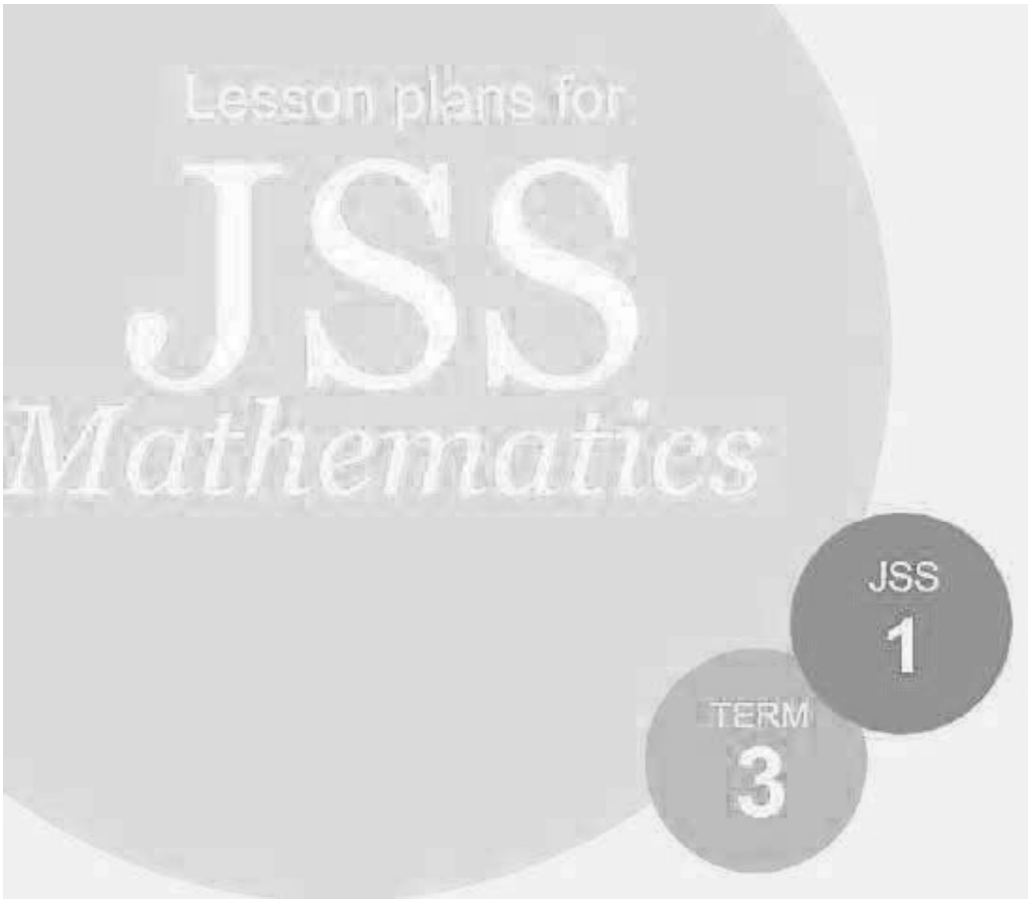
JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3



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JSS2 Term 3	JSS1 resources for JSS2
Lessons 110 – 115 (JSS2 PHB) Number patterns ***(covered in Term 2)***	**TERM 3, TOPIC PROGRESS CHART 1** Lesson 106 to 108 (JSS1 PHB)
Lessons 116 – 120 (JSS2 PHB) Algebra (expand, factorise, substitute)	**TERM 3, TOPIC PROGRESS CHART 2, 3 & 4** Lesson 109 to 118 (JSS1 PHB)
Lessons 121 – 130 (JSS2 PHB) Linear equations	**TERM 3, TOPIC PROGRESS CHART 5** Lesson 119 to 120 (JSS1 PHB)
Lessons 131 – 135 (JSS2 PHB) Cartesian Plane	**TERM 3, TOPIC PROGRESS CHART 6** Lesson 121 to 125 (JSS1 PHB)
Lessons 136 – 137 (JSS2 PHB) Data, tables	**TERM 3, TOPIC PROGRESS CHART 7** Lesson 126 to 127 (JSS1 PHB)
Lessons 138 (JSS2 PHB) Bar charts	**TERM 3, TOPIC PROGRESS CHART 8** Lessons 128 to 129 (JSS1 PHB)
Lessons 139 (JSS2 PHB) Line graphs	**TERM 3, TOPIC PROGRESS CHART 9** Lessons 130 to 131 (JSS1 PHB)
Lessons 140 (JSS2 PHB) Interpreting charts and graphs	**TERM 3, TOPIC PROGRESS CHART 11** Lessons 134 to 135 (JSS1 PHB)
Lessons 141 to 144 (JSS2 PHB) Mean, median, mode, range	**TERM 3, TOPIC PROGRESS CHART 12** Lessons 136 to 137 (JSS1 PHB)
Lessons 144 to 146 (JSS2 PHB) Pie charts	**TERM 3, TOPIC PROGRESS CHART 10** Lessons 132 to 133 (JSS1 PHB)
Lessons 147 to 148 (JSS2 PHB) Stem diagrams	*Not covered in JSS1*
Lessons 149 to 150 (JSS2 PHB) Statistics	**TERM 3, TOPIC PROGRESS CHART 13** Lessons 138 to 140 (JSS1 PHB)

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Topic 1: Number patterns M-07-106 to M-07-108 p2 – 9

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 2 – 9.

Check that you can	**Do you understand these words?**
* complete simple number patterns	Arithmetic pattern; term; sequence; common difference

CONCEPTS:

* When a list of numbers is created using a pattern, we call it a **sequence.**
* In an **arithmetic sequence** of numbers, we add the same number each time to get the next **term** (number).

Example: **2, 5, 8, 11, 14 …** follows the rule: "add 3 to get the next term".
3 is the **common difference** for the sequence.

* Any list of **multiples** of a number is an arithmetic sequence.

Example: 4, 8, 12, 16, 20 …

* A sequence has a **rule** that it follows. To complete a number sequence, we identify the rule used.

Example: **1, 5, 9, 13 …** follows the rule: "add 4 to get the next term".
So the next 4 terms will be 17, 21, 25, 29.

* We can also find the **missing terms** in a sequence using the rule.

Example: **–13, –8, ____, 2, 7, ___.**
The rule is "add 5 to get the next term", so the missing terms are **–3** and **12.**

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JSS1 Mathematics Topic Progress Chart

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Topic 1: Number patterns

Exercise

1. Which of the following are arithmetic sequences?
   - A. 10, 25, 40, 55, 70
   - B. 7, 14, 21, 28, 35
   - C. 33, 29, 25, 21, 17, 13
   - D. 200, 190, 170, 140, 100

2. If an arithmetic pattern starts with 3 and has a common difference of 5, what is the second term? What is the third term?

