LESSON PLANS FOR JUNIOR HIGH SCHOOLS

MATHEMATICS

BASIC 8

TERM 1

- Weekly forecast
- Detailed lesson plans

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FIRST TERM MATHEMATICS LESSON NOTES – BASIC 8

SCHEME OF LEARNING – TERM 1

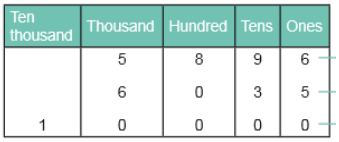
WEEKS	STRAND	SUB STRAND	INDICATORS	RESOURCES
1	Number	Read And Write In Number Quantities Over 1,000,000,000 Skip Counting	B8.1.1.1.1 B8.1.1.1.2	Counters, bundle and loose straws base ten cut square, Bundle of sticks
2	Number	Compare & Order Whole Numbers Standard Form	B8.1.1.1.3 B8.1.1.1.4	
3	Number	Significant Figures	B8.1.1.1.5	Counters, bundle and loose straws base ten cut square, Bundle of sticks
4	Number	Word Problems On Place Values Sets	B8.1.1.1.6 B8.1.1.2.1	
5	Number	Union & Intersection Of Sets Decimals	B8.1.1.2.2. B8.1.2.1.1	Counters, bundle and loose straws base ten cut square, Bundle of sticks
6	Algebra	Patterns and Relations	B8.1.2.3.4 B8.2.1.1.1	
7	Algebra	Patterns and Relations	B8.2.1.1.1	Counters, bundle and loose straws base ten cut square, Bundle of sticks
8	Geometry & Measurement	Shapes and Space (Angles and Construction)	B8.3.1.1.1 B8.3.1.1.2	
9	Geometry & Measurement	Shapes and Space (Angles and Construction)	B8.3.1.1.1 B8.3.1.1.2	Counters, bundle and loose straws base ten cut square, Bundle of sticks
10	Handling Data	Data	B9.4.1.1.2-3 B9.4.1.2.1-2	
11	Handling Data	Data	B9.4.1.1.2-3 B9.4.1.2.1-2	
12	Handling Data	Data	B9.4.1.1.2-3 B9.4.1.2.1-2	Charts

FIRST TERM
WEEKLY LESSON NOTES
WEEK 1

Week Ending:	**DAY:**	**Subject:** Mathematics	
Duration: 60MINS		**Strand:** Number	
Class: B8	**Class Size:**	**Sub Strand:** Read And Write In Number Quantities	
Content Standard: B8.1.1.1 Demonstrate understanding and the use of place value for expressing quantities in standard form and rounding numbers.	**Indicator:** B8.1.1.1.1 Apply the understanding of place value to read and write in number quantities over 1,000,000,000.	**Lesson:** 1 of 1	
Performance Indicator: Learners can read and write in number quantities over 1,000,000,000.		**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 90			

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Play:"1 more than". Mention a number and learners add 1 to it and call out the number e.g. 1) 6 →7 2) 15 → 16 3) 30 → 31 4) 88 → 89 • *Did you have fun playing the game?* • *What set of numbers did you hear in the song?* • *Write 1 to 20 in your books.* Share performance indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Have learners look at the multi-based block and write the number name for each. 1) One thousand 2) Five thousand 3) Sixty 4) Four Draw the Place Value Chart on the board Have learners be in groups of five. Write these numbers on the board. Learners read it and write the numerals under the appropriate columns: 1, 2 4 6. And 3, 6 0 4 Give out the place value chart to learners. They write numeral on their own and write it under the appropriate column in the place value chart. In pairs, let learners write the number name for these numerals. 1) 645 2) 1,332 3) 2,408,321 In groups of five, give out the Place Value Chart. Write these numerals on the board for learners to write them in the chart. 1) 5,896 2) 6,035 3) 10,000	Counters, bundle and loose straws base ten cut square, Bundle of sticks

Ten thousand	Thousand	Hundred	Tens	Ones
1	2	4	6	
3	6	0	4	

	 Repeat this exercise. Learners write their own numerals and write number names for them. They should move round other groups and compare their work. Engage learners to work in pairs. Write number names for these numerals. 1) 5,648 2) 6,099 <u>Assessment</u> Write number names for these numerals. 1) 9,804 2) 10,024 3) 9,999 4) 1,567,451 Write the number names for these numerals. 1) 4,999 2) 4,005 3) 3,079 4) 1,567,451	
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: B8	**Class Size:**	**Sub Strand:** Read And Write In Number Quantities

Content Standard: B8.1.1.1 Demonstrate understanding and the use of place value for expressing quantities in standard form and rounding numbers and decimals to significant figures and a given number of decimal places	**Indicator:** B8.1.1.1.2. Skip count forwards and backwards in 10,000s, 100,000s, 500,000s, etc.	**Lesson:** 2 of 2

Performance Indicator: Learners can skip count forwards and backwards in 10,000s, 100,000s, 500,000s	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 90	

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Play: "How Many fingers up" and "How Many" fingers down? Hold up fingers on two hands. Say "How Many fingers up" and "How Many fingers down"? Learners call out the fingers they see up and the number of fingers they see down	
PHASE 2: **NEW LEARNING**	Revise counting forwards and backwards by 1000s and 10000s with the class. Put learners into groups of five. Give them 100000 number charts. Learners skip count in columns in 100000s starting on 200000,300000,400000,500000. The group leaders should identify errors or omissions and correct them. Give 1000 numeral cards to learners in their groups. They play counting forwards in 10s starting on 200000, 400000, 500000 etc. Deduce from learners a pattern or trend that they have identified when they were counting forwards in 10000's. Have learners work in pairs. Give them 10000 numeral charts. They skip count forwards in 10s starting from any number. Call out 10 learners to the front of the class. Make sure you cater for gender and social inclusiveness. Give each of them multiples of 10000 numeral cards. They hold from 100 – 10. Each learner reads his/her number. 100 90 80 70 60 50 40 30 20 10 Give out the 100 numeral chart to learners in their groups. They skip count backwards by 10s starting from different numbers. Give them the 1000 numeral cards to repeat the same above. Give out 1000 numeral charts to learners, they skip count backwards by 100s from any number. Count backwards in 100,500s up to the fifth number.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	(l) 1,800,000, 1699500, 1599000, ... <u>Assessment</u> Give out 10000 numeral charts to learners. They skip count backwards from these numbers 1) 520 2) 802 3) 905 Give them 10000 numeral cards. They skip count forwards by 10000's starting from any number.	
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 2

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Number
Class: B8	**Class Size:**	**Sub Strand:** Compare & Order Whole Numbers

Content Standard: B8.1.1.1 Demonstrate understanding and the use of place value for expressing quantities in standard form and rounding numbers.	**Indicator:** B8.1.1.1.3. Compare and order whole numbers using ">, <, and ="	**Lesson:** 1 of 1
Performance Indicator: Learners can compare and order whole numbers using ">, <, and ="	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 90		

