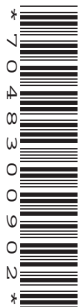# OCR
Oxford Cambridge and RSA

H

GCSE (9–1) Mathematics
J560/06 Paper 6 (Higher Tier)

Tuesday 12 June 2018 – Morning
Time allowed: 1 hours 30 minutes

You may use:
* a scientific or graphical calculator
* geometrical instruments
* tracing paper

First name	
Last name	

Centre number						Candidate number				

INSTRUCTIONS
* Use black ink. You may use an HB pencil for graphs and diagrams.
* Complete the boxes above with your name, centre number and candidate number.
* Answer **all** the questions.
* Read each question carefully before you start to write your answer.
* Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
* Write your answer to each question in the space provided. Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
* Do **not** write in the barcodes.

INFORMATION
* The total mark for this paper is **100**.
* The marks for each question are shown in brackets **[ ]**.
* Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
* This document consists of **20** pages.

OCR is an exempt Charity

Turn over

2

Answer **all** the questions.

1   Ping chooses four numbers.

The mode of these four numbers is 8, the range is 7 and the mean is 11.

Find Ping's four numbers.

………… , ………… , ………… , ………… **[3]**

2   A box contains only red, blue and green pens.
The ratio of red pens to blue pens is 5 : 9.
The ratio of blue pens to green pens is 1 : 4.

Calculate the percentage of pens that are blue.

………………………….. % **[4]**

3

3 Asha worked out $\dfrac{326.8 \times (6.94 - 3.4)}{59.4}$.

She got an answer of 19.5, correct to 3 significant figures.

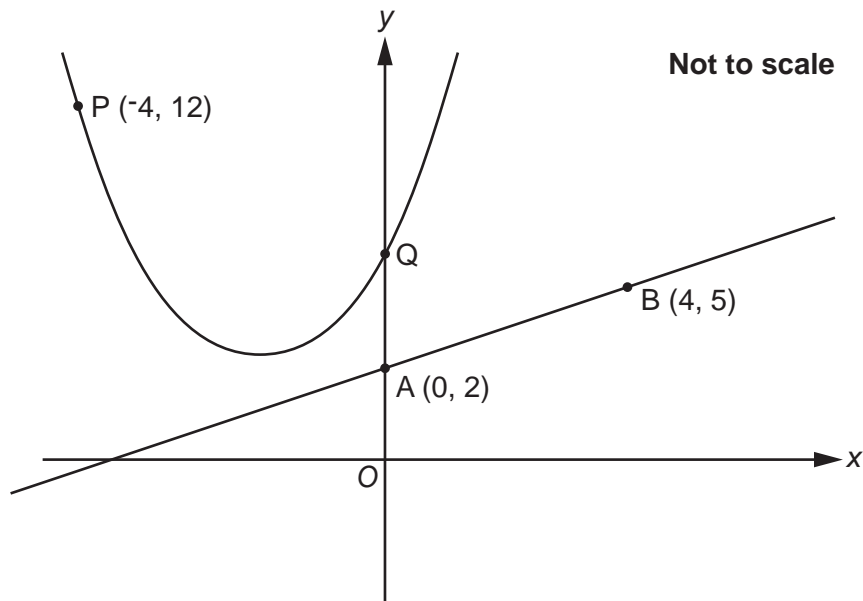Write each number correct to 1 significant figure to decide if Asha's answer is reasonable.

....

.... **[3]**

4 (a) Show that $a^5 \times (a^3)^2$ can be expressed as a^{11}. **[2]**

(b) Write $\dfrac{1}{125} \times 25^9$ as a power of 5.

(b) .... **[3]**

Turn over

5   The diagram shows a straight line that passes through points A and B, and a curve that passes through points P and Q.

(a) Find the equation of the straight line.

(a)   .... **[3]**

(b) The equation of the curve is $y = x^2 + kx + 8$.

Find the value of k.

(b) $k =$ ....……………………………. **[3]**

(c) Diann draws line BQ.
She says

Triangle ABQ is isosceles.

Is Diann correct?
You must show all your working.

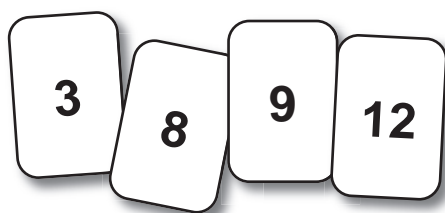.. **[4]**

6 *y* is inversely proportional to *x*.
$y = 0.04$ when $x = 80$.

Find the value of *y* when $x = 32$.

y = ... **[3]**
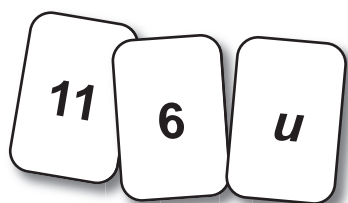
Turn over

7 Edsel has four number cards.

3 8 9 12

Sharon has three number cards.
u represents a number that Sharon knows.