3. Identify the rule in the pattern: 44, 38, 32, 26.
4. Write an arithmetic pattern with a common difference of 3.

5. Write the next 4 terms of the arithmetic pattern: 11, 14, 17, _____, _____, _____, _____.
6. Find the missing terms: 74, 70, _____, _____, _____, 54, 50.

7. Find the first 3 terms: _____, _____, _____, 24, 30, 36.
8. Find the missing terms: –2, –9, _____, –23, –30, _____,–44.
9. Find the next 3 terms: 620, 640, 680, _____, _____, _____.
10. An arithmetic sequence starts with –4 and has a common difference of 3. Write the first 5 terms of the sequence.

Check your answers:

1. A, B and C are arithmetic sequences. D. is not.
2. second term is 8 (from 3 + 5); third term is 13 (from 8 + 5)
3. The rule is to **subtract 6** to get the next term.
(44 – 38 = 6; 38 – 32 = 6; 32 – 26 = 6)
4. Your pattern can start at any number and you must add 3 to get the next term (number).
5. The rule is add 3, so the next terms are 20, 23, 26, 29.
6. The rule is subtract 4, so missing terms are 66, 62, 58.
7. The common difference is 6, so first 3 terms are 6, 12, 18.
8. Subtract 7 each time so we get
–2, –9, **–16**, –23, –30, **–37,** –44
9. Add 20 each time, so the next 3 terms are 700, 720, 740.
10. –4; –1; 2; 5; 8.

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Topic 2: Intro to Algebra M-07-109 to M-07-112 p10 – 18

Check that you can
* find a missing value in a linear equation?
Example: If $3x + 15 = 0$, find the value of x.

Do you understand these words?
equation; variable; constant; coefficient; substitute.

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 10 – 18.

CONCEPTS:

* Any letter in an algebraic expression or equation is a **variable.**
* A variable is an **unknown value** in place of a missing number. It represents the number.
* To solve for a variable, we want to get the variable on its own on one side of the equals sign in the equation.
* A number multiplied by a variable is called the **coefficient** of the variable.

Examples:

In $4a$, 4 is the coefficient of a. $4a$ means $4 \times a$, or $a + a + a + a$

If $n - 2 = 10$,
we can get n on its own by adding 2 to both sides (to keep the equation balanced)
$n - 2 + 2 = 10 + 2$
$n = 12$

If $2x = 6$, we can divide both sides of the equation by 2.

$$\frac{2x}{2} = \frac{6}{2}$$

So $x = 3$.

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JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 2: Intro to Algebra

Exercise

1. Find the value of the variable in the equations:
   a. $p + 2 = 7$
   b. $3 - q = 4$
   c. $a - 8 = 9$
   d. $6 - x = 0$
   e. $6 - z = 5$
   f. $n - 7 = 16$
   g. $k + 7 = 15$
   h. $36 - 17 = x$
   i. $8 + m = 0$

2. Identify the variables, constants and coefficients in each algebraic expression:
   a. $4x + 2y - 3z$
   b. $3m - n + 4$
   c. $x - 1$
   d. $\frac{1}{2}k - \frac{1}{4}y$

3. Simplify and identify the coefficient:
   a. $9 \times b$
   b. $c + c + c$
   c. $t + t + t + t + q + q$
   d. $15z$

4. Solve for the variable:
   a. $6q = 3 + 9$
   b. $2 \times k = 6 + 4$
   c. $5 \times t = 6 + 19$

Check your answers:

1a. $p = 5$
b. $q = -1$
c. $a = 17$
d. $x = 6$
e. $z = 1$
f. $n = 23$
g. $k = 8$
h. $x = 19$
i. $m = -8$

2a. x, y, z are variables;
4, 2, –3 are coefficients
b. m, n are variables;
3 and –1 are coefficients;
4 is a constant.
c. x is the variable;
1 is the coefficient of x;
–1 is a constant.
d. k and y are variables;
½ and –¼ are coefficients.

3a. $9b$; coefficient is 9
b. $3c$; coefficient is 3
c. $4t + 2q$; coefficients are 4 and 2
d. coefficient is 15

4a. $6q = 12$, $q = 2$
b. $2k = 10$, $k = 5$
c. $5t = 25$, $t = 5$

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 3: Simplifying algebraic expressions M-07-113 to M-07-115 p19 – 25

Check that you can:
* identify the number of terms in an algebraic expression

VOCABULARY:
like terms; simplify; algebraic expression; combine like terms

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 19 - 25.

CONCEPTS:

* In an algebraic expression, the terms are separated by + or –.
  Example:
  $3x + 2y - 1$ has 3 terms.

* Unlike terms cannot be combined.
  $3x$, $2y$ and 1 are unlike terms
  Think of 3 rulers, 2 pens and 1 pencil – you can't add them and get 6 ruler-pen-pencils!.

* $3x + 4x - 3y$ has two **like terms**, $3x$ and $4x$. They can be added.
  There are 3 x's and another 4 x's. Together there are 7 x's.
  The negative 3y cannot be simplified.
  $3x + 4x - 3y = 7x - 3y$

* We can **simplify algebraic expressions** by adding or subtracting like terms:
  $2x + 3x = 5x$

* Check this by writing out the repeated addition
  $2x + 3x = (x + x) + (x + x + x) = 5x$

Examples:

$4ab + 3a + 2ab - a$

$= 4ab + 2ab + 3a - a$ → collect like terms

$= (4 + 2)ab + (3 - 1)a$ → add/ subtract coefficients

$= 6ab + 2a$ → combine like terms

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JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 3: Simplifying algebraic expressions

Exercise

1. Here is a list of terms:

   $3p \quad 7r \quad 5 \quad r \quad q \quad 2p \quad 2q \quad 8 \quad 5q \quad 7q$

   True or false:

   a. $3p$ and $2p$ are like terms.
   b. $2p$ and $2q$ are like terms.
   c. $7r$ and $7q$ are like terms.
   d. r and q are like terms.
   e. r and $7r$ are like terms.
   f. q, $2q$, $5q$ and $7q$ are like terms.
   g. 5 and 8 are not terms.
   h. 5 and $5q$ are like terms.
   i. 5 and 8 are constant like terms.
   j. q and $5q$ are not like terms.

2. Identify the like terms in each algebraic expression:

   a. $p + 3 - 3p - 8$
   b. $7m + 7n - 9m - 2n$
   c. $7 - 7k + 7p + 6p - k$

3. Choose the correct answer:

   a. $5x + 2x =$ A. $10x$ B. $7x$
   b. $9m - 3m =$ A. $6m$ B. $3m$
   c. $8b - 10b =$ A. $2b$ B. $-2b$
   d. $7q - 6q =$ A. q B. 1

4. Simplify the expressions by combining like terms:

   a. $3p + 7p$
   b. $2q - q + 1$
   c. $2ab + a + 15 - 3ab - 5a - 10$
   d. $7r - 7q + r - q$
   e. $20x - 30x$
   f. $10x - 5y + 2y - 9x$

Check your answers:

1a. True. They have the variable p.
b. False. The variables must be the same.
c. False. The variables must be the same.
d. False. The variables must be the same.
e. True. They have the variable r.
f. True. They have the variable q.
g. False. They are constant terms.
h. False. The variables must be the same.
i. True. They are constant with no variable.
j. False. They have the same variable q.

