

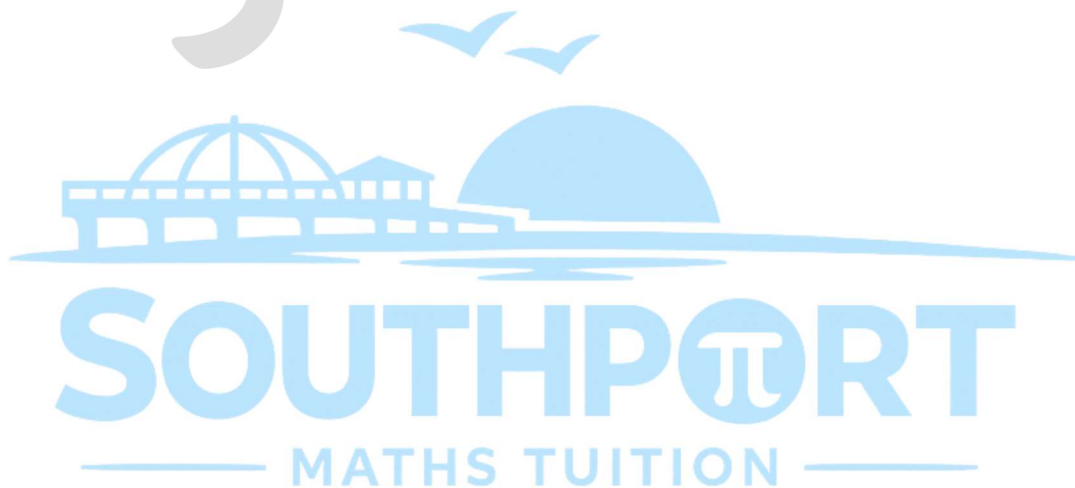
GCSE MATHEMATICS

Mastery

REVISION BOOKLET

Name: _____

SAMPLE



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Algebra

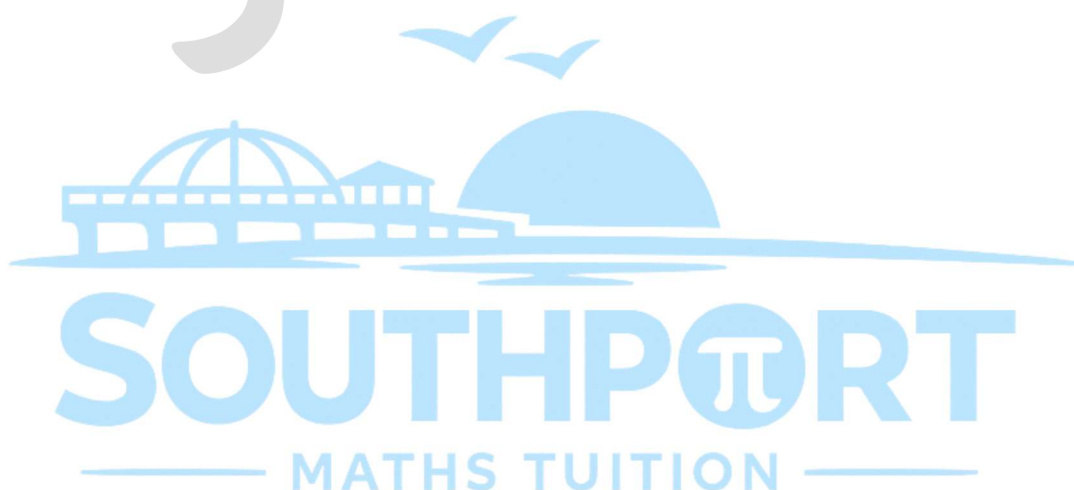
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Direct proportion – What you need to know:

- If two quantities are in **direct proportion**, one is always a **constant multiple** of the other.
- The relationship can be written as an equation:

$$A = kY$$

where k is the **constant of proportionality**.

1. A and Y are in direct proportion. When $A = 8$, $Y = 20$.

Work out the value of k in the equation $A = kY$.

2 marks

2. A and Y are in direct proportion.

When $A = 54$, $Y = 36$.

Find the value of A when $Y = 54$.

2 marks

3. A and Y are in direct proportion. When $Y = 30$, $A = 12$.

Find the constant of proportionality and work out Y when $A = 45$.

3 marks

4. A and Y are in direct proportion.

When $A = 63$, $Y = 21$.

Write an equation for A in terms of Y

Find the value of Y when $A = 120$.

3 marks

5. The cost C is directly proportional to the number of kilograms k bought.

6 kg costs £15

a. Find the constant of proportionality

b. Find the cost of 14 kg.

3 marks

Vectors – What you need to know:

- A vector shows a movement: *how far and in what direction*.
- Column vectors are written as $\begin{pmatrix} a \\ b \end{pmatrix}$, meaning right/left and up/down.
- Top number – positive = right; negative = left.
- Bottom number – positive = up; negative = down.
- To add/subtract vectors, add/subtract the top numbers and add/subtract the bottom numbers.
- Parallel vectors are multiples of each other (e.g. $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$ and $\begin{pmatrix} 12 \\ 20 \end{pmatrix}$)
- The vector from A to B is written as \overrightarrow{AB} and means “movement from A to B”.

1. Write the movement represented by the vector $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$.

1 mark

2. Simplify:

$$\begin{pmatrix} 5 \\ -2 \end{pmatrix} + \begin{pmatrix} -3 \\ 6 \end{pmatrix}$$

2 marks

3. Find

$$3 \begin{pmatrix} -2 \\ 4 \end{pmatrix}$$

2 marks

4. a. If $\mathbf{a} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$.
Find $2\mathbf{a} + 4\mathbf{b}$.

