), Drama (5 learners), Animation (2 learners)

Have learners represent the data set in;

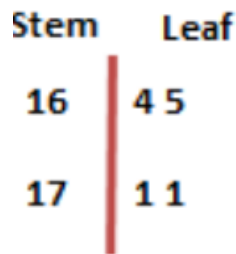
- Create a stem and leaf plot (if ungrouped data).
- Construct a pie chart showing the proportion of learners who prefer each genre.
- Design a bar graph where each bar represents the number of learners in each genre.

Once learners have created their various data representations, have them analyze the information presented in each format.

Ask questions that encourage them to compare and contrast the different visualizations (e.g., which genre is most popular according to the pie chart and bar graph?).



Assessment

1. Complete the stem and leaf plots below to display the raw data. Use the plot to solve the following problems.
 - a. Find the range of the lifespan of bulbs
 - b. What is the mode lifespan?
 - c. What is the median lifespan?
 - d. What other problems can you pose?



2. The pictograph below describes the number of boys and girls in each class in Kojokrom Junior High School.



	<p style="text-align: center;">ENROLMENT INFOGRAPHICS KOJOKROM JUNIOR HIGH SCHOOL</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>46% BOY</p> <p><small>In Kojokrom Junior High School there are 20 boys and 25 girls in B7, 20 boys and 20 girls in B8 and 15 boys and 20 girls in B9</small></p> </div> <div style="text-align: center;">  <p>%</p> <p><small>In Kojokrom Junior High School there are 20 boys and 25 girls in B7, 20 boys and 20 girls in B8 and 15 boys and 20 girls in B9</small></p> </div> </div> <p>What is the percentage of boys and of girls in the school? ii. Use your answers in (i) to represent the data by copying and completing the following infographic.</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	

Week Ending:	DAY:	Subject: Mathematics	
Duration: 60MINS		Strand: Handling Data	
Class: B9	Class Size:	Sub Strand: Data	
Content Standard: B9.4.1.1 Select, justify, and use appropriate methods of collecting data (grouped/ungrouped), use the data to construct and interpret frequency tables and histogram and use it to determine the mode and to solve and/or pose problems.		Indicator: B9.4.1.1.3 Use a histogram to determine the mode of a given data to solve and/or pose real life cases	Lesson: 1 of 1
Performance Indicator: Learners can construct histograms for data sets and identify the mode (most frequent value) of a data set using a histogram.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving	
References: Mathematics Curriculum Pg.			
New words:			
Phase/Duration	Learners Activities	Resources	
PHASE 1: STARTER	Distribute data sets (prepared beforehand) showing the number of pencils learners have in their pencil cases (e.g., 5 learners with 3 pencils, 8 learners with 4 pencils). Have learners create a frequency table showing how many learners have each number of pencils. Ask them what the most common number of pencils learners have. Introduce the concept of histograms as a visual tool to identify this information.		
PHASE 2: NEW LEARNING	Introduce histograms as a graphical representation of data distribution. Explain that data is divided into intervals (bins) along the x-axis, and the y-axis represents the frequency of data points within each interval. Demonstrate how to create a histogram using a frequency table: <ul style="list-style-type: none"> • Determine the range of the data (highest value - lowest value). • Choose an appropriate number of intervals (bins) to represent the data effectively (usually 5-10 intervals). • Calculate the width of each interval by dividing the data range by the number of intervals. • Label the x-axis with the interval values and the y-axis with frequency. • Draw rectangles for each interval, with the height of each rectangle representing the frequency of data points within that interval. (Use different colors for the rectangles) Distribute a new data set; Plant heights (cm): 25, 32, 40, 35, 28, 38, 45, 30 Guide learners through creating a histogram for the data set. They can estimate the width of each interval based on the data range and the desired number of intervals (e.g., 5 intervals). Explain that the mode of a data set is the most frequent value.	Markers or pens Sample data sets	