2a. p and $-3p$ are like terms.
3 and -8 are like terms
b. $7m$ and $-9m$ are like terms.
$7n$ and $-2n$ are like terms.
c. $-7k$ and $-k$ are like terms.
$7p$ and $6p$ are like terms.

3a. B b. A c. B d. A

4a. $10p$ b. $q + 1$
c. $-ab - 4a + 5$ d. $8r - 8q$
e. $-10x$ f. $x - 3y$

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Topic 4: Multiplying, dividing and factorising M-07-116 to M-07-118 p26 – 31

Check that you can:
* write algebraic expressions
* use BODMAS

VOCABULARY:
Factors; common factor

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 26 – 31.

CONCEPTS:

* **Multiplication**:

$3 \times 8 \times x$ means the same as $3(8x)$ and $3x.(8) = 24x$

$2(3x + 5) = 6x + 10$ → multiply each term in the bracket by 2

$-5(2a + 8) = -10a - 40$ → multiply each term by a *negative* 5

* **Division** has the opposite effect to multiplication.
Division and multiplication are inverse operations.

Examples:

1. If $2x \times 3 = 6x$, then $6x \div 2x = 3$
2. $-48ab \div 6 = \frac{-48ab}{6} = -8ab$
   Check your answer using multiplication:
   $-8ab \times 6 = -48ab$

Factorising:
To find the factors of $5x - 10$, look for **common** factors of the two terms.
5 is the common factor, so we can divide each *term* by 5 and use brackets to show the answer.
$5x - 10 = 5(x - 2)$
So 5 and $x - 2$ are the factors of $5x - 10$.

Example:
$7a - 14b + 21c = 7(a - 2b + 3c)$
7 and $(a - 2b + 3c)$ are the factors of $7a - 14b + 21c$.

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JSS1 Mathematics Topic Progress Chart

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Topic 4: Multiplying, dividing and factorising

Exercise

1. Simplify the algebraic expressions by multiplying:

a.	$2(4y)$	b.	$3(5abc)$	c.	$2(p + 3q - 2r)$
d.	$-2(2x + 1)$	e.	$-2(xy - 3)$	f.	$3(2x - y) + y$

2. Simplify by dividing:

a.	$36p \div 6$	b.	$9xy \div 9$	c.	$\frac{55}{11}xy$
d.	$-40z \div 4$	e.	$5k \div 1$	f.	$\frac{-32}{4}xy$
g.	$16a \div 2$	h.	$16a \div 2 - 2a$	i.	$-16a \div 2 - 2a$

3. a. What is a common factor of $3xy$ and 6?
   b. Factorise $3xy + 6$.

4. a. What is a common factor of $100p$ and -25?
   b. Factorise $100p - 25$.

5. Factorise the following:

a.	$3x + 12$	b.	$-3x + 12$
c.	$7k + 6$	d.	$6 + 3pq$
e.	$3a + 24b - 21c$	f.	$12k - 9m$
g.	$8r - 8q$	h.	$4x - 12y + 16z$

Check your answers:

1a. $8y$ b. $15abc$
c. $2p + 6q - 4r$ d. $-4x - 2$
e. $-2xy + 6$ f. $6x - 2y$

2a. $6p$ b. xy c. $5xy$
d. $-10z$ e. $5k$ f. $-8xy$
g. $8a$ h. $8a - 2a = 6a$
i. $-8a - 2a = -10a$

3a. 3 b. $3(xy + 2)$

4a. 25 or -25 d. $25(4p - 1)$

5a. $3(x + 4)$ b. $-3(x - 4)$
c. $7k + 6$ d. $3(2 + pq)$
e. $3(a + 8b - 7c)$ f. $3(4k - 9m)$
g. $8(r - q)$ h. $4(x - 3y + 4z)$

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Topic 5: Linear equations M-07-119 to M-07-120 p30 – 31

Check that you can:
* recognize a linear equation

VOCABULARY:
linear equation; transposition; balancing

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 30 – 31.

CONCEPTS:

* An equation has two sides with an equals sign between them.
* **Linear equations** only contain variables with a power of 1.
  So no exponents are used. They can be represented by a **straight line graph**.
* We can solve linear equations with one variable.

Method 1: Balancing

$3x + 5 = 14$ Get the variables on one side and the constant numbers on the other

$3x + 5 \mathbf{- 5} = 14 \mathbf{- 5}$ subtract 5 from both sides

$3x = 9$

$\frac{3x}{3} = \frac{9}{3}$ divide by 3 on both sides

$x = 3$

Method 2: Transposing

$3x + 5 = 14$ transpose 5 to the right side and change the sign

$3x = 14 - 5$

$3x = 9$

$x = 3$

Example with variables on both sides of the equation

$3x + 4 = 14 - 2x$ Get the variables on one side and the constant numbers on the other

$3x + 2x = 14 - 4$

$5x = 10$

$x = 2$

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JSS1 Mathematics Topic Progress Chart

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Topic 5: Linear equations

Exercise

1. Which of the following equations are linear?

   a. $2x + 5 = 10$ b. $3y - 10 = 5x$

   c. $x^2 - 9 = 0$ d. $t = r - 3$

2. Explain what is done in each step of the equation:

   a. $5x - 3 = 7 + 3x$

   $5x - 3 - 3x = 7 + 3x - 3x$ ← Subtract _____ from both sides

   $2x - 3 + 3 = 7 + 3$ ← Subtract _____ from both sides

   $\frac{2}{2}x = \frac{10}{2}$ ← Divide both sides by _____

   $x = 5$

   b.

   $3x - 6 = -2 + x$

   $3x - 6 - x = -2 + x - x$ ← _____ x from both sides

   $2x - 6 + 6 = -2 + 6$ ← _____ 6 to both sides

   $\frac{2}{2}x = \frac{4}{2}$ ← _____ both sides by 2

   $x = 2$

3. Solve the linear equations:

   a. $4x + 10 = 30$ b. $9 + 4x = -15$ c. $5 + 10x = -15$

   d. $25 = 46 - 3x$ e. $4x - 8 = 20$ f. $14 + 6x = 2$

   g. $10 = 7 - x$ h. $4 - x = 9 - 6x$ i. $5 + 2x = 35 + x$

   j. $2x - 3 = x - 2$ k. $2x - 4 = 12 - 2x$ l. $5x - 8 = 3x + 2$

Check your answers:

1a. linear b. linear

c. not linear d. linear

2a. Subtract **3*x*** from both sides; subtract **3** from both sides; divide both sides by **2.**

b. **Subtract** x from both sides; **add** 6 to both sides; **divide** both sides by 2.