2 marks

b. If $\mathbf{a} = \begin{pmatrix} -4 \\ 7 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 6 \\ 1 \end{pmatrix}$.
Find $3\mathbf{a} - \mathbf{b}$.

2 marks

c. If $\mathbf{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} -5 \\ 4 \end{pmatrix}$.
Find $\mathbf{a} + 2\mathbf{b}$.

2 marks

d. If $\mathbf{a} = \begin{pmatrix} 7 \\ -1 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$.
Find $4\mathbf{a} - 2\mathbf{b}$.

2 marks

5. The vector AB is $\begin{pmatrix} 7 \\ -1 \end{pmatrix}$.
Write the vector BA.

1 mark



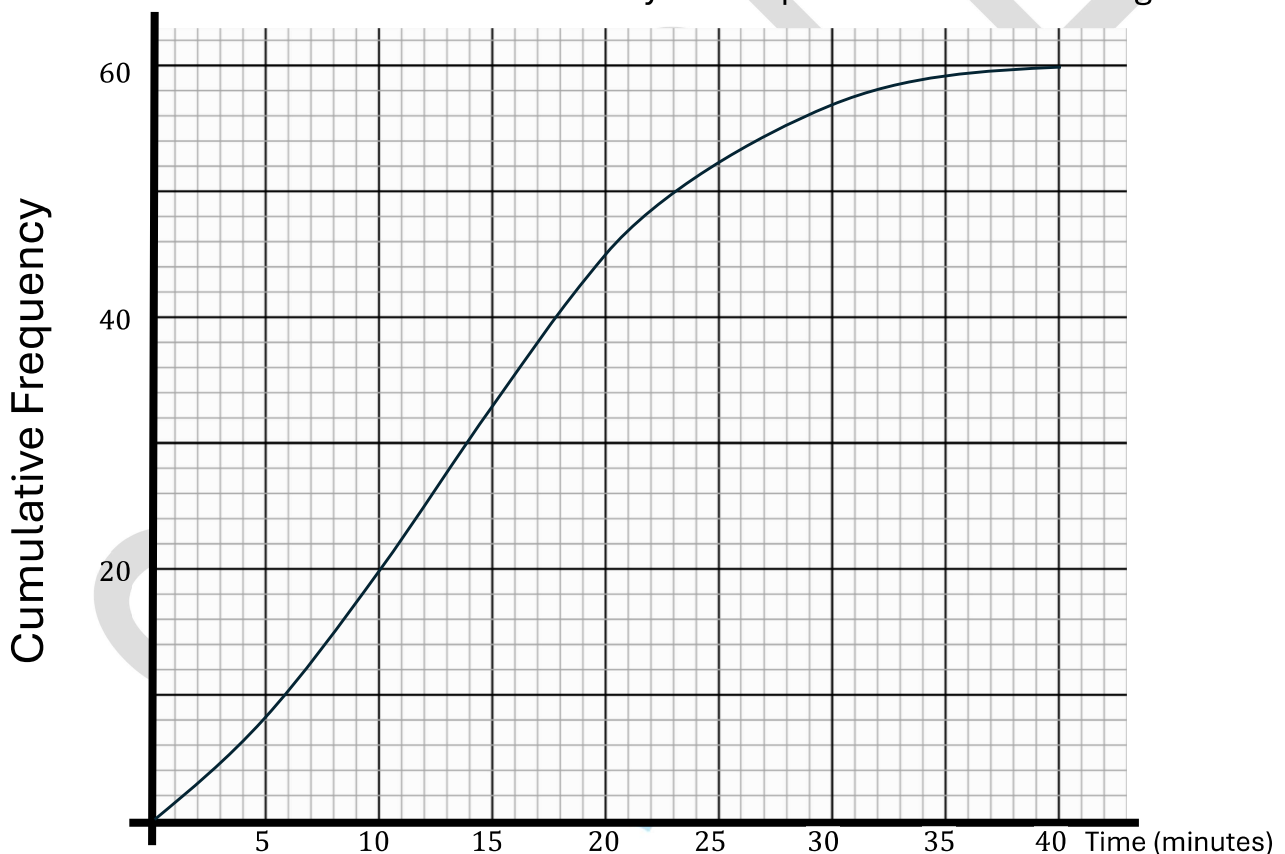
Cumulative Frequency – What you need to know:

- A **cumulative frequency** graph shows a running total of how many values are **up to** a point.
- The graph always **rises** (never falls) because totals keep increasing.
- To estimate the **median**, find the point at **half the total frequency** and read across, then down.
- To estimate the **lower quartile (Q1)**, use $\frac{1}{4}$ of the total frequency.
- To estimate the **upper quartile (Q3)**, use $\frac{3}{4}$ of the total frequency.
- To estimate the **interquartile range (IQR)**, subtract Q1 from Q3.
- A **steep section** means many values occur in a small interval.
- A **shallow section** means values are more spread out.
- The **shape** of the curve helps you understand how the data is distributed.

Comparing cumulative frequency graphs

- Compare **medians** → who typically has the higher value.
- Compare **IQRs** → who is more consistent.
- Compare **ranges** → who has the most variation.
- Always make comparisons **in context** (e.g., times, ages, distances).

1. The CF curve shows the times taken by to complete a fitness challenge.



a. Use the graph to estimate the median time.

1 mark

b. Estimate the lower quartile.

1 mark

c. Estimate the upper quartile.

1 mark

d) Work out an estimate for the interquartile range.

1 mark