



GCSE MATHEMATICS

S21-C300

Non-Calculator Assessment Resource I

Foundation Tier

Formula list

Area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

Kinematics formulae

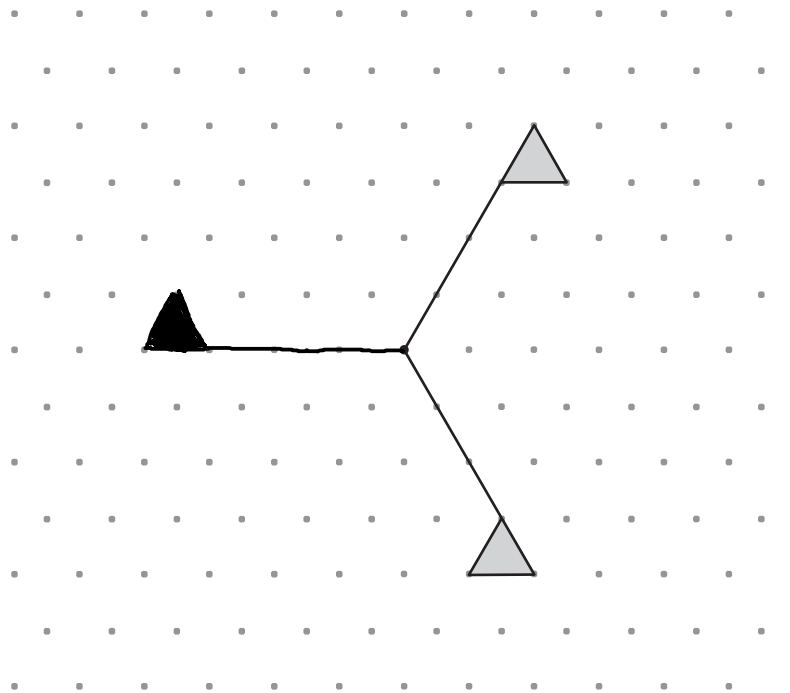
Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

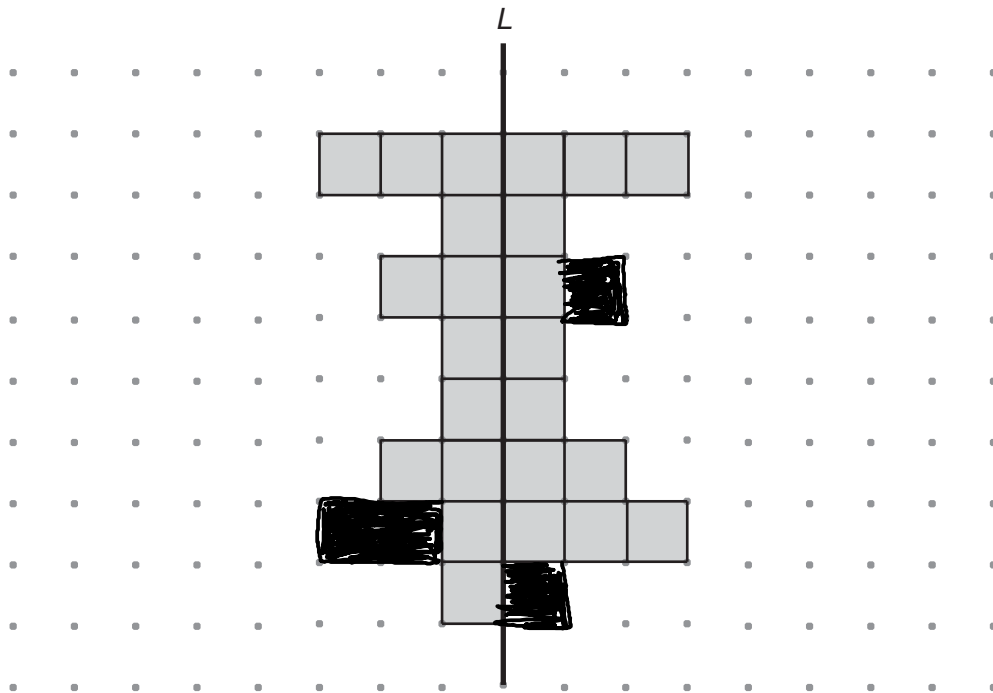
$$v^2 = u^2 + 2as$$

1. (a) This shape is drawn on a triangular dotted grid. Complete this shape so that it has rotational symmetry of order 3. [2]



- (b) This shape is drawn on a square dotted grid. Complete the shaded shape so that L is a line of symmetry. [2]

You must shade the smallest possible number of squares.