3.

a. $4x = 20$, $x = 5$ b. $4x = -24$, $x = -6$

c. $10x = -20$, $x = -2$ d. $3x = 21$, $x = 7$

e. $4x = 28$, $x = 7$ f. $6x = -12$, $x = -2$

g. $3 = -x$, $x = -3$ h. $-x = 5 - 6x$, $5x = 5$, $x = 1$

i. $2x = 30 + x$, $x = 30$ j. $2x - 3 = x - 2$, $2x - 1 = x$, $-1 = -x$, $x = 1$

k. $2x = 16 - 2x$, $4x = 16$, $x = 4$ l. $2x - 8 = 2$, $2x = 10$, $x = 5$

JSS1 Mathematics Topic Progress Chart

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Topic 6: Cartesian plane M-07-121 to M-07-125 p38 – 55

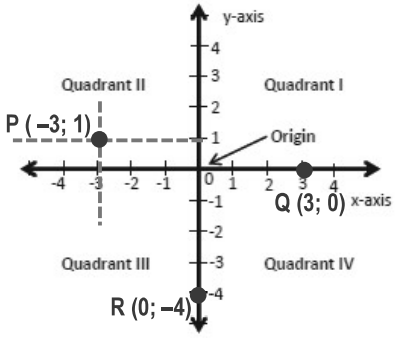
Check that you can:
* work with number lines

VOCABULARY:
Cartesian plane; coordinates; x-coordinate; y-coordinate; ordered pair; x-axis, y-axis (plural of axis is *axes*); quadrant.

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 38 – 55.

CONCEPTS:

* The Cartesian plane is a plane (flat surface) created from two perpendicular number lines that intersect at 0. The axes are numbered in equal intervals.



* x-axis is the horizontal axis; y-axis is the vertical axis

Each point on the Cartesian plane has an x-coordinate and a y-coordinate
P (–3; 1) is a point with $x = -3$ and $y = 1$
Q (3; 0) is on the x-axis because $y = 0$
R (0; –4) is on the y-axis because $x = 0$

To plot a point, make a vertical line from the x-value on the axis and a horizontal line from the y-value on the axis. Where they meet, plot the point.

In Quadrant 1, x is +ve and y is +ve
In Quadrant 2, x is –ve and y is +ve
In Quadrant 3, x is –ve and y is –ve
In Quadrant 4, x is +ve and y is –ve

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JSS1 Mathematics Topic Progress Chart

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Topic 6: Cartesian plane

Exercise

1. Match the terms that have the same meaning.

1. Cartesian plane	A. vertical axis
2. x-axis	B. (3; 1)
3. y-axis	C. horizontal axis
4. origin	D. coordinate plane
5. ordered pair	E. (0; 0)

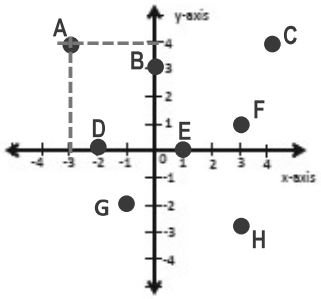
2. In which quadrant is each of the following points:

   a. (–2; –3) b. (–2; 3) c. (2; 3) d. (2; –3)

3. On which axis is each of the following points:

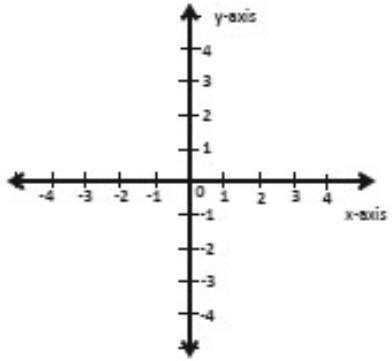
   a. (–4; 0) b. (0; 4) c. (4; 0) d. (0; –4)4

   R (0; –4)

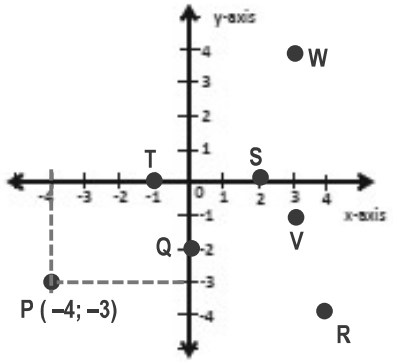
4. 

5. Plot and label these points on the Cartesian plane:

   P (–4; –3) Q (0; –2) R (4; –4) S (2; 0) T (–1; 0) V (3; –1) W (3; 4)



Check your answers:

1. 1-D; 2-C; 3-A; 4-E; 5-B.
2. a. Quadrant IV b. Quadrant II
   c. Quadrant I d. Quadrant III
3. a. (negative) x-axis
   b. (positive) y-axis
   c. (positive) x-axis
   d. (negative) y-axis
4. A (–3; 4) B (0; 3) C (4; 4) D (–2; 0)
   E (1; 0) F (3; 1) G (–1; –2) H (3; –3)
5. 

JSS1 Mathematics Topic Progress Chart

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Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 7: Data & tallies M-07-126 to M-07-127 p56 –62

Check that you can:
* know what data is

VOCABULARY:
data; tally; tally table; pictogram

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 56 – 62.

CONCEPTS:

* Data is just information, usually information that can be measured or counted. We collect data about chosen topics using numbers or measurements.
* We use tallies (marks or strokes) to help us count the number of pieces of data. We group the tallies in fives to make it easier to count them:

This is 4 tallies: ////. Then we show the 5th tally like this: 𝍸

Example 1:

A pupil receives these marks on her weekly tests:
Mathematics 14, English 10, Social Studies 13, French 19, Business Studies 8 and Integrated Science 11.

Tally table of her marks

Mathematics	English	Social Studies	French	Business Studies	Integrated Science
𝍸 𝍸 ////	𝍸 𝍸	𝍸 𝍸 ///	𝍸 𝍸 𝍸 ////	𝍸 ///	𝍸 𝍸 /

Each block in the **pictogram** represents 2 marks.

For Pictogram:

Mathematics =
English =
Social Studies =
French =
Business studies =
Integrated Science =

Example 2:

20 pupils are each asked to give the **number of sisters** they have. The data is collected as follows:
Michael (4), Issa (4), Janet (5), Abass (3), Jane (1) Idrissa (2) and Fanta (1).

Tallies of number of sisters:
Michael //// Issa //// Janet //// Abass ///
Jane / Idrissa // Fanta /

Pictogram of number of sisters = 1 sister

Michael
Issa
Janet
Abass
Jane
Idrissa
Fanta

Ready to work with pupils.

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 7: Data and tallies

Exercise

1. In a small class, pupils voted for their favourite subject. Complete the tally chart and the pictogram. In the pictogram, use one picture to represent two people.