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Play: "10 more than". Mention a number and learners add 10 to it and call out the number. E.g. 1) 13 → 23 2) 40 → 50 3) 50 → 60 4) 90 → 100 Share performance indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Identify numbers which are 100,000, 1500,000, etc. more or less than given 8 to 9-digit number. Put learners into groups of five. Write these numbers on the board and let them describe the relationship between them. 126,000 and 526,000. Have learners use the place values to determine the difference. Both numbers have numbers at the hundred thousand columns but 500,000 is a lot bigger than 100,000. So, 526,000 is a lot bigger than 126,000, and 126,000 is a lot smaller than 526,000. In their groups learners describe the relationship between these numbers 1) 648,000 and 230,000 2) 136,000 and 128,000. Justify your answers. Put leaners into groups of five. Write these numbers on the board 268,000 and 320,000. Have learners find the values of each digit. i.e. looking at the 2 numbers, 300,000 is greater than 200,000 so, 320,000 is greater than 268,000. Encourage learners to use the symbols. So, 320,000 > 268,000 and 268,000 < 320,000.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	<u>Assessment</u> Have learners work in pairs. Use the symbols >, = and < to compare these numbers. 1) 789,600 _____ 786900 2) 998900 _____ 999800 3) 765000 _____ 765000	
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. <u>Home Work</u> Use the symbols >, =, < to compare these numbers 1) 885600 _____ 885600 2) 640000 ____ 642000 3) 987200 _____ 897200 4) 845600 ____ 854600	

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Number
Class: B8	**Class Size:**	**Sub Strand:** Standard Form

Content Standard: B8.1.1.1 Demonstrate understanding and the use of place value for expressing quantities in standard form and rounding numbers and decimals to significant figures and a given number of decimal places	**Indicator:** B8.1.1.1.4 Express integers of any size into standard form.	**Lesson:** 2 of 2

Performance Indicator: Learners can express integers of any size into standard form	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 91	

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Guide learners to write integers as a power of 10: $1 = 10^0$ $10 = 10^1$ $100 = 10^2$ $1000 = 10^3$ Guide learners to write multiples of 10 in standard form: (I) $10 = 1 \times 10$ (II) $100 = 1 \times 10^1$ (III) $1000 = 1 \times 10^3$ etc. Guide learners to write integers in standard form: (i) $26 = 2.6 \times 10$ (ii) $375 = 3.75 \times 10^2$ (iii) $8,765,049 = 8.765049 \times 10^6$ <u>Assessment</u> Write these integers in standard form 1. 234 2. 3456778 3. 97864064 4. 1234787	Counters, bundle and loose straws base ten cut square, Bundle of sticks
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 3

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Number
Class: B8	**Class Size:**	**Sub Strand:** Significant Figures

Content Standard: B8.1.1.1 Demonstrate understanding and the use of place value for expressing quantities in standard form and rounding numbers.	**Indicator:** 8.1.1.1.5 Express integers in a given number of significant and decimal places	**Lesson:** 1 of 1

Performance Indicator: Learners can express integers in a given number of significant and decimal places	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)

References: Mathematics Curriculum Pg. 90

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Revise with learners on place value of numbers. Guide learners to explain what a significant figure is. As you read a figure from left to right, the first value you come to that is not zero has the highest place value, so it is called the first significant figure (s.f.), For example, in the number 4078; 4 is the first significant figure, 0 is the second significant figure and so on... Also, in the number 0.00507; 5 is the first significant figure since it is the first non-zero figure reading from left to right. The 0 after 5 is the 2 significant figure and 7 is the 3" significant figure. To correct a number to a stated number of significant figures • find the last significant figure you want • then look at the next significant figure (to the right) • If this figure is less than 5 leave the last significant figure you want as it is If this figure is 5 or more add 1 to the last significant figure you want. Guide learners to express any given integer to a given number of significant figures. (i) Express 56734 correct to two significant figures. Solution a) The 2nd significant figure is 6 but the figure after it (i.e. the 3rd significant figure) is 7 which is more than 5. Therefore we add 1 to 6 to give 7 as the 2nd significant figure. 56734 = 57000 (to 2 significant figures) <u>Assessment</u> Express 975.8674, correct to (i) two decimal places; (ii) three decimal places	Counters, bundle and loose straws base ten cut square, Bundle of sticks

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. <u>Home Work</u> Correct each of the following numbers to 2 significant figures. a) 0.0496 b) 0.0996	

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Number
Class: B8	**Class Size:**	**Sub Strand:** Standard Form

Content Standard: B8.1.1.1 Demonstrate understanding and the use of place value for expressing quantities in standard form and rounding numbers and decimals to significant figures and a given number of decimal places	**Indicator:** B8.1.1.1.4 Express integers of any size into standard form.	**Lesson:** 2 of 2

Performance Indicator: Learners can express integers of any size into standard form	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 91	

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Start the lesson with a recap of the previous lesson. Allow learners to reflect on what they learnt from the previous lesson and the homework relating to significant. Learners work these examples in groups. Correct the following to; i) 4 ii) 3 iii) 2 iv) 1 • 17300 • 0.651234 • 782001 • 0.423568 • 20023 • 0.24780021 Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Brainstorm learners for meaning of standard form. It is a way of writing down very large or very small numbers easily. Guide learners to write numbers in standard form. $\binom{a\ number\ between}{1\ and\ 10} * \binom{an\ integer\ power}{of\ 10}$ Therefore a * 10^n is in the standard form, where $1 \leq a < 10$ and n is an integer. The value of n in the standard form shows whether the number is greater than 1 or is a fraction. Revise with learners to write integers as a power of 10: $1 = 10^0$ $10 = 10^1$ $100 = 10^2$ $1000 = 10^3$ Guide learners to write multiples of 10 in standard form: (IV) $10 = 1 \times 10$ (V) $100 = 1 \times 10^1$	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	(VI) 1000 = 1x 10^3 etc. Guide learners to write integers in standard form: Example 1: 26 = 2.6 x 10 2.6 x 10 is in standard form but 26 x 10 is not in standard form because 26 is not between 1 and 10. Example 2: 375 = 3.75 x 10^2 3.75 x 10^2 is in standard form but 37.5 x 10^2 is not in standard form because 37.5 is not between 1 and 10. Have learners practice in groups to write the following integers in standard form (i) 8,765,049 (ii) 872 (iii) 460000 Take learners through the rules of writing numbers in standard form. If n is positive, the number is 10 or more. Example 4.6 x 10^6 = 460000 if n is zero, the number is between 1 and 10 example 5.6 x 10^0 = 5.6 if n is negative, the number is a fraction. Example: 3 x 10^{-1} = 0.3 <u>Assessment</u> Write these integers in standard form 5. 234 6. 0.03456778 7. 97864064 8. 0.0001234787	
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 4