11 6 *u*

Edsel and Sharon each pick one of their cards at random.
They calculate the **difference** between the numbers on their cards.
This is their sample space.

		Edsel			
		3	8	9	12
	6	3	2	3	6
Sharon	11	8	3	2	1
	u	11	6	*r*	*t*

Work out the values of *r* and *t*.

r = ...

t = ...

[4]

8 The graph shows the speed of a tram as it travels from the library to the town hall.
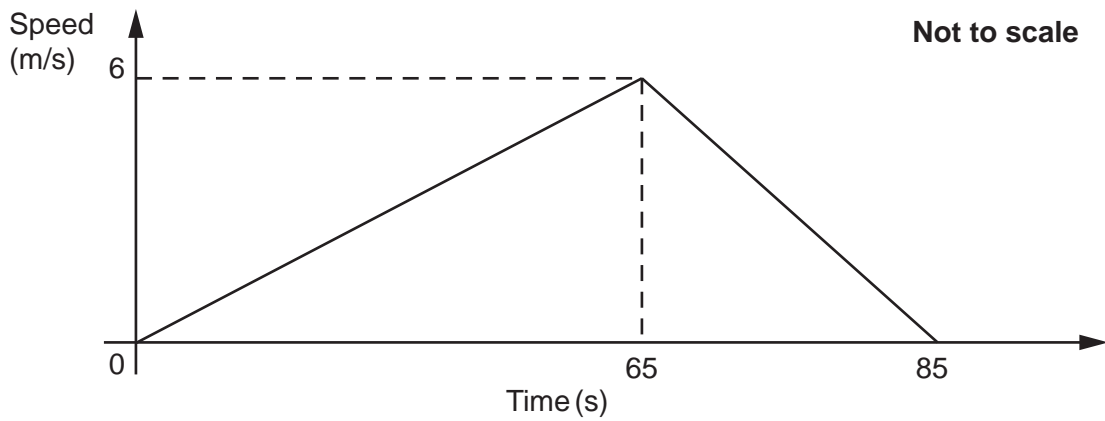
(a) Calculate the deceleration of the tram as it approaches the town hall.

(a) .... m/s² **[2]**

(b) Calculate the distance travelled by the tram between the library and the town hall.

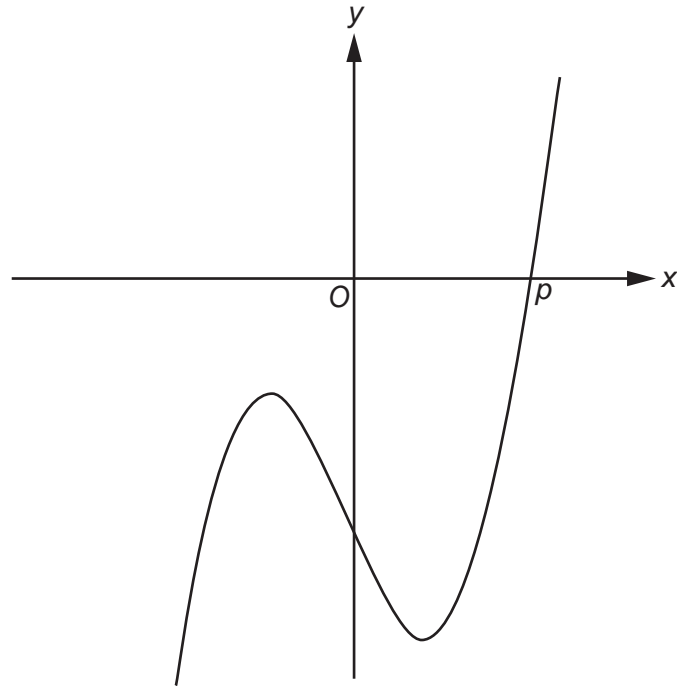**(b)** .... m **[3]**

(c) What was the maximum speed of the tram as it travelled between the library and the town hall?
Give your answer in **kilometres per hour**.

(c) .... km/h **[4]**

Turn over

9 The graph of $y = x^3 - 7x - 12$ is shown below.
The root of the equation $x^3 - 7x - 12 = 0$ is p.

(a) Calculate y when $x = 3$.