Subject	Tally marks	Number of pupils
Mathematics		6
English Language		10
Social Studies	𝍸 𝍸 𝍸	
Integrated Studies	𝍸 ////	
Total		

Mathematics

English

Social Studies

Integrated Studies

2. The ages of 15 pupils were recorded as follows: *(Note: not the same numbers as used in PHB)*

13, 15, 14, 13, 11, 15, 13, 13, 15, 14, 16, 12, 13, 11, 11.

Complete the tally table for this data:

Age	Tally marks	Number of pupils
11		
12		
13		
14		
15		
16		
	Total	

3. The marks obtained by pupils in a Social Sciences test (out of 20) are listed below. Organise the data in a table with columns for Marks, Tally and Number of pupils.

14, 20, 17, 15, 14, 14, 20, 14, 14, 15, 14, 19, 19, 15, 14, 15, 16, 15, 20, 15, 14, 14, 15, 14, 15.

Check your answers:

1.

Subject	Tally marks	Number of pupils
Mathematics	𝍸 /	6
English Language	𝍸 𝍸	10
Social Studies	𝍸 𝍸 𝍸	**15**
Integrated Studies	𝍸 ////	**9**
Total		**40**

Mathematics

English

Social Studies

Integrated Studies

2.

Age	Tally marks	Number of pupils
11	///	3
12	/	1
13	𝍸	5
14	//	2
15	///	3
16	/	1
	Total	15

3.

Mark	Tally	No of pupils
14	𝍸 𝍸	10
15	𝍸 ///	8
16	/	1
17	/	1
18		0
19	//	2
20	///	3

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 8: Bar charts M-07-128 to M-07-129 p63 – 69

Check that you can:
* represent data with tallies in a table.

VOCABULARY:
frequency; frequency table; bar chart

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 63 – 69.

CONCEPTS:

A **bar chart** has rectangular bars of equal width.
The height of each bar is equal to the number of items (called the **frequency**) being represented.
A bar chart needs a title, labels for the x-axis and the y-axis (frequency) and equal intervals between numbers.

Example:

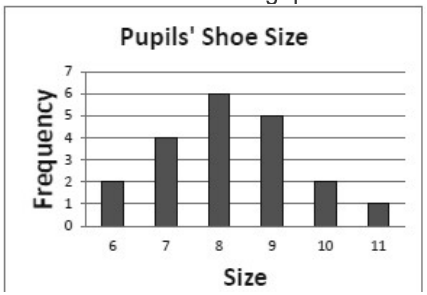
The following are sizes of shoes worn by 20 pupils:

7, 9, 6, 10, 8, 8, 9, 11, 8, 7, 9, 6, 8, 10, 9, 8, 7, 7, 8, 9.

Make a frequency table.

Shoe size	Tally	Frequency
6	//	2
7	////	4
8	///\ /	6
9	///\	5
10	//	2
11	/	1
Total		**20**

- The **bar chart** needs to have 6 bars, one for each shoe size.
- The **frequency** on the y-axis is the number of pupils for each shoe size. It shows the height of each bar.
- The possible sizes are on the x-axis.
- The chart needs a title.
- Make sure there are gaps between the bars.



Read the bar chart to see that the most common shoe size is 6; only 1 pupil takes a size 11 shoe.

Ready to work with pupils.

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

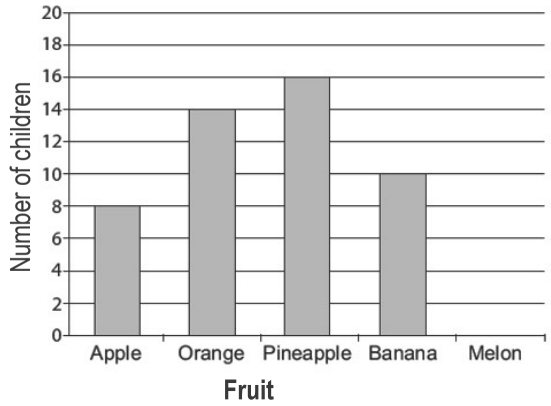
Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 8: Bar charts

Exercise

1. Aminata asks some children to name their favourite fruit. This is her bar chart.

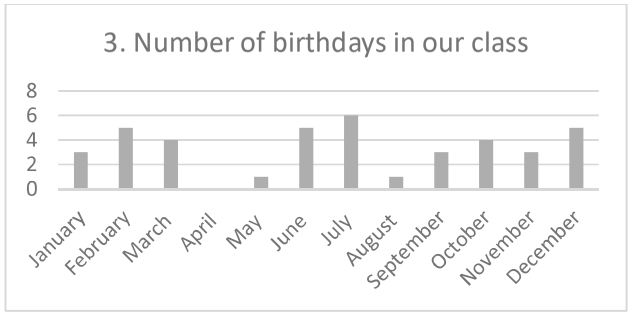
   a. If 7 children chose melon, complete the bar to show this.



   b. How many children did Aminata ask altogether?

2. The table shows the number of rainy days in Freetown, Sierra Leone every month of 2018. Draw a bar chart to show this. Remember to include labels and axes.

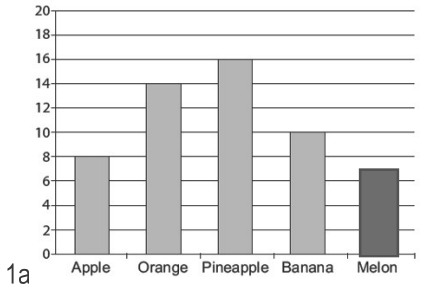
Month	January	February	March	April	May	June	July	August	September	October	November	December
Number of days when it rained	2	1	6	10	19	27	30	30	29	28	20	4



3. Use the birthday graph to answer the questions:

   a. Which month has the most birthdays?
   b. How many birthdays are there in December?
   c. In which two months is there only 1 birthday?
   d. How many birthdays are there in April?
   e. Are there more birthdays in the first half of the year, or in the second half of the year?

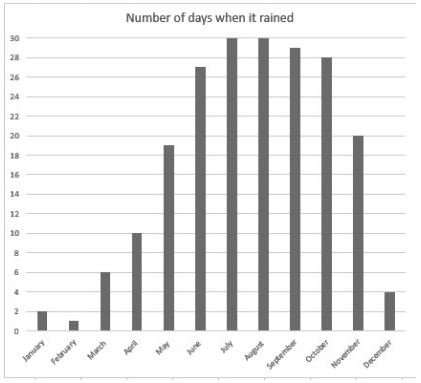
Check your answers:



1a

b. 8 + 14 + 16 + 10 + 7 = 55 children

2.



3a. July

b. 5

c. May and August

d. None

e. There are 22 birthdays in the second half of the year and 18 in the first half.

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)
Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 9: Line graphs M-07-130 to M-07-131 p70 – 76

Check that you can:
* plot points for a graph

VOCABULARY:
frequency; frequency table; line graph

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 70 – 76.