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Number
Class: B8	**Class Size:**	**Sub Strand:** Word Problems On Place Values

Content Standard: B8.1.1.1 Demonstrate understanding and the use of place value for expressing quantities in standard form and rounding numbers and decimals to significant figures and a given number of decimal places	**Indicator:** B8.1.1.1.6 Create and solve word or real-life problems on place values	**Lesson:** 1 of 1

Performance Indicator: Learners can solve word or real-life problems on place values	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)

References: Mathematics Curriculum Pg. 90

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Revise with learners on the basic operations used in mathematics. That is Addition, Subtraction, Multiplication and Division. Explain these basic operation with scenarios to aid learners understanding. Example 1: Last summer Jane earned GHc75.50 mowing lawns. From these earnings, she saved GHc2.50 more than she spent. How much money did Jane save? <u>Solution</u> Since Jane made GHc75.50, choose a reasonable guess for the amount of money spent, such as GHc30.00. Make a table and compute the amount saved. Find the total to test your guess.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

Spent	30.00	37.00	36.50
Saved	32.50	39.50	39.00
Total	62.50	76.50	75.50
Test	Too low	Too low	Correct

Jane saved GHc39.00.

Subtract the amount saved from the amount earned to see if GHc36.50 was spent.
GHc75.50 - GHc39.00 = GHc36.50
GHc39.00 – GHc36.50 = GHc2.50
The answer checks.

	Example 2: In a typical week, a chicken farmer collects about 1164 eggs each day. If all of the eggs are sent to the market, how many dozen eggs are sent each week? Solution First, to find how many eggs are collected in one week, multiply 7 days x 1164 eggs per day = $\frac{?}{eggs\ in\ one\ week}$ Then, to find how many dozen eggs are sent to the market each week, divide: $\frac{\text{Eggs collected in one week}}{\text{12 eggs}}$ = number of dozens sent to the market 1 4 2 1 1 6 4 × 7 8 1 4 8 eggs collected each week 6 7 9 ← dozen eggs sent to the market 12)8 1 4 8 −7 2 9 4 −8 4 1 0 8 −1 0 8 Each week 679 dozen eggs are sent to the market. Check your computations by using inverse operations. $8148 \div 7 \stackrel{?}{=} 1164$ Yes. $12 \times 679 \stackrel{?}{=} 8148$ Yes. Assessment Adom earns Gh₵2500 a month after tax and his elder brother Arko earns three times as much. How much is their total income after five years if there are no increases in their earnings?	
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: B8	**Class Size:**	**Sub Strand:** Sets

Content Standard: B8.1.1.2 Identify perfect squares, determine their square root and solve real life problems involving union and intersection of two sets	**Indicator:** B8.1.1.2.1. Use the concept of sets to identify perfect squares and determine the square roots.	**Lesson:** 1 of 1

Performance Indicator: Learners can identify perfect squares and determine the square roots	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 91	

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Guide learners to identify perfect squares or perfect numbers. Engage learners to list sets of multiples of numbers and identify a set of perfect numbers among them. In groups, learners list the first twelve multiples of the following (1) 5 (2) 2 (3) 4 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, … 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 … 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48… Guide learners on how to determine if a number is a perfect square. - By using repeated division of prime factors. Therefore the Perfect squares 4, 9, 16, 25, 36 Guide learners to use the knowledge on odd numbers to determine the square root of perfect numbers. (i) Determine the square root of 49. <u>Assessment</u> Which of the following numbers are perfect square? 40 64 676 50 4 36 73	Counters, bundle and loose straws base ten cut square, Bundle of sticks
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 5

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Number
Class: B8	**Class Size:**	**Sub Strand:** Union & Intersection Of Sets

Content Standard: B8.1.1.2 Identify perfect squares, determine their square root and solve real life problems involving union and intersection of two sets	**Indicator:** B8.1.1.2.2. Use the knowledge on sets and sets of factors of numbers to solve real life problems involving union and intersection	**Lesson:** 1 of 1

Performance Indicator: Learners can use sets of factors of numbers to solve real life problems	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)

References: Mathematics Curriculum Pg. 93

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Revise with learners on the meaning of factors of numbers. *A factor is a number that divides into another number exactly and without leaving a remainder.* Write this on the board. 2 x 3 = 6 Guide learners to identify 2 and 3 as factors and 6 as the product. Let learners understand that factors are also numbers that multiply together to get another number (product). In groups, learners list the factors of these numbers. 1) 6 2) 8 3) 10 Engage learners in different activities to find common factors of numbers. Example: 12 and 15 12 = {1,2,3,4,6,12} and 15= {1,3,5,15} Common factors = {1,3} Guide learners to explain and understand the concept of union and intersection of sets. The union of two sets is a set containing all the elements that are in A or in B. it has the symbol U. For example: A={1,2} and B= {2,3} So A U B = {1,2,3} Have learners note that, in writing the members for the union sets, numbers which are common in both sets are written once. Engage learners in different activities to introduce learners to intersection of sets.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	<u>Assessment</u> Guide learners to solve story and real-life problems involving union and intersection of sets (i) There are 80 farmers in a certain village who grow maize and rice or both. Out of the 80 farmers, 50 grow maize and 60 grow rice. (a) Represent the information on a Venn diagram. (b) If x of them grows both crops, write an equation in x and solve for it	
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.	

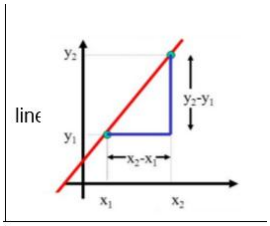
WEEK 6

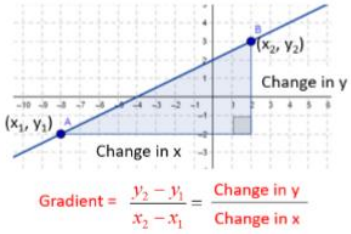
Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Algebra
Class: B8	**Class Size:**	**Sub Strand:** Patterns and Relations

Content Standard: B8.2.1.1 Demonstrate the ability to draw table of values for a linear relation, graph the relation in a number plane, determine the gradient of the line and use it to write equation of a line of the form y = mx + c.	**Indicator:** B8.2.1.1.1 Calculate the gradient of a line and use it to write equation of a line of the form y = mx + c.	**Lesson:** 2 of 2

Performance Indicator: Learners can calculate the gradient of a line and use it to write equation of a line of the form y = mx + c	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)

References: Mathematics Curriculum Pg. 112

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Explain the concept of gradient using real life examples and to discover the practical meaning of gradient. The gradient is the measure of how steep the hill the rider is climbing is. The gradient is the slope (or steepness) of the roofing of the building. Determine the formula for calculating the gradient of a line. The formula for calculating the gradient of a straight.  $\frac{\Delta y}{\Delta x} = \frac{y2-y1}{x2-x1}$ Determine the gradient when given two coordinates. Find the gradient of a line which passes through the point; i. A (1, 1) and B (7, 2) ii. P (-2, 4) and Q (3, 5) iii. C (3, -2) and D (-3, 4) Determine the gradient of a straight line when its equation is given. Find the gradient from the equation of the straight line below. 1. y = 5x + 13 2. 2x – 8y + 3 = 0 3. y = -3x + 12	Counters, bundle and loose straws base ten cut square, Bundle of sticks

