



## GCSE MATHEMATICS

S21-C300

# Non-Calculator Assessment Resource M

Higher 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:

Curved surface area of a cone = 
$$\pi rl$$
  
Surface area of a sphere =  $4\pi r^2$   
Volume of a sphere =  $\frac{4}{3}\pi r^3$   
Volume of a cone =  $\frac{1}{3}\pi r^2h$ 

#### 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. The diagram shows a cylinder.

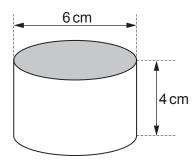


Diagram not drawn to scale

[3]

On the 1 centimetre grid below, draw accurately: • the plan of the cylinder, • the side elevation of the cylinder.

Plan	•	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠
٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠
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٠	٠	•	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠
Side	eleva	ation	•	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠
٠	٠	•	٠	•	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠
٠	٠	•	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠
٠	٠	٠	۰	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠
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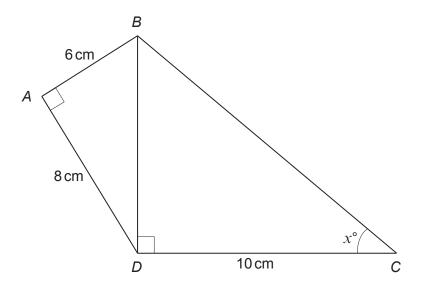


Diagram not drawn to scale

ind the value of <i>x</i> . fou must show all your working.	[3]
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	••••••
	••••••
	••••••
	••••••

*x* = .....

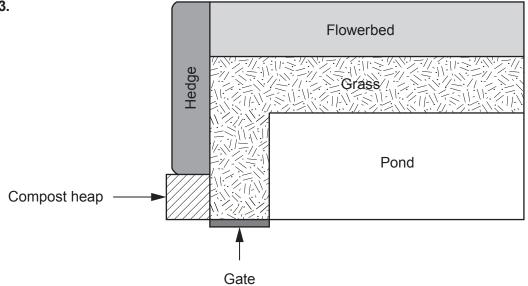


Diagram not drawn to scale

The diagram shows a garden which has:

- an L shaped area of grass,
- a rectangular flowerbed and pond,
- a square compost heap.

The length of each side of the compost heap is 1.2 m. The ratio of the length of the compost heap to the length of the hedge is 2 : 11.

The length of the gate is 2m.

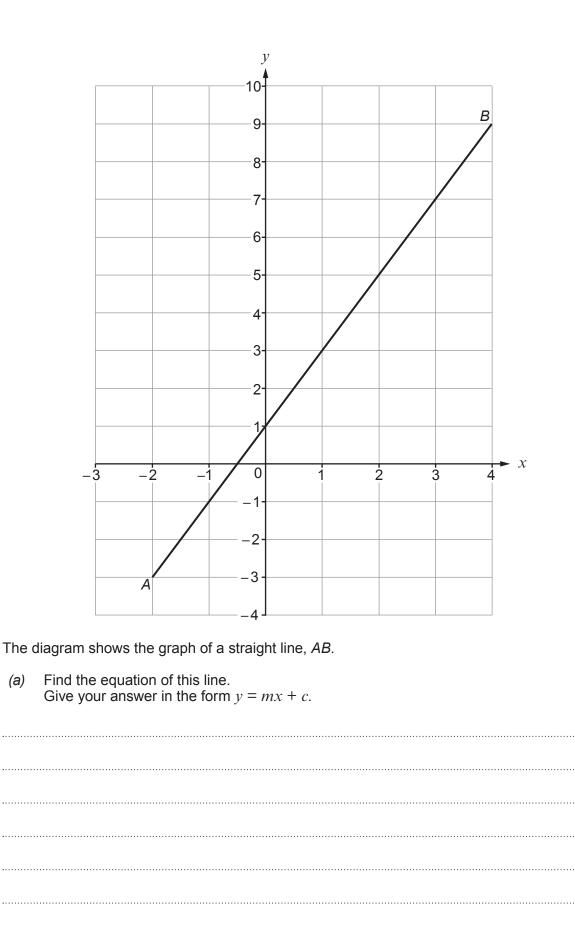
The length of the gate is  $\frac{1}{4}$  of the length of the pond.

The area of the pond is  $28 \text{ m}^2$ . The perimeter of the flowerbed is the same as the perimeter of the pond.

Find the area of the grass.

[6]

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[3]

*y* = .....

4.

(b) Find the equation of the perpendicular bisector of the line AB. [4]

**5**. It is known that *y* varies inversely as the cube root of *x* and that y = 2 when x = 27.

(a)	Find a formula for <i>y</i> in terms of <i>x</i> .	[3]
·····		
•••••		
•••••		
(b)	Using your answer to part <i>(a)</i> , find	
. /	(i) $y$ when $x = 1000$ ,	[1]
	(ii) $x$ when $y = 3$ .	[2]

 $V_0 = 10000$  $V_{n+1} = 0.8 V_n$  where  $n \ge 0$ This iterative formula can be used to work out the value  $V_n$  of a particular type of car when it is *n* years old. (i) Show that a car of this type that is 1 year old is worth £8000. [1] Use this formula to find the value of a car of this type that is 3 years old. [3] (ii) Value is £

(b)



A newly built house is worth £240000 and is expected to increase in value by 2% each year.

Complete the following iterative formula to show this information. [1]

 $V_0 = ....$ 

 $V_{n+1}$  = ......  $V_n$  where  $n \ge 0$ 

6. (a)

(a) (i) Explain why  $x \neq 1$  for this function. [1] (ii) Show that  $f^{-1}(x) = \frac{a}{x} + b$ , where a and b are integers. [2]

(b) The functions g and h are defined for all real x by

Solve hg(x) = f(x).

 $g(x) = \sqrt[3]{x+1} ,$  $h(x) = 9x^3 .$ 

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7. The function f is defined, for  $x \neq 1$ , by  $f(x) = \frac{7}{x-1}$ .

[5]