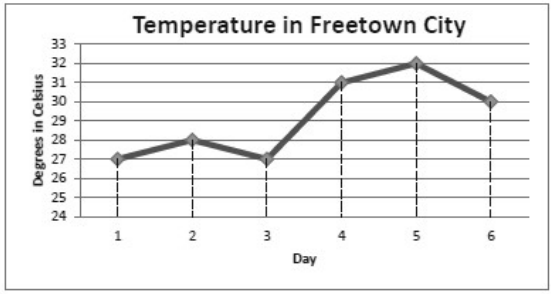
CONCEPTS:

A **line graph** is useful for data that has changed over time.
We can plot points and join them with line segments.
Example:
The table below shows daily temperatures for Freetown City, recorded for 6 days in degrees Celsius.

Temperature in Freetown City

Day	1	2	3	4	5	6
Temperature (°C)	27	28	27	31	32	30

Start the y-axis at about 24 and go up to 34.
There will be 6 plotted points, one for each day's temperature.
Label the x-axis with the Number of the Day.
Intervals between marks must be equal using the **scale** of each axis.
The plotted points can be joined because the lines show the **change in temperature over time** between the points.



We can also read information off a given line graph. For example, the temperature on Day 5 is the hottest at 32°C; the first three days have lower temperatures than the next three days.

Ready to work with pupils.

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

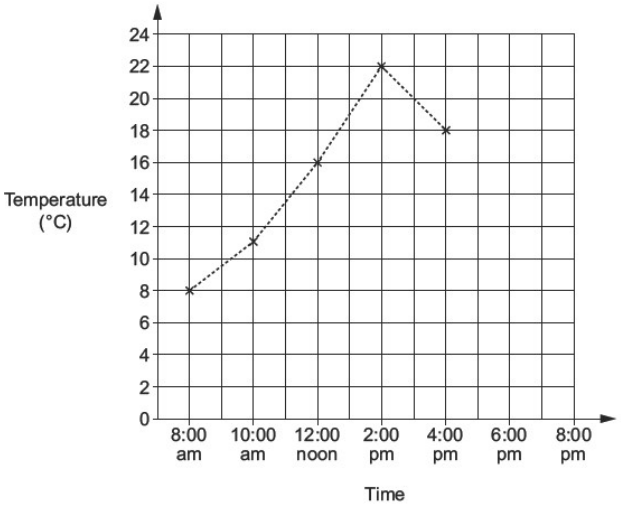
Topic 9: Line graphs

Exercise

1. The temperature in a greenhouse was measured every two hours.

Time	Temperature (°C)
8:00 am	8
10:00 am	11
12:00 noon	16
2:00 pm	22
4:00 pm	18
6:00 pm	15
8:00 pm	10

a. Plot the missing data on the line graph:



b. What is being measured?

c. What is on the horizontal axis?

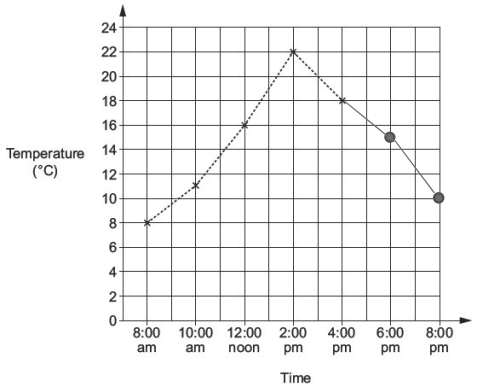
d. Estimate the temperature at 1 pm and at 7 pm (in °C).

e. What is the difference in the temperature at 8 am and at 8 pm?

f. What is the difference between the highest temperature and the lowest temperature?

Check your answers:

1a.



b. The change in temperature in a greenhouse.

c. Time intervals from 8 am to 8 pm.

d. At 1 pm, it is about 19°C.

At 7 pm it is about 12°C.

e. 10°C – 8°C = 2°C.

f. 22°C – 8°C = 14°C

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 10: Pie charts and comparing graphs M-07-132 to M-07-133 p77 – 84

Check that you can:
* find percentage of a number

VOCABULARY:
Pie chart; sector; percentage

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 77 – 84.

CONCEPTS:

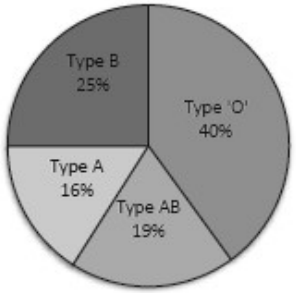
A **pie chart** is a circle with sectors (slices) that represent the data.
Each sector is a fraction of the whole.

Example:
* This pie chart shows the percentage of blood types for 200 pupils.
* The percentages add up to 100%, which is the whole pie.
* 19% of pupils have Blood Type AB.

To calculate the number of pupils from this,

$\frac{19}{100} \times 200 = 38$ pupils

Blood Types of 200 Pupils



Comparing graphs and charts
* When the data changes over time, use the **line graph.**

* When the categories of data are clearly separate (e.g marks for different subjects), the **bar chart** is best.

* When the relationship to the whole is important, use a **pie chart.**

Ready to work with pupils.

JSS1 Mathematics Topic Progress Chart

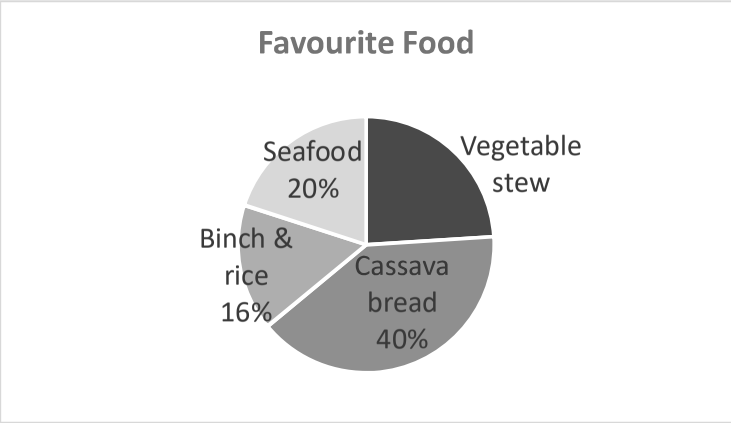
for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 10: Pie charts and comparing graphs

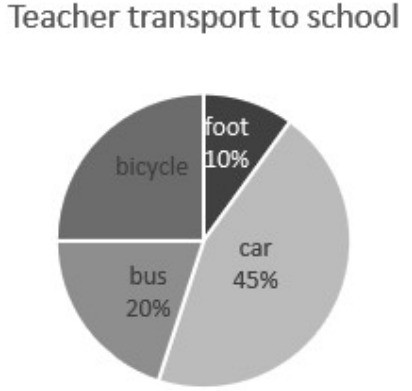
Exercise

1. In a survey, 75 people were asked to vote for their favourite food from the list given to them. The pie chart below shows the results of the survey.



a. Which food is the most popular?
b. Which food has half as many votes as the cassava bread?
c. What percentage of people voted for the vegetable stew?
d. How many people voted for the binch and rice?
e. How many people chose seafood?
f. Use your answer to e. to find the number of people who chose cassava bread.