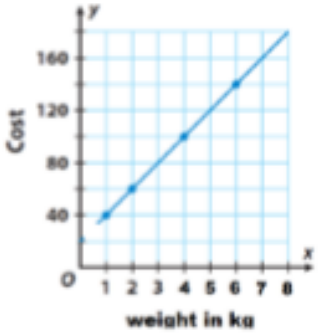
	 Determine the gradient from a graph. From the graph, the coordinates are A (-8,-2), B (2, 3). m = $\frac{-2-3}{-8-2} = \frac{-5}{-10} = \frac{1}{2}$ The gradient of the line is $\frac{1}{2}$  Determine the slope-intercept form of the equation of a straight line Hint: The equation of a straight line in slope-intercept form is y = mx + c. Find the equation of a line with slope 2 and y-intercept -3. Hence find the value of y when x is 4. Find the equation of a line in slope-intercept form having y-intercept $\frac{7}{2}$ and slope -$\frac{5}{2}$ Find the equation of a line with slope $\frac{1}{2}$ and y-intercept 4 E.g.7 Determine the point-slope form of the equation of a straight line Hint: The point-slope form of the equation of a straight line is $y - y_1 = m(x - x_1)$ Find the equation of a line with slope $\frac{2}{3}$ that passess through the point (3, -1) Find the equation of a line that passes through the point (3, -7) and has the slope m = $\frac{5}{4}$ Find the equation of a line which passes through the points (5, 4) and (-10, 2). Write the equation 5x + 4y – 3 = 0 in the form y = mx + c. Hence state the gradient and the intercept.	
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: B8	**Class Size:**	**Sub Strand:** Patterns and Relations

Content Standard: B8.2.1.1 Demonstrate the ability to draw table of values for a linear relation	**Indicator:** B8.2.1.1.2 Use graph of a linear relation to determine subsequent missing elements in the ordered pairs of the relation	**Lesson:** 1 of 2

Performance Indicator: Learners can use graph of a linear relation to determine subsequent missing elements in the ordered pairs of the relation	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)

References: Mathematics Curriculum Pg. 115-116

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Guide learners to use graph of a linear relation to determine subsequent missing elements in the ordered pairs of the relation. Write a sample question on the board and take learners through its solution. Use information from a graph to find missing elements. The graph represents the relation $yy = 20xx$, where y is the cost (in Ghana cedis) of the weight (in kilograms) of meat sold in a market.  Use the graph to find: i. the cost of 3.5kg of meat ii. the weight of meat that can be bought with GH₵80. iii. Using the relation from the graph, how many kilograms of meat can be bought at a cost of GH₵240. Use information from a graph to find missing element.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

<table>
<tr>
<td></td>
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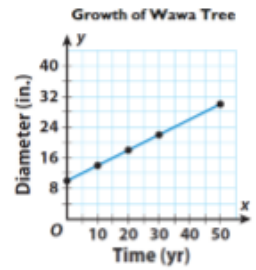


The diameter of a wawa tree is currently 10 inches when it is measured at chest height. After 50 years, the diameter is expected to increase by an average growth rate of 2/5 inch per year. The equation y = 2/5x + 10 gives you y. the diameter of the tree in inches, after x years

Use the graph to complete the table below

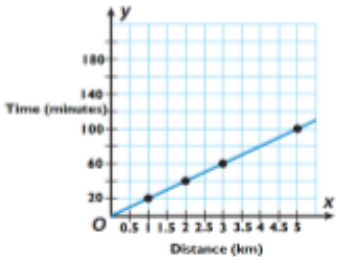
<table>
<tr><td>X (years)</td><td>0</td><td>10</td><td>20</td><td>30</td><td>50</td></tr>
<tr><td>Y (diameter)</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

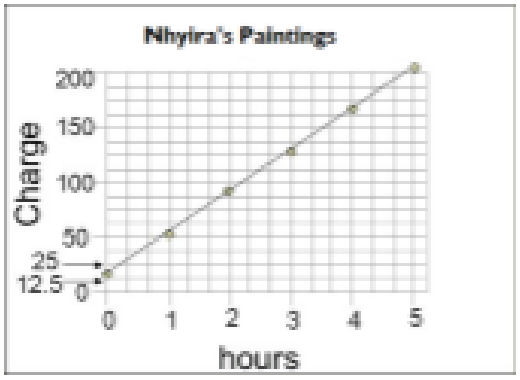
What will be the diameter of the tree in 100 years?
</td>
<td></td>
</tr>
<tr>
<td>PHASE 3:
REFLECTION</td>
<td>Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson.

Take feedback from learners and summarize the lesson.</td>
<td></td>
</tr>
</table>

WEEK 7

Week Ending:	**DAY:**	**Subject:** Mathematics	
Duration: 60MINS		**Strand:** Algebra	
Class: B8	**Class Size:**	**Sub Strand:** Patterns and Relations	
Content Standard: B8.2.1.1 Demonstrate the ability to draw table of values for a linear relation		**Indicator:** B8.2.1.1.3 Use graphs of linear relations to solve real life problems	**Lesson:** 2 of 2
Performance Indicator: Learners can use graphs of linear relations to solve real life problems		**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 117			

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Guide learners to use graphs of linear relations to solve real life problems. Write a sample question on the board and take learners through its solution. Every morning, you go for a walk. The distance you walk can be modelled by the equation d = ½h, where d is the distance walked in kilometers and h is the number of hours you've walked. Make a table for the relation and draw a graph with the values to see how far you've walked after 6hours. Copy and complete the table for the relation: Distance | 1 | 2 | 3 | 4 | 5 Time | | | | |  Nhyira paints portraits of people for a living. The graph below shows how much she charges based on how long it takes her to paint the portrait. Use the graph to answer the questions that follow How much does she charge for a portrait that takes 3 hours to paint? ii. Is she charges GH₵175, how many hours did she use to paint the portrait? iii. How many hours will she require to paint a portrait that cost GH₵300?	Counters, bundle and loose straws base ten cut square, Bundle of sticks