2. Fifty students in a small school voted for their Head Girl and Head Boy.

(a) The three candidates for Head Girl were Abby, Bea and Cherry.

The frequency table shows the tally of the votes for 30 of the students.

Candidate	Tally	Frequency
Abby	### ##	10
Bea	### III	8
Cherry	### ## II	12

The remaining 20 votes are shown below.

Abby	Bea	Abby	Abby	Cherry
Bea	Abby	Bea	Cherry	Abby
Cherry	Abby	Bea	Abby	Cherry
Bea	Cherry	Abby	Bea	Abby

Which girl won the vote?
You must show all your working.

[2]

Cherry because she has the highest number of votes = 12

(b) The frequency table shows the results of voting for the Head Boy.

Candidate	Frequency
Dan	13
Eli	20
Fred	17

What percentage of the 50 students voted for the winning boy?

[2]

$$\frac{20}{50} \times 100 = \underline{\underline{40\%}}$$

3. (a) Simplify each of the following.

[2]

(i) $3x - 2y + x - 7y$

$4x - 9y$

(ii) $7(x+2) - 5$

$7x + 14 - 5 \rightarrow \underline{\underline{7x + 9}}$

(iii) $\frac{4x \times 5x}{2}$

$4x \times 5x = 20x^2$
 $20x^2 \div 2 = \underline{\underline{10x^2}}$

- (b) (i) A can contains w ml of lemonade.
Taka drinks 15 ml of lemonade from the can.

Write an expression, in terms of w , for the amount of lemonade that is left in the can.

[1]

$w - 15$

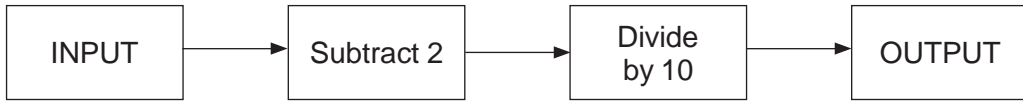
- (ii) In the first week of April, Johan made r bird boxes.
In the second week of April, Johan made half as many bird boxes as he did the week before.

Write an expression, in terms of r , for the number of bird boxes Johan made in the second week of April.

[1]

$\frac{1}{2}r$

4. (a) Here is a number machine.



(i) The input is 45.
What is the output?

[1]

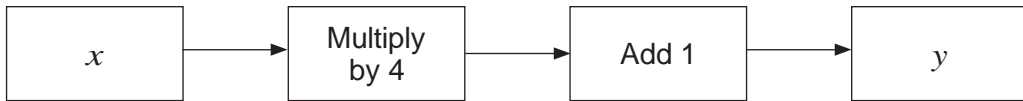
$$45 - 2 = 43 \quad 43 \div 10 = \underline{\underline{4.3}}$$

(ii) The output is 0.9.
What is the input?

[1]

$$0.9 \times 10 = 9 \quad 9 + 2 = \underline{\underline{11}}$$

(b) This number machine can be used to find coordinates (x, y) .



(i) Use the number machine to complete these coordinates.