2. The pie chart below shows what percentage of 60 teachers use what transport to get to school.



a. Which type of transport is used by most teachers?
b. What percentage of teachers go to school by bicycle?
c. What is the difference between the percentages of teachers that use cars and walk?
d. How many teachers go to school by bus?
e. How many teachers do not walk to school?
f. How many teachers use cars to get to school?

Check your answers:

1a. Cassava bread
b. Seafood
c. 100 – 76 = 24%
d. $\frac{16}{100} \times 75 = 12$ people
e. $\frac{20}{100} \times 75 = 15$
f. Double 15 is 30.

2a. Cars
b. 100 – 75 = 25%
c. 45 – 10 = 35%
d. $\frac{20}{100} \times 60 = 12$
e. Teachers that walk: $\frac{10}{100} \times 60 = 6$
So 60 – 6 = 54 teachers who do not walk to school.
f. Teachers that use a car: $\frac{45}{100} \times 60 = 27$

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 11: Community Survey M-07-134 to M-07-135 p85 – 91

Check that you can:
* make and use a tally table
* display data with a bar or chart

VOCABULARY:
community: survey; data collection; occupation

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 85 – 91.

CONCEPTS:

* We can use a **survey** to ask important questions in the community; **collect** the data; **organize** it and **represent** it with a graph or chart and then **analyze** the results.

Example: (adjusted from LMP)

A class **collects data** about the work that their parents do.

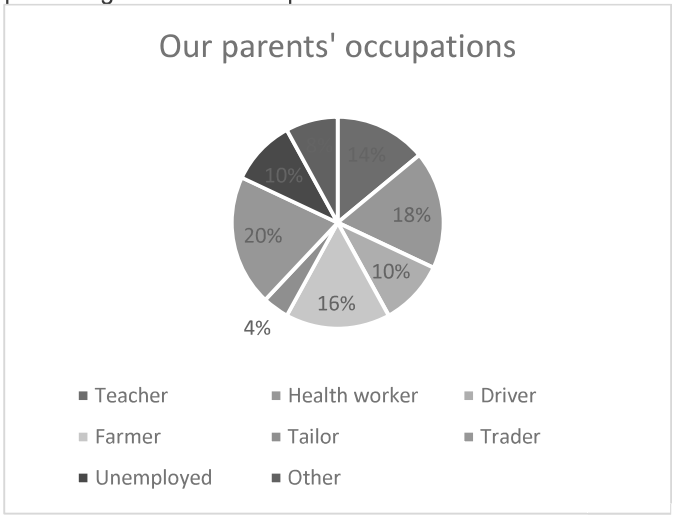
In the **survey**, they limit the choices to 8 common occupations and "other" to make it easier to record the data.

They count the **tallies** and organize their data in a **table**:

Work	Number
Teacher	7
Health Worker	9
Driver	5
Farmer	8
Tailor	2
Trader	10
Unemployed	5
Other	4
Total	**50**

They represent the data using a **bar chart.**

They also represent the data using a **pie chart** to compare percentages of each occupation with the whole.



They notice that there are more parents in trade, health work, farming and teaching than other work.

Ready to work with pupils.

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 11: Community survey

Exercise

1. Two friends living in a small village in the Kono district collected data from their local clinic about the number of patients seen in the month of August. The total population of the village is 150 people.

This table shows their findings.

August patient numbers	
Babies up to 2 years	9
Children up to 12 years	4
Men and women up to 60 years	11
Men and women older than 60 years	3

a. What kind of graph can they use to represent this data?
b. Draw the graph/chart. Give the graph a title and label both axes.
c. Use the graph to analyse your results, noting the age category of the highest and lowest number of patients, the total number of patients seen and any other observations you can make.
d. How many people in the village did not attend the clinic in August?

2. The two friends also collected data about the total number of patients seen in the second half of the year, from July to December. The table below shows their data.

Month	July	August	September	October	November	December
Number of patients seen	24	27	36	27	16	10

a. What kind of graph can they use to represent this data?
b. Draw the graph/chart. Give the graph a title and label both axes.
[Hint: Let the frequency axis start at 10 and use intervals of 2 up to 36 or 38].
c. Use the graph to analyse your results. Make at least 3 or 4 observations about the data.

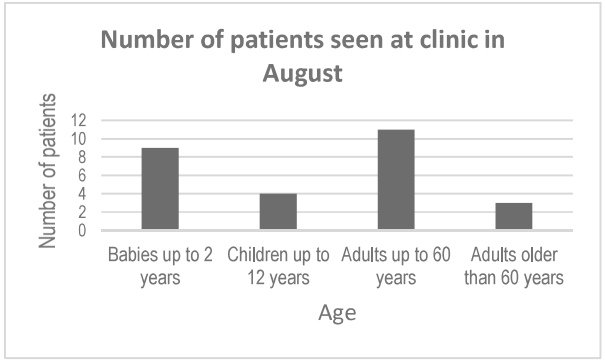
Answers continued:

2c. The most patients attended clinic in September (36) and the least number of patients attended clinic in December. The numbers for August and October are the same (27). The difference between the highest number and the lowest number of Patients per month is 36 – 10 = 26.

Check your answers:

1a. The best graph to show categories is a bar graph. The data is not changing over time.

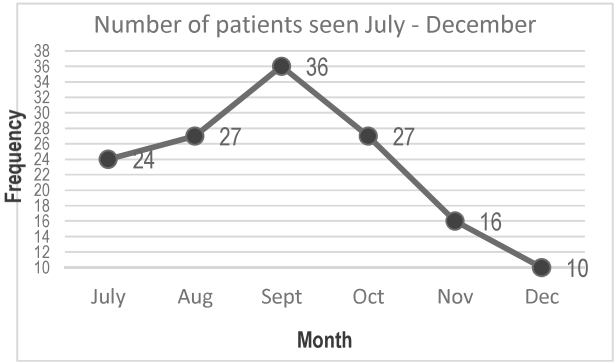
b.



c. The highest number of patients were adults up to 60 years old (11), followed by babies (9). The least number of patients were over 60 (3). In August, 27 patients were seen. The low number of children seen (4) might show that the children are mostly healthy. The low number of older patients might show that there are fewer old people in the village. It is unknown without more data.

d. 150 – 27 = 123 people

2a. A line graph to show how the numbers change over the months.



JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 12: Mean, median, mode and range M-07-136 to M-07-137 p92 – 97

Check that you can:

- understand how to collect and record data
- make a chart or bar to represent the data.

VOCABULARY:

mean, median, mode, measures of central tendency, range – measure of spread of the data

Refer to JSS1 Pupil's Handbook (PHB) pages 92 – 97 and the Lesson Plan Manual.

CONCEPTS:

* We can find different kinds of average or middle of the data.