		
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 8

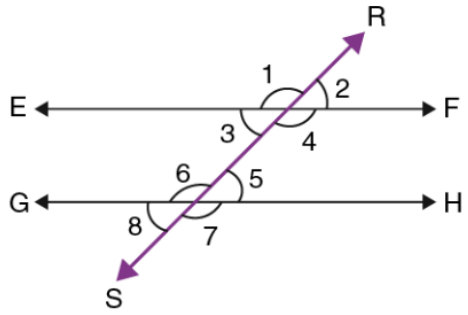
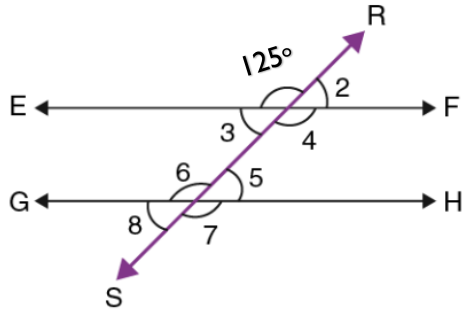
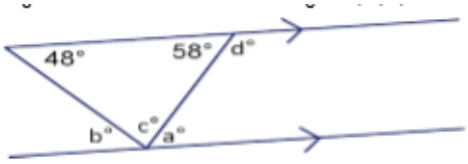
Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Geometry & Measurement
Class: B8	**Class Size:**	**Sub Strand:** Shapes and Spaces

Content Standard: B8.3.1.1 Demonstrate understanding and use of the relationship between parallel lines and alternate and corresponding angles and use the sum of angles in a triangle to deduce the angle sum in any polygon	**Indicator:** B8.3.1.1.1 Draw and determine the values of alternate and corresponding angles.	**Lesson:** 1 of 2

Performance Indicator: Learners can draw and determine the values of alternate and corresponding angles	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)

References: Mathematics Curriculum Pg. 123

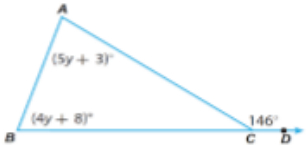
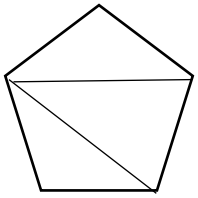
Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Revise with learners on how angles are formed. *An angle is a measure of the space between two intersecting lines or surfaces, often measured in degrees or radians. It is formed when two lines or surfaces meet at a common point, called the vertex of the angle.* Revise with learners on the types of angles. *1. Acute Angle: An acute angle is an angle whose measure is between 0 and 90 degrees.* *2. Right Angle: A right angle is an angle whose measure is exactly 90 degrees. It is often represented by a small square placed at the vertex of the angle.* *3. Obtuse Angle: An obtuse angle is an angle whose measure is between 90 and 180 degrees.* *4. Straight Angle: A straight angle is an angle whose measure is exactly 180 degrees. It is essentially a straight line.* *5. Reflex Angle: A reflex angle is an angle whose measure is between 180 and 360 degrees.* *6. Complementary Angles: Two angles are complementary if their measures add up to 90 degrees.* *7. Supplementary Angles: Two angles are supplementary if their measures add up to 180 degrees.* *8. Congruent Angles: Two angles are congruent if they have the same measure.* *9. Adjacent Angles: Two angles are adjacent if they share a common vertex and a common side, but do not overlap.* *10. Vertical Angles: Vertical angles are two non-adjacent angles formed by the intersection of two lines. They are equal in measure.*	Counters, bundle and loose straws base ten cut square, Bundle of sticks

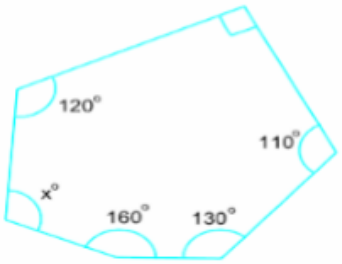
	Introduce learners to alternate and corresponding angles. Using pictures have them identify alternate and corresponding angles. • *Alternate angles: Alternate angles are pairs of angles that are formed on opposite sides of the transversal and on different lines.* • *Corresponding angles: Corresponding angles are pairs of angles that are formed by a transversal and two lines that are not parallel.*  From the above diagram, EF and GH are the two parallel lines. RS is the transversal line that cuts EF at L and GH at M. If the two parallel lines are cut by a transversal, then the alternate angles are equal. Therefore <3 = <5 and <4 = <6 <1 = <7 and <2 = <8 On the other hand, the corresponding angles are; 1&6, 2&5, 3&8 and 4&7 <u>Assessment</u> Learners in pairs draw the diagram and calculate the values of the angles marked 1, 3,4,5,6,7,8  Calculate the value of the angles a, b, c, and d  	
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: B8	**Class Size:**	**Sub Strand:** Shapes and Spaces

Content Standard: B8.3.1.1 Demonstrate understanding and use of the relationship between parallel lines and alternate and corresponding angles and use the sum of angles in a triangle to deduce the angle sum in any polygon	**Indicator:** B8.3.1.1.2 Determine the values of angles in a triangle using knowledge of the sum of interior angles in a triangle and other properties.	**Lesson:** 2 of 2

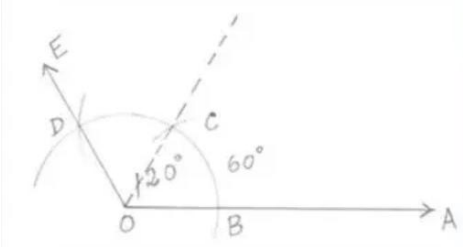
Performance Indicator: Learners can determine the values of angles in a triangle using knowledge of the sum of interior angles in a triangle and other properties.	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 124	

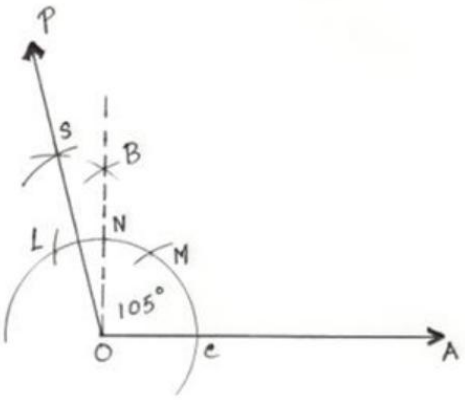
Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Revise with learners on polygons and the types of polygons. Guide learners to calculate the values of y and the angles in the triangle.  Learners in pairs deduce the formula for the sum of interior angles in a polygon and determine the value of an angle in a regular hexagon. *To derive the formula for the sum of interior angles in a polygon, we can start by dividing the polygon into triangles. Any polygon can be divided into triangles by drawing all the possible diagonals from one vertex. The number of triangles that result from this division is always two less than the number of sides in the polygon.* *For example, a pentagon can be divided into three triangles, as shown below:*  *From this diagram, we can see that the sum of the interior angles of the pentagon is equal to the sum of the interior angles of the three triangles.* *Each triangle has two interior angles that are shared with the other triangles and one angle that is unique to that triangle. Therefore, the sum of the interior angles of each triangle is 180 degrees, and the sum of the interior angles of the polygon is:*	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	Sum of interior angles = (number of triangles) x 180 degrees *The number of triangles in the polygon is two less than the number of sides or vertices, so we can substitute (n - 2) for the number of triangles:* *Sum of interior angles = (n - 2) x 180 degrees* *where n is the number of sides or vertices in the polygon.* *Therefore, we have derived the formula for the sum of interior angles in a polygon, which is:* *Sum of interior angles = (n - 2) x 180 degrees.* Learners to use the formula for finding the sum of interior angles in a polygon (n-2)180 to determine the value of x in the hexagon.  	
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: B8	**Class Size:**	**Sub Strand:** Shapes and Spaces