(a) $y =$ .... **[1]**

(b) Show that $3 < p < 4$. **[2]**

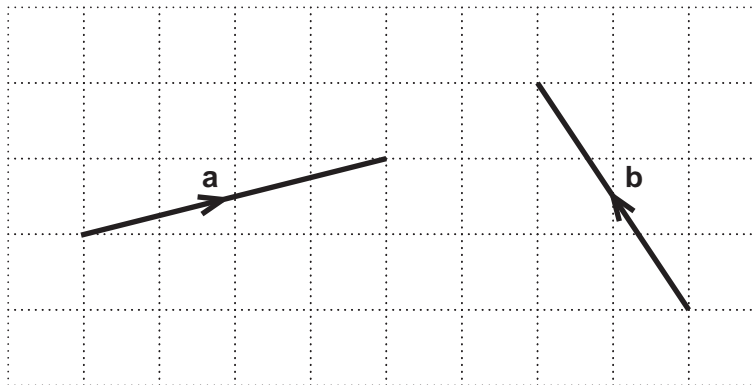**(c)** Find a smaller interval that contains the value of p.
You must show calculations to support your answer.

(c) .... $< p <$ .... **[3]**

10 Two vectors, **a** and **b**, are shown on the 1 centimetre grid below.

Show that the vector **a** + 2**b** has length 7 cm.
You may use the grid below.

[3]

PMT

10

11 The diagram below shows two triangles.

Not to scale
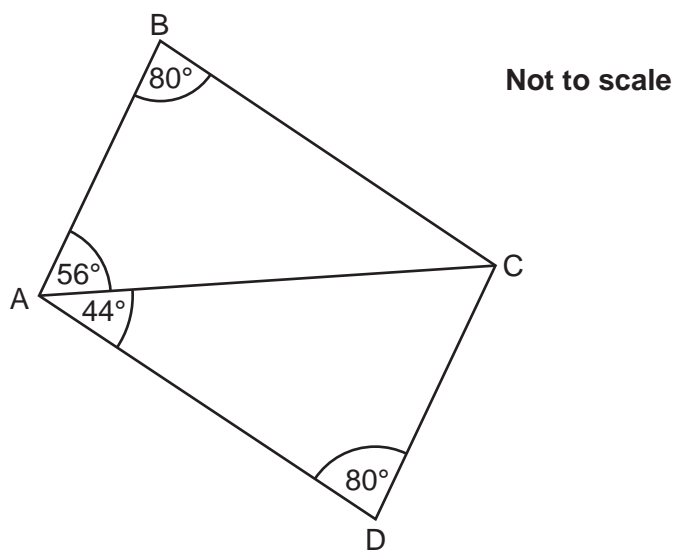
Prove that triangle ABC is congruent to triangle ACD.

....

....

....

....

....

.... **[4]**

12 The diagram below shows two right-angled triangles.

R

Not to scale

4 cm   8 cm

Q

S

10 cm

P
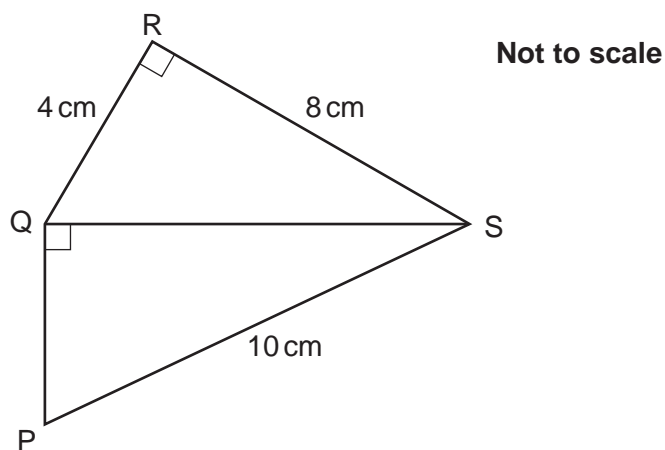
Prove that triangles PQS and QRS are similar.

....

....

....

....

....

.... **[5]**
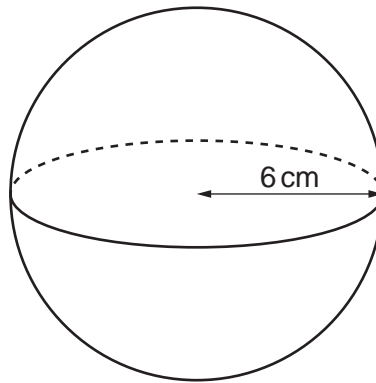
Turn over

13 (a) Calculate the volume of a sphere with radius 6 cm.

[The volume V of a sphere with radius r is $V = \dfrac{4}{3}\pi r^3$.]