	<p>Ask learners to analyze their histograms and identify the interval with the highest rectangle. The value in the center of that interval represents the mode of the data set.</p> <p>Pose questions for learners to analyze their data and histograms (e.g., what is the range of plant heights, what is the most common plant height range?).</p> <p>Encourage them to discuss the distribution of data points based on the histogram's shape.</p> <p>Show learners examples of real-life applications of histograms (e.g., distribution of test scores in a class, age ranges of movie viewers).</p> <p>Discuss how histograms help us visualize trends and patterns in data sets.</p> <p>Challenge learners to create their own word problems based on the data they analyzed (e.g., If 2 more plants fall within the 33-37 cm height range, how many plants would be in that category?).</p> <p>Assessment E.g. 1- The waiting times, x minutes, for 60 patients at a certain clinic are as follows</p> <p style="text-align: center;">25 12 53 8 26 5 19 73 67 18 87 42 6 21 14 19 12 15 13 36 36 16 72 36 13 37 11 51 39 32 30 47 6 22 68 25 98 23 45 22 7 9 26 35 27 48 58 56 29 20 32 62 80 41 58 17 54 15 14 74</p> <p>i. Construct a frequency table using class intervals 0 – 10.5; 10.5 – 20.5; 20.5– 30.5, and so on.</p> <p>ii. Construct a frequency table using class intervals $0 < x < 10$; $10 < x < 20$; $20 < x < 30$, and so</p> <p>iii. Draw a histogram and find the modal class</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



FIRST TERM
WEEKLY LESSON NOTES
WEEK 12

Week Ending:		DAY:	Subject: Mathematics
Duration: 60MINS		Strand: Handling Data	
Class: B9	Class Size:		Sub Strand: Data
Content Standard: B9.4.1.2 Select, justify, and use appropriate methods of collecting data (quantitative and qualitative), organise and analyse the data (grouped/ungrouped) to interpret the results using the descriptive statistics (measures of central tendency and range)		Indicator: B9.4.1.2.1 - Select a method for collecting data (quantitative and qualitative), taking into consideration how bias (use of language, ethics, cost, time and timing, privacy or cultural sensitivity) may influence data.	
		Lesson: 1 of 1	
Performance Indicator: Learners can explore different methods for collecting quantitative and qualitative data and identify potential biases in various data collection methods.		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving	
References: Mathematics Curriculum Pg.			
New words:			
Phase/Duration	Learners Activities		Resources
PHASE 1: STARTER	Conduct a quick survey in class about a preferred learning activity (e.g., group work, presentations, quizzes). Ask learners to raise hands or use response cards to indicate their choices. Discuss how this method collects data (quantitative) and highlight the importance of clear question wording to avoid bias.		
PHASE 2: NEW LEARNING	Introduce the concept of quantitative data (numerical) and qualitative data (descriptive, non-numerical). Explain that data collection methods can be chosen based on the type of data needed. Present different data collection methods: <ul style="list-style-type: none"> • Surveys (questionnaires): Structured questions gather quantitative data. • Interviews: In-depth conversations gather qualitative data. • Observations: Recording behavior or events gathers both quantitative and qualitative data (depending on the observation method). • Focus groups: Group discussions gather qualitative data on opinions and experiences. Guide learners to identify a bias data Example: Suppose in a school survey form the following question was asked: <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Overall, don't you think the teaching of mathematics is very good? </div>		Counters, bundle and loose straws base ten cut square, Bundle of sticks



The designer of the survey form has a bias for the methodology used in math lessons and the bias influences how the question was written. The language used in writing the question may lead people to just answer yes or no. A better question would be: Overall, how will you rate the teaching of mathematics?

Very poor Poor Fair Good Very Good

Example 2: Ama Mereku in B9 wants to write an article for their school magazine on sport-related injuries. The responses for the survey question stated below were collected from only the schools' football team.

The influencing factors in this survey question are: time and bias.

Football is a contact sport. The chances are that the answers from her targeted respondents will be high in favour of injuries and thus negatively affect the conclusion/report.

In order to report accurately on sport-related injuries Ama needs to ask more people (time needed) who participate in a variety of sports, including contact and non-contact sports (e.g. athletics tennis, volleyball, and so on)

Example 3: Learners in B9 are asked by their physical education teacher to complete a survey related to "Overall Physical Health". One question on the survey form is;

What is your current body weight?

Identify the influencing factor in the survey and provide a solution.

Example 4: Suppose you tell your classmates that the response to the question in the Class Survey Question Form is to help you plan remedial classes.

What is your worst subject?

If you then use the information collected to write an article for the school magazine how would your actions be described and how would that influence future surveys you conduct?

Example 5: Suppose in a survey questionnaire you wanted to know the favourite method of cooking pork and you asked:

Please tick the box against your favourite method of cooking pork

Boiling Grilling Frying

Please tick the box against your favourite method of cooking pork (**Optional**)

Boiling Grilling Frying



This question does not apply to everyone because some people do not eat pork (i.e. the question is not culturally sensitive.) A better question would be;

If you eat pork please name the favourite method you cook it.