Content Standard: B8.3.1.2 Demonstrate the ability to perform geometric constructions of the angles (75˚, 105˚, 60˚, 135˚ and 150˚), and construct triangles and find locus of points under given conditions.	**Indicator:** B8.3.1.2.1 Construct and bisect angles of 120˚, 105˚, 135˚ and 150˚	**Lesson:** 1 of 2
Performance Indicator: Learners can construct and bisect angles of 120˚, 105˚, 135˚ and 150˚	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)	
References: Mathematics Curriculum Pg. 123		

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Use a pair of compasses and a ruler, guide learners to construct angles of 120˚, 105˚, 135˚ and 150˚ <u>To Construct an angle of 120⁰</u> • *Draw a ray OA.* • *With O as center and any suitable radius draw an arc cutting OA at B.* • *With B as center and the same radius cut the arc at C, then with C as center and same radius cut the arc at D. Join OD and produce it to E.*  Then, **∠AOE = 120°**. <u>To Construct an angle of 105⁰</u> • *Take any ray OA.* • *With O as center and any convenient radius, draw an arc cutting OA at B.* • *With B as center and the same radius, draw an cutting the first arc at C.* • *With C as center and the same radius, cut off an arc cutting again the first arc at D.* • *With C and D as center and radius of more than half of CD, draw two arcs cutting each other at E, join OE.* • *After making 90° angle take L and N as center and draw two arcs cutting each other at S.* • *Join SO.*	Counters, bundle and loose straws base ten cut square, Bundle of sticks



To Construct an angle of 135^0

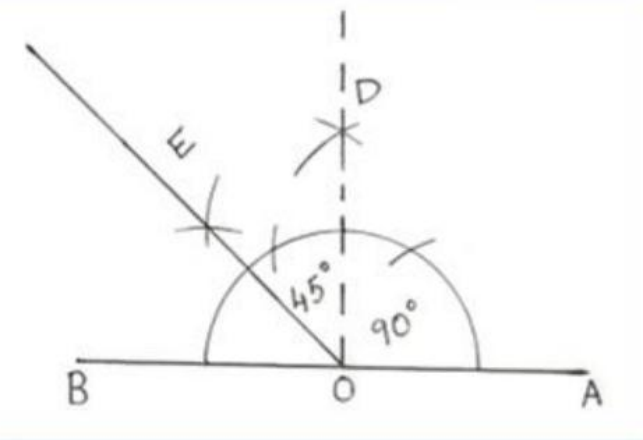
Construct ∠AOD = 90°

Produce ∠AO to B.

Draw OE to bisect ∠DOB.

∠DOE = 45°

∠EOA = 45° + 90° = 135°



To Construct an angle of 135^0

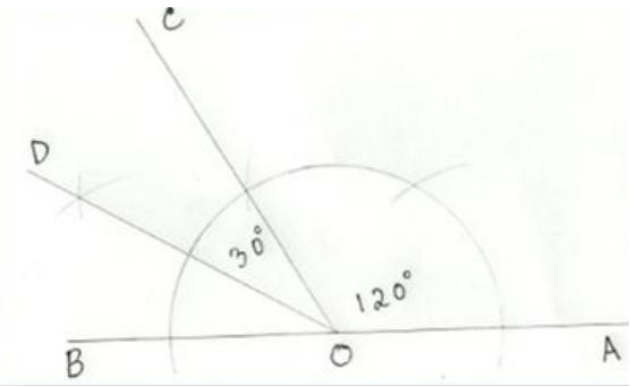
Construct ∠AOC = 120°

Produce ∠AO to B.

Draw OD to bisect ∠COB.

Now ∠COD = 30°

Therefore, ∠AOD = 120° + 30° = 150°



	<u>Assessment</u> Using a pair of compasses and a ruler only, construct the following angles; 120°, 105°, 135° and 150°	
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 9

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Geometry & Measurement
Class: B8	**Class Size:**	**Sub Strand:** Shapes and Spaces

Content Standard:	**Indicator:**	**Lesson:**
B8.3.1.2 Demonstrate the ability to perform geometric constructions of the angles (75˚, 105˚, 60˚, 135˚ and 150˚), and construct triangles and find locus of points under given conditions	B8.3.1.2.2: Construct scalene triangles, isosceles triangles, equilateral triangles, obtuse-angled triangle, and acute-angled triangles in different orientations under given conditions.	2 of 2

Performance Indicator:	**Core Competencies:**
Learners can determine the values of angles in a triangle using knowledge of the sum of interior angles in a triangle and other properties.	Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)

References: Mathematics Curriculum Pg. 127-132

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Gide learners to use a pair of compasses and a ruler to construct an equilateral triangle when a side is given and justify why it is an equilateral triangle • *Draw a straight line segment to serve as the base of your triangle. Label the endpoints as points A and B.* • *Use a ruler to measure the length of the given side. Let's say the length is "a". Mark a point C on the line segment AB, at a distance of "a" from point A.* • *With a compass, set the width to the length "a". Place the compass tip on point C and draw an arc that intersects the line segment AB. Label the intersection points as D and E.* • *Without changing the compass width, place the compass tip on point D and draw another arc that intersects the arc drawn in the previous step. Label the intersection point as F.* • *Draw a straight line connecting point C and point F.* • *Draw a straight line connecting point F and point B.* Guide learners to use a pair of compasses and a ruler to construct an equilateral triangle • *Draw a straight line segment to serve as the base of your triangle. Label the endpoints as points A and B.* • *Use a ruler to measure and mark a second point, C, on the same line but at a different distance from point A than point B. This will determine the length of one side of the triangle.* • *With a compass, set the width to the length of the second side of the triangle. Place the compass tip on point B and draw an arc that intersects the line segment AB.* • *Without changing the compass width, place the compass tip on point A and draw another arc that intersects the line segment AB.* • *Label the intersection point of the arcs as point D.*	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	• *Draw a straight line connecting point C and point D. This will be the second side of the triangle.* • *Draw a straight line connecting point C and point B. This will be the third side of the triangle.* Using a pair of compasses and a ruler, guide learners to perform geometric construction of an isosceles right-angled triangle when the base line is given. *1. Draw a straight line segment to serve as the base of your triangle. Label the endpoints as points A and B.* *2. Use a ruler to measure and mark a point C on the line segment AB. This will be the midpoint of AB.* *3. With a compass, set the width to the length of AC. Place the compass tip on point C and draw an arc that intersects the line segment AB. Label the intersection points as D and E.* *4. Without changing the compass width, place the compass tip on point D and draw another arc that intersects the arc drawn in the previous step. Label the intersection point as F.* *5. Draw a straight line connecting point C and point F.* *6. Draw a straight line connecting point F and point B.* <u>Assessment</u> 1. Use a pair of compasses and a ruler to perform geometric construction of an isosceles triangle when all the sides are given. 2. Use a pair of compasses and a ruler to perform geometric construction of an isosceles triangle when the base angles and base side are known 3. Use a pair of compasses and a ruler to construct acute-angled triangles, obtuse-angled triangles and right-angled triangles when a side and two angles are given 4. Use a pair of compasses and a ruler to construct triangles when all the sides are given.	
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: B8	**Class Size:**	**Sub Strand:** Construct & Bisect Angles