Example: We use the ages of 5 children

9, 6, 6, 13, 15

* **Mean** = sum of all data values / number of data values = (6+6+9+13+15) / 5

= 49 ÷ 5 = 9.8

The mean average of the ages is 9.8 years.

* **Median**: the middle value (in the middle place) when the data is ordered.

6; 6; **9;** 13; 15

The median of the ages is 9.

Note: If there are 2 middle values, add them and divide by 2 to find the median.

Example:

6; 6; **9; 11;** 13; 15

(9 + 11) = 20 and 20 ÷ 2 = 10

The median is 10.

* **Mode**: the value that appears most often.

6; 6; 9; 13; 15

6 is the mode

The mean, median and mode are called *measures of central tendency* – they locate the approximate **middle** of the data.

* The **range** of the data tells you how spread out the data is

Range = highest value – lowest value = 15 – 6 = 9

Ready to work with pupils.

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 12: Mean, median, mode and range

Exercise

1. The ages of 7 friends are: 6 7 7 8 9 11 12.
   Find the mean, median, mode and range of their ages.

2. The table shows the number of rainy days in Freetown, Sierra Leone every month of 2018.

Month	January	February	March	April	May	June	July	August	September	October	November	December
Number of days when it rained	2	1	6	10	19	27	30	30	29	28	20	4

   a. Find the mean number of days of rainfall in a month over 2018.
   b. Find the median number of days of rainfall in a month over 2018.
   c. What is the mode of this data?
   d. What is the range of this data?

3. The table below shows daily temperatures for Freetown City, recorded for 6 days in degrees Celsius.

Temperature in Freetown City

Day	1	2	3	4	5	6
Temperature (°C)	27	28	27	31	32	30

   a. Find the mean temperature for these 6 days.
   b. Find the median temperature for these 6 days.
   c. What is the mode of these temperatures?
   d. What is the range of these temperatures?

Check your answers:

1. Mean = $\frac{6 + 7 + 7 + 8 + 9 + 11 + 12}{7} = 8.6$

Median is 8 years

Mode is 7 years

Range is 12 – 6 = 6 years

2a. mean = $\frac{2+1+6+10+19+27+30+30+29+28+20+4}{12}$

$= 206 = 17.2$ days

b. median

Order the data first:

1 2 4 6 10 19 20 27 28 29 30 30

(19 + 20) ÷ 2 = 19.5 days

c. mode is 30

d. range is 30 – 1 = 29

3a. mean = $\frac{27 + 28 + 27 + 31 + 32 + 30}{6}$

$= 175 \div 6 = 29.2°C$

b. median

ordered data: 27 27 28 30 31 32

(28 + 30) ÷ 2 = 29°C

c. mode is 27°C

d. range is 32 – 27 = 5°C

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 13: Statistics M-07-138 to M-07-140 p98 – 105

Check that you can:
* calculate the mean, median, mode and range of a set of data.

VOCABULARY:
Statistical calculations

Refer to JSS1 Lesson Plan Manual and Pupil's Handbook (PHB) pages 98 – 105.

CONCEPTS:

* Example:

The ages of 10 college students are: 18, 24, 20, 35, 19, 23, 29, 23, 19, and 20

Calculate the mean, median, mode and range of their ages.

Order the data: 18, 19, 19, 20, 20, 23, 23, 24, 29, 35

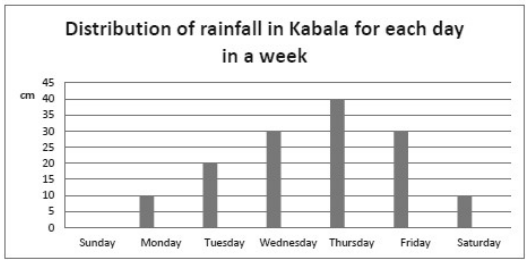
Mean = $\frac{18+19+19+20+20+23+23+24+29+35}{10} = \frac{230}{10}$ = 23 years

Median = $\frac{20 + 23}{2}$ = 21.5 years

Mode: 19, 20 and 23 are modes for the data.

Range = 35 – 18 = 17 years

* Example using a bar chart



Mean = $\frac{0+10+20+30+40+30+10}{7}$ = 20cm of rain

Median: Middle of ordered data is 20cm
Mode: 10cm and 30cm
Range: 40 – 0 = 40cm

Note: Use the same calculations for story problems

Ready to work with pupils.

JSS1 Mathematics Topic Progress Chart

for Maths Captains (to support JSS2 pupils)

Based on Lesson plans for JSS Mathematics JSS1, Term 3

Topic 13: Statistics

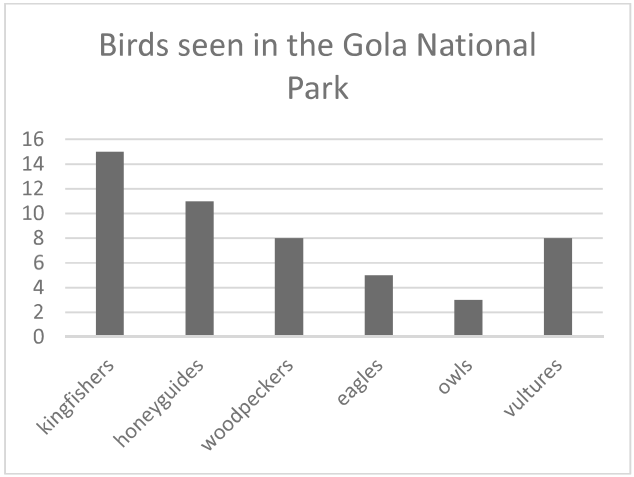
Exercise

1. Use this list of numbers: 13, 20, 15, 14, 16, 20, 10, and 20.
   Find the mean, median, mode and range.

2. In a survey of a rare bird species, the number of white breasted Guinea Fowl sighted was recorded. Over five weeks they saw 15, 13, 20, 11 and 9 in each week.

   Calculate the mean, median, mode and range of the number of times this rare bird was seen.

3. In an environmental survey of birdlife in Sierra Leone, a group of birdwatchers counted the number of Six different bird types sighted in the Gola rainforest national park.
   This is the bar chart they made of their findings:
   15 kingfishers, 11 honeyguides, 8 woodpeckers, 5 eagles, 3 owls, 8 vultures



Calculate the mean, median, mode and range of numbers of birds they saw.

Check your answers:

1. Mean = 128 ÷ 8 = 16
   Median: 10 13 14 15 16 20 20 20
   (15 + 16) ÷ 2 = 30.5
   Mode is 20
   Range is 20 – 13 = 7.
2. Mean = 68 ÷ 5 = 5.2
   Median of 9 11 13 15 20 is 13.
   There is no mode for this data.
   Range is 20 – 9 = 11.

3. Mean = $\frac{15 + 11 + 8 + 5 + 3 + 8}{6}$ = 8.3
   Median of 3 5 8 8 11 15 is 8.
   Mode is 8.
   Range is 15 – 3 = 12