Boiling Grilling Frying

OR

If you eat pork please name the favourite method you cook it.

Boiling Grilling Frying

Divide the class into small groups. Distribute scenarios for role-playing activities (prepared beforehand) that describe a data collection situation. These scenarios can involve choosing a method for a school project or identifying potential bias in a survey.

Example 1: Your group is assigned a project on healthy eating habits. What data collection method would be most suitable (survey, interview, observation)?

How would you design the method to gather reliable information?

Example 2: A survey asks learners to rate the difficulty of different math topics. The answer choices are "very easy," "easy," "difficult," and "very difficult."

Might this wording introduce bias? How could the question be improved?

Have each group discuss the scenario, propose a data collection method, and identify potential biases. Encourage them to consider factors like language used, fairness, and respect for privacy.

Explain that bias can influence data collection in various ways. This can include:

- Leading questions in surveys that sway responses.
- Unrepresentative samples that don't reflect the whole population.
- Observer bias where the observer's expectations influence what they record.

Ask learners to brainstorm situations where bias might occur in different data collection methods (e.g., asking leading questions in an interview, focusing on negative aspects during observation). Use sticky notes to collect their ideas on the board.

Discuss strategies to minimize bias:

- Wording questions in a neutral and unbiased way.
- Selecting a representative sample for surveys or interviews.
- Having clear guidelines for observation to minimize subjective interpretation.



	<p>Show learners examples of biased data collection in real-world contexts (e.g., leading questions in a news poll, focusing only on positive aspects in a product review).</p> <p>Discuss how identifying bias helps us evaluate the credibility of data sources.</p>	
<p>PHASE 3: REFLECTION</p>	<p>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.</p> <p>Take feedback from learners and summarize the lesson.</p>	



Week Ending:	DAY:	Subject: Mathematics	
Duration: 60MINS		Strand: Handling Data	
Class: B9	Class Size:	Sub Strand: Data	
Content Standard: B9.4.1.2 Select, justify, and use appropriate methods of collecting data (quantitative and qualitative), organize and analyze the data (grouped/ungrouped) to interpret the results using the descriptive statistics (measures of central tendency and range)		Indicator: B9.4.1.2.2 Organize and analyze data and interpret the results using the descriptive statistics (i.e. minimum, maximum, measures of central tendency and range) to answer a given question	Lesson: 1 of 1
Performance Indicator: Learners can able to calculate descriptive statistics (minimum, maximum, range, mean, median, mode) and able to calculate descriptive statistics (minimum, maximum, range, mean, median, mode)		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving	
References: Mathematics Curriculum Pg.			
New words:			
Phase/Duration	Learners Activities	Resources	
PHASE 1: STARTER	<p>Present a data set with descriptive statistics already calculated (e.g., minimum, maximum, mean test scores for a class).</p> <p>Without revealing the data itself, ask learners what they can learn about the test scores based on the statistics provided. Introduce descriptive statistics as tools to summarize and understand data.</p>		
PHASE 2: NEW LEARNING	<p>Show learners an unorganized data set (e.g., a list of random numbers representing test scores).</p> <p>Ask them why organizing the data is important before analyzing it.</p> <p>Discuss the benefits of using frequency tables or ordering data from least to greatest.</p> <p>Introduce the concepts of minimum (smallest value) and maximum (largest value) in a data set.</p> <p>Show learners how to identify these values in an ordered data set or frequency table.</p> <p>Define the range as the difference between the maximum and minimum values.</p> <p>Explain how it shows the spread of data points. Guide learners through calculating the range for a data set.</p> <p>Introduce the mean (average) as a measure of central tendency, representing the sum of all values divided by the number of values.</p> <p>Show learners how to calculate the mean for a data set using a formula or a calculator</p>	Counters, bundle and loose straws base ten cut square, Bundle of sticks	



Define the median as the middle value when the data is ordered from least to greatest.

In case of an even number of data points, the median is the average of the two middle values.

Demonstrate how to find the median in a data set.

Introduce the mode as the most frequent value in a data set. Learners can identify the mode by examining a frequency table or the distribution of data points.