Content Standard: B8.3.1.2 Demonstrate the ability to perform geometric constructions of the angles (75˚, 105˚, 60˚, 135˚ and 150˚), and construct triangles and find locus of points under given conditions.	**Indicator:** B8.3.1.2.3: Construct loci	**Lesson:** 1 of 2

Performance Indicator: Learners can construct loci	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 133-141	

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson. Share performance indicators with learners and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Have learners understand that a 'locus' refers to the set of all points that satisfy a specific geometric condition. It represents the path or trajectory followed by a point or object under certain constraints or rules. The concept of locus is often used in geometry to describe the collection of points that satisfy a given property. For example, the locus of points equidistant from two fixed points is a straight line called the perpendicular bisector. Similarly, the locus of points equidistant from a fixed point is a circle. Demonstrate how to construct a loci *1. Identify the condition: Determine the specific condition or property that the points must satisfy.* *2. Analyze the condition: Understand the requirements of the condition or property. Break it down into simpler components if needed. For example, if the condition involves the distance between points, consider the distances involved and their relationships.* *3. Use geometric tools: Depending on the condition, utilize geometric tools such as rulers, compasses, protractors, or specific geometric constructions to help determine and visualize the locus.* *4. Consider different scenarios: Explore different cases or variations of the condition to gain a better understanding of the locus. This might involve changing parameters or considering different possibilities within the condition.* *5. Record the locus: Once you have determined the set of points that satisfy the condition, record or represent the locus appropriately. This could be by drawing the locus on a coordinate plane, labeling it with relevant equations or descriptions, or using mathematical notation to express the locus.*	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	6. Verify and refine: After constructing the locus, verify that the points on the locus indeed satisfy the condition. If necessary, refine the construction by checking additional points or adjusting the construction based on any discrepancies found. Guide learners to construct loci under given conditions including: (i) the locus of sets of points from a fixed point; (ii) the locus of points equidistant from two fixed points; (iii) the locus of points equidistant from two intersecting straight lines, and (iv) the locus of points equidistant from two parallel lines. Describe the locus of a circle by tracing the path of a point P which moves in such a way that its distance from a fixed point, say O, is always the same to construct circles Perform geometric construction to locate the centre of a circle by locating the intersection of the perpendicular bisectors of any two chords on the circle Draw circles of given radii at the points as centre and chord. Construct a regular hexagon within a circle given the length of a side <u>Assessment</u> Use a pair of compasses and a ruler to construct a hexagon ABCDEF such that |AB| = 6cm. Find the measure of the angles AOB and compare to its value.	
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 10

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Handling Data
Class: B8	**Class Size:**	**Sub Strand:** Data

Content Standard: B8.4.1.1Select, 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:** B8.4.1.1.1 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**	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). 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?	
PHASE 2: **NEW LEARNING**	Present a real-life scenario where data is needed to make a decision (e.g., choosing a movie to watch with friends). Ask learners: What kind of information would be helpful to make a decision? (e.g., Reviews, genre preferences) Introduce the concept of data (quantitative - numerical, qualitative - descriptive) and its role in decision making. Divide learners into small groups. Assign each group one of the following case studies: Case Study A: Musa's Book Club (Quantitative and Qualitative Data) Question: What are the most popular books among Ayisha's friends? 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? Each group will discuss and answer the following questions for their assigned case study: • 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)	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	Each group will present their case study and choices for data collection methods. Facilitate a discussion on the reasoning behind their choices. Encourage justifications based on data type, target audience, and practicality. Introduce additional data collection methods like questionnaires and online polls.	
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:** Handling Data
Class: B8	**Class Size:**	**Sub Strand:** Data

Content Standard: B8.4.1.1Select, 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:** B8.4.1.1.2 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 frequency tables for grouped and ungrouped data.	**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**	Begin with a simple question like "What is your favorite color?" and collect responses from learners. Show how to organize the responses into a frequency table, counting the number of times each color is chosen.	
PHASE 2: **NEW LEARNING**	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). 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." Provide learners with counters or small objects and ask them to create their own ungrouped data set (e.g., sorting the objects by color). Have them group the objects based on a certain criteria (e.g., size) and create a grouped data set. Discuss the difference in representation. Introduce the concept of a frequency table. Explain that it helps us organize and count data sets. Show learners an example of a frequency table with labeled columns (value/category, frequency). Provide a data set (e.g., ages of learners in the class) and guide learners in creating a frequency table. Explain how to determine the frequency of each data point and organize it in a table format. Solve an example together to ensure understanding. Example 1: Thirty bulbs were life-tested and their lifespan to the nearest hour are as follows:	Data sets (e.g., heights of learners, temperatures over a week, sales data) Graph paper

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).

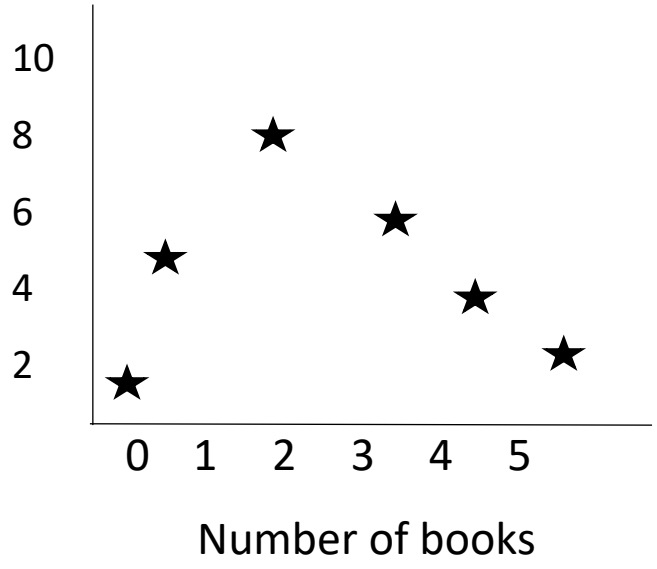
Introduce line graphs and their use in representing data trends over time or categories.

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.