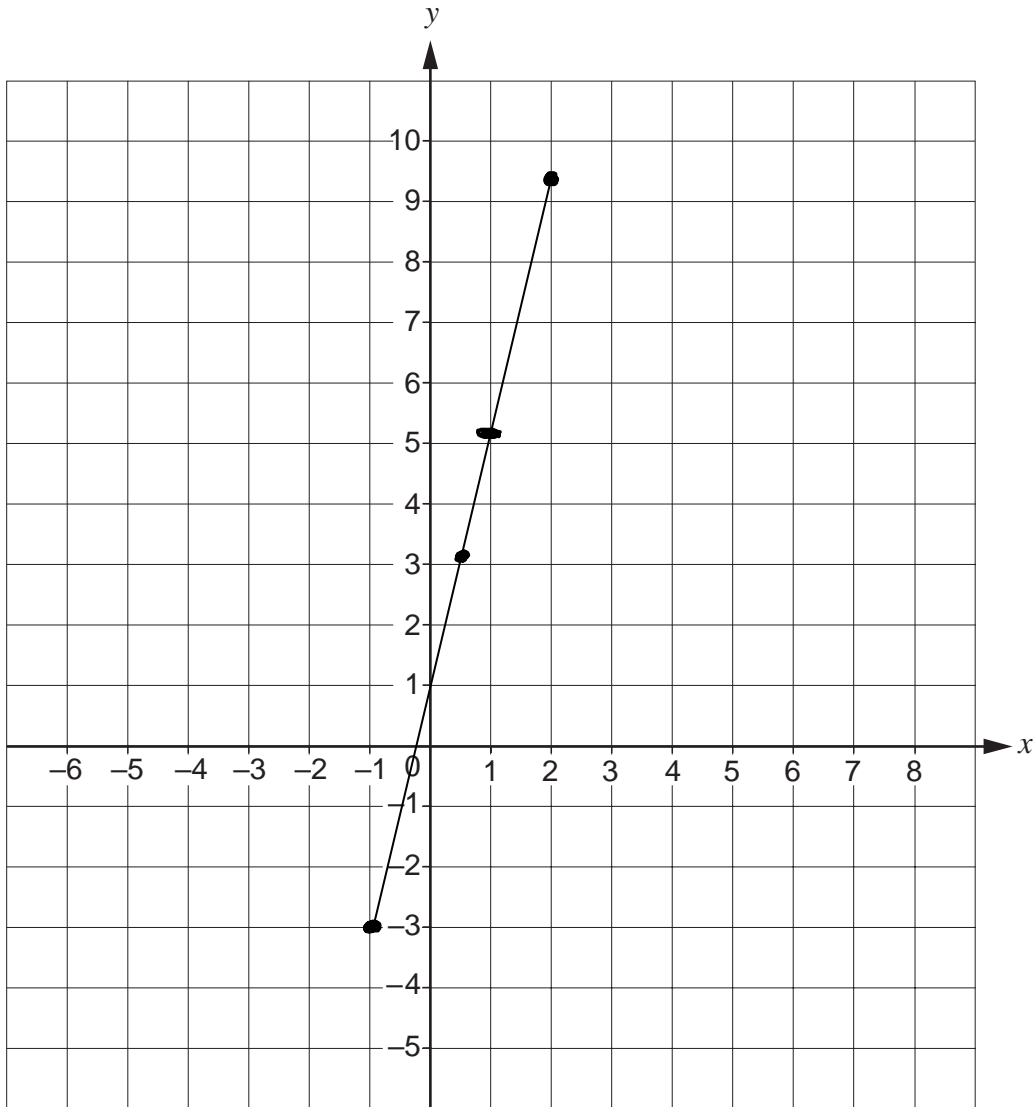
[3]

$$(2, \underline{9}) \quad (0.5, \underline{3}) \quad (-1, \underline{-3}) \quad (\underline{1}, 5)$$

(ii) These coordinates can be used to draw a straight line.

Plot the coordinates found by the number machine and draw the line.

[3]



5. Solve the following equations.

(a) $\frac{x}{3} = 8$

[1]

$$x/3 = 8 \rightarrow x = \underline{\underline{24}}$$

(b) $5x - 8 = 7$

[2]

$$5x - 8 = 7 \rightarrow 5x = 15 \rightarrow x = \underline{\underline{3}}$$

6. (a)