Write this on the board: Ages of learners in a drama club (years):
13, 14, 15, 15, 16, 16, 17, 17

Challenge learners to calculate all the descriptive statistics (minimum, maximum, range, mean, median, mode) for this data set.

Guide them through the process and answer any questions they may have.

Assessment

1: Thirty bulbs were life-tested and their lifespan to the nearest hour are as follows:

167 171 179 167 171 165 175 179 169 171
177 169 171 177 173 165 175 167 174 177
172 164 175 179 179 174 174 168 171 168

Present the raw data in a frequency table by completing the table below:

Lifespan of Bulbs (hours)	Tally	Frequency
164 - 167		
168 - 171		
172 - 175		
176 - 179		

Find (minimum, maximum, measures of central tendency and range)

- The minimum lifespan, to the nearest hour, of the bulbs tested.
- The maximum lifespan, to the nearest hour, of the bulbs tested.
- The range of the data collected from the life-testing.
- What is the mean lifespan of the bulbs?
- What is the median of the lifespan of the bulbs?
- What is the mode of the lifespan of the bulbs?
- When placing an order for the bulbs tested to sell in your shop, which of them will you consider buying?

PHASE 3: REFLECTION

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.



	Take feedback from learners and summarize the lesson.	
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Week Ending:	DAY:	Subject: Mathematics	
Duration: 60MINS		Strand: Handling Data	
Class: B9	Class Size:	Sub Strand: Data	
Content Standard: B9.4.1.2 Select, justify, and use appropriate methods of collecting data (quantitative and qualitative), organize and analyze the data (grouped/ungrouped) to interpret the results using the descriptive statistics (measures of central tendency and range)		Indicator: B9.4.1.2.3 Demonstrate the effect on the mean, median, and mode when extreme data is included in a data set	Lesson: 1 of 1
Performance Indicator: Learners can demonstrate the effect on the mean, median, and mode when extreme data is included in a data set		Core Competencies: Communication and Collaboration (CC) Critical Thinking and Problem solving	
References: Mathematics Curriculum Pg.			
New words:			
Phase/Duration	Learners Activities	Resources	
PHASE 1: STARTER	<p>Present a number line with several data points marked and one point significantly far away from the others.</p> <p>Ask learners if this point seems unusual compared to the rest of the data.</p> <p>Introduce the concept of outliers as extreme values that fall outside the overall pattern of a data set.</p>		
PHASE 2: NEW LEARNING	<p>Distribute a data set with a clear outlier: Test Scores: 78, 85, 92, 80, 100 (outlier), 88, 75</p> <p>Ask learners to analyze the data and identify the outlier based on its significant difference from the other values. They can use a number line or dot plot to visualize the data distribution.</p> <p>Explain that the mean (average) is sensitive to outliers. Calculate the mean for the data set with and without the outlier</p> <p>Revisit the concept of the median as the middle value when data is ordered from least to greatest.</p> <p>Calculate the median for the data set with and without the outlier.</p> <p>Demonstrate how the median is less affected by the outlier compared to the mean.</p> <p>Remind learners that the mode is the most frequent value. Identify the mode for the data set with and without the outlier.</p> <p>In most cases, the outlier will not be the mode as it is an extreme value. Discuss how the mode is generally not affected by outliers.</p> <ul style="list-style-type: none"> • Mean is sensitive to outliers and can be misleading if outliers are present. 	Counters, bundle and loose straws base ten cut square, Bundle of sticks	



- Median is a more robust measure of central tendency and is less affected by outliers.
- Mode is typically not affected by outliers but might not be informative for all data sets.

Assessment

I: Thirty bulbs were life-tested and their lifespan to the nearest hour are as follows:

167 171 179 167 171 165 175 179 169 171
 177 169 171 177 173 165 175 167 174 177
 172 164 175 179 179 174 174 168 171 168

Present the raw data in a frequency table by completing the table below:

Lifespan of Bulbs (hours)	Tally	Frequency
164 - 167		
168 – 171		
172 - 175		
176 – 179		

- Find the mean of the data, if one of the bulbs is replaced with a new bulb with lifespan of 300 hours, find the new mean of the bulbs and compare it to the original mean
- In small groups, find the mean of the data, if the lifespan of one of the bulbs tested was 70 hours, and compare it to the original mean.
- Continue to replace the values of the lifespan in the data with extreme values (small and large), calculate the mean, median, and mode and discuss the findings.

**PHASE 3:
REFLECTION**

Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.