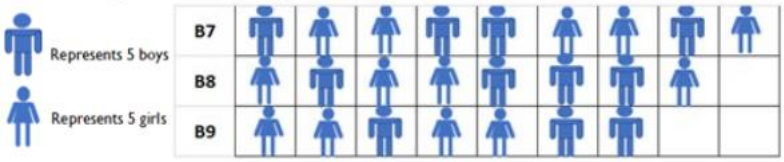
Number of Books	**Frequency**
0	2
1	5
2	8
3	6
4	4
5	3

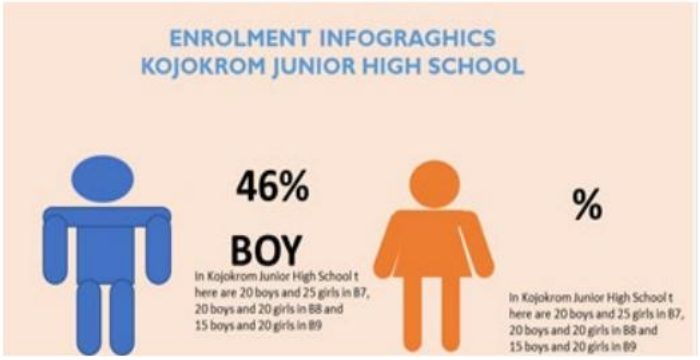
	 Guide learners to analyze the graph. • The line graph shows that most learners read between 1 and 3 books per month, with fewer learners reading 0 or 4 books. • This data can be used to discuss reading habits and preferences among learners. Have learners work in pairs or small groups to create their own frequency tables and line graphs using different data sets provided. Encourage them to choose data relevant to their interests or experiences (e.g., favorite sports, daily temperatures). Circulate to provide assistance and check understanding.	
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 11

Week Ending:	**DAY:**	**Subject:** Mathematics	
Duration: 60MINS		**Strand:** Handling Data	
Class: B8	**Class Size:**	**Sub Strand:** Data	
Content Standard: B8.4.1.1Select, 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:** B8.4.1.1.2 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**	Show learners pie charts and bar graphs representing data on topics relevant to them (e.g., favorite movie genres, preferred music styles). 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.	
PHASE 2: **NEW LEARNING**	Introduce stem and leaf plots as an alternative way to organize data, especially for ungrouped numerical data. 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. Distribute a sample ungrouped data set (prepared beforehand, see example below). Test Scores: 85, 78, 92, 88, 75, 82, 95, 80 Guide learners through creating a stem and leaf plot for the data set. Explain how to arrange the data points by their stems and leaves, providing a clear visual representation of the distribution of scores. 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. Introduce bar graphs as a way to visually compare different categories or values. Explain how bars represent the frequency or quantity for each category/value. Show an example of a bar graph with labeled categories/values on the x-axis and frequency/quantity on the y-axis.	Markers or pens Sample data sets

	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?). <u>Assessment</u> 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? Stem Leaf 16 | 4 5 17 | 1 1 2. The pictograph below describes the number of boys and girls in each class in Kojokrom Junior High School.  	

	 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.	
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:** Handling Data
Class: B8	**Class Size:**	**Sub Strand:** Data

Content Standard: B8.4.1.1Select, 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:** B8.4.1.1.3 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: • 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

	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. 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?). Encourage them to discuss the distribution of data points based on the histogram's shape. Show learners examples of real-life applications of histograms (e.g., distribution of test scores in a class, age ranges of movie viewers). Discuss how histograms help us visualize trends and patterns in data sets. 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?). Assessment E.g. 1- The waiting times, x minutes, for 60 patients at a certain clinic are as follows 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 i. Construct a frequency table using class intervals 0 – 10.5; 10.5 – 20.5; 20.5– 30.5, and so on. ii. Construct a frequency table using class intervals 0<x<10; 10<x<20; 20<x<30, and so iii. Draw a histogram and find the modal class	
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 12

Week Ending:	**DAY:**	**Subject:** Mathematics	
Duration: 60MINS		**Strand:** Handling Data	
Class: B8	**Class Size:**	**Sub Strand:** Data	
Content Standard: B8.4.1.2 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:** B8.4.1.2.1 - 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: • 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: **Overall, don't you think the teaching of mathematics is very good?** 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	Counters, bundle and loose straws base ten cut square, Bundle of sticks

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. 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). Discuss how identifying bias helps us evaluate the credibility of data sources.	
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:** Handling Data
Class: B8	**Class Size:**	**Sub Strand:** Data

Content Standard: B8.4.1.2 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:** B8.4.1.2.2 Organise and analyse 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**	Present a data set with descriptive statistics already calculated (e.g., minimum, maximum, mean test scores for a class). 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.	
PHASE 2: **NEW LEARNING**	Show learners an unorganized data set (e.g., a list of random numbers representing test scores). Ask them why organizing the data is important before analyzing it. Discuss the benefits of using frequency tables or ordering data from least to greatest. Introduce the concepts of minimum (smallest value) and maximum (largest value) in a data set. Show learners how to identify these values in an ordered data set or frequency table. Define the range as the difference between the maximum and minimum values. Explain how it shows the spread of data points. Guide learners through calculating the range for a data set. Introduce the mean (average) as a measure of central tendency, representing the sum of all values divided by the number of values. Show learners how to calculate the mean for a data set using a formula or a calculator 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.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	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. <u>Assessment</u> 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) i. The minimum lifespan, to the nearest hour, of the bulbs tested. ii. The maximum lifespan, to the nearest hour, of the bulbs tested. iii. The range of the data collected from the life-testing. iv. What is the mean lifespan of the bulbs? v. What is the median of the lifespan of the bulbs? vi. What is the mode of the lifespan of the bulbs? vii. 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.	

Week Ending:	**DAY:**	**Subject:** Mathematics
Duration: 60MINS		**Strand:** Handling Data
Class: B8	**Class Size:**	**Sub Strand:** Data

Content Standard: B8.4.1.2 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:** B8.4.1.2.3 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**	Present a number line with several data points marked and one point significantly far away from the others. Ask learners if this point seems unusual compared to the rest of the data. Introduce the concept of outliers as extreme values that fall outside the overall pattern of a data set.	
PHASE 2: **NEW LEARNING**	Distribute a data set with a clear outlier: Test Scores: 78, 85, 92, 80, 100 (outlier), 88, 75 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. Explain that the mean (average) is sensitive to outliers. Calculate the mean for the data set with and without the outlier Revisit the concept of the median as the middle value when data is ordered from least to greatest. Calculate the median for the data set with and without the outlier. Demonstrate how the median is less affected by the outlier compared to the mean. Remind learners that the mode is the most frequent value. Identify the mode for the data set with and without the outlier. 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. • Mean is sensitive to outliers and can be misleading if outliers are • present. • 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.	Counters, bundle and loose straws base ten cut square, Bundle of sticks

	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: i. 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 ii. 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. iii. 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.	

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