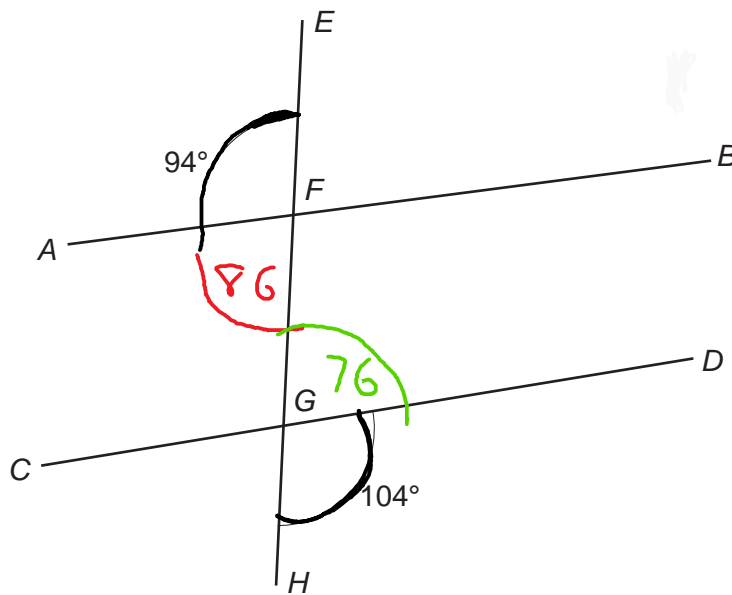


Diagram not drawn to scale

Show that AB and CD are **not** parallel.

Give a reason for each step of your answer.

[2]

Angle AFG = $180 - 94 = 86^\circ$ as angles
on straight line = 180°

Angle DGF = $180 - 104 = 76^\circ$ as angle on
straight line = 180°

If AD and CB were parallel AFG would equal
 DGF due to alternate angle rule. However
they are not equal - $76 \neq 86$ - so AB and
 CD not parallel.

(b)

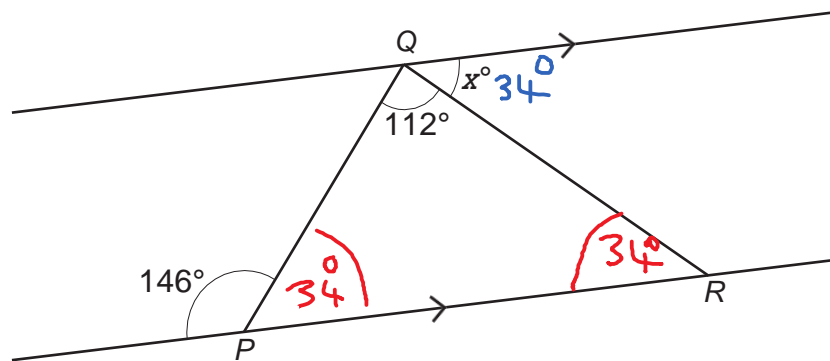


Diagram not drawn to scale

- (i) Calculate the value of x .
Give reasons and calculations to support your answer.

[3]

$$\underline{\underline{QPR}} = 180 - 146 = \underline{\underline{34^\circ}} \text{ due to straight line rule}$$

$$\underline{\underline{QRP}} = 180 - (34 + 112) = \underline{\underline{34^\circ}} \text{ as triangle} = 180^\circ$$

$$\underline{\underline{x}} = \underline{\underline{34^\circ}} \text{ due to alternate angle rule.}$$

$$x = \underline{\underline{34}} \text{ }^\circ$$

- (ii) Write down the mathematical name for triangle PQR .
Give a reason for your answer.

[1]

Isosceles as two angles are equal
in the triangle.

7. A line L has equation $y = 12 - 4x$.

Write down the equation of a different line that is parallel to L .

[1]

Same gradient = -4

$y = -4x + 1$

8. Factorise $3x^2 - 4xy$.

[1]

$x(3x - 4y)$

9. A cinema has standard seats and premier seats.
Omar and Fatima each book some cinema tickets.

Omar books 3 standard and 2 premier seats and pays £30.
Fatima books 2 standard and 4 premier seats and pays £40.

Use an algebraic method to work out the difference in cost between a standard seat and a premier seat. [5]

$$\underline{\text{Standard} = x} \quad \underline{\text{premier} = y}$$

$$\text{Omar} \rightarrow 3x + 2y = 30$$

$$\text{Fatima} \rightarrow 2x + 4y = 40$$

$$\text{Omar} \times 2 \rightarrow 6x + 4y = 60$$

$$\text{Fatima} \rightarrow 2x + 4y = 40$$

$$\underline{4x + 0y = 20}$$

$$\underline{x = 5}$$

$$\text{Sub } x = 5 \text{ in Fatima} \rightarrow 2(5) + 4y = 40 \rightarrow 4y = 30$$

$$7.5 - 5 = \underline{\underline{2.5}}$$

$$y = \underline{\underline{7.5}}$$

Difference in cost between a standard seat and a premier seat is £ 2.5