(a) .... cm^3 **[2]**

(b) An ornament is made from a solid glass square-based pyramid.
The base has side length 15 cm.
A hemisphere with radius 6 cm is cut out of the base of the pyramid.
This reduces the volume of glass contained in the ornament by 30%.
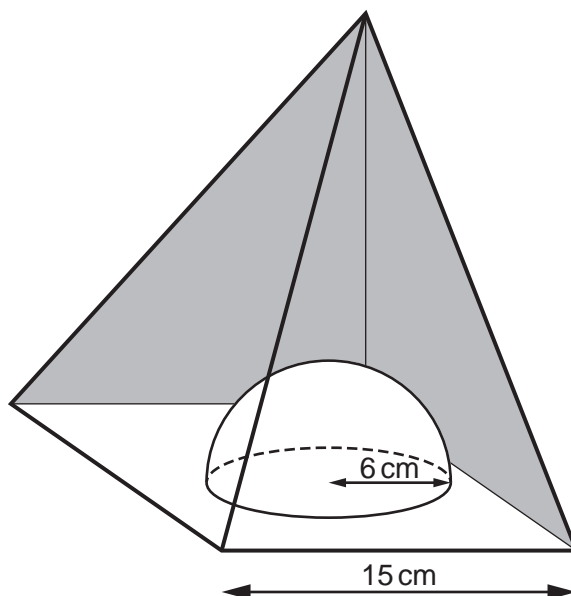
Calculate the perpendicular height of the pyramid.

[The volume of a pyramid is $\frac{1}{3} \times$ area of base $\times$ perpendicular height.

A hemisphere is half a sphere.]

(b) .... cm **[5]**

Turn over

14 (a) Standard bricks have dimensions 21.5 cm by 10.3 cm by 6.5 cm, correct to 1 decimal place.

A house is built using 4663 standard bricks.

Joslin says

Placed end to end, the bricks from the house would definitely reach over 1 km.

Show that Joslin's statement is correct. **[4]**

(b) A standard brick should weigh 2.8 kg, correct to 1 decimal place.
A truck can carry a maximum load of 20 tonnes.

(i) Calculate the maximum number of standard bricks that the truck should be able to carry.

(b)(i) .... **[3]**

(ii) Explain why your answer to **(b)(i)** may not be possible to achieve.

....

.... **[1]**
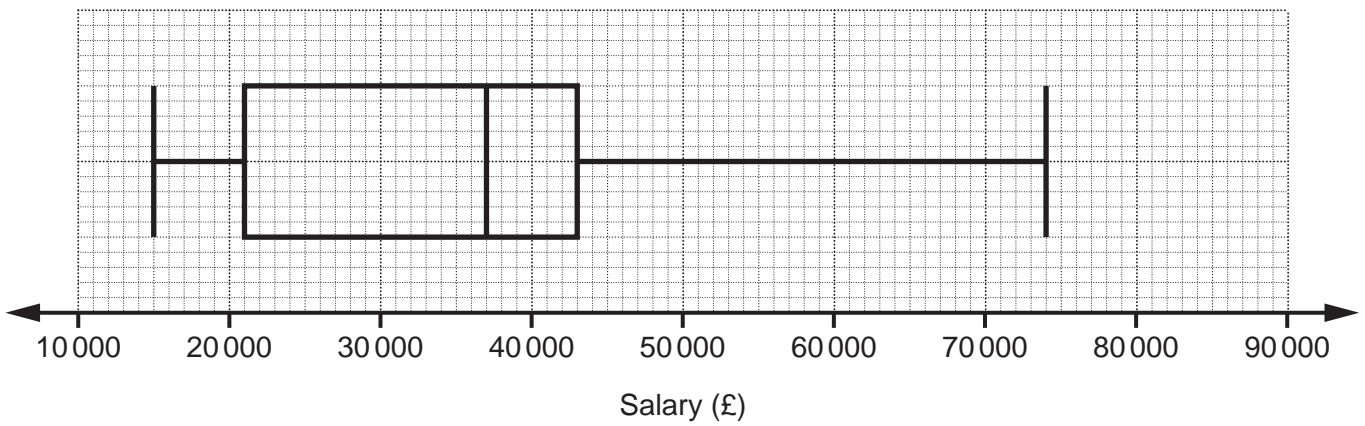
15 Ratna invests £1200 for 2 years in a bank account paying r% per year compound interest.
At the end of 2 years, the amount in the bank account is £1379.02.

Calculate r.

$r =$ .... **[4]**

16 The box plot shows the distribution of the salaries for the workers at Bexbridge Biscuits.

Salary (£)

(a) State the median salary.

(a) £ .... **[1]**

(b) Find the interquartile range.

(b) £ .... **[2]**

(c) The following salary information is true for workers at Camford Cookies.

- The highest paid worker earns £85 000.
- The lowest paid worker earns 20% of the salary of the highest paid worker.
- 25% of the workers earn more than £50 000.
- 25% of the workers earn less than £28 000.
- The median salary is £37 000.

Draw a box plot to show the salaries of the workers at Camford Cookies.

| | | | | | | | | |
|10 000|20 000|30 000|40 000|50 000|60 000|70 000|80 000|90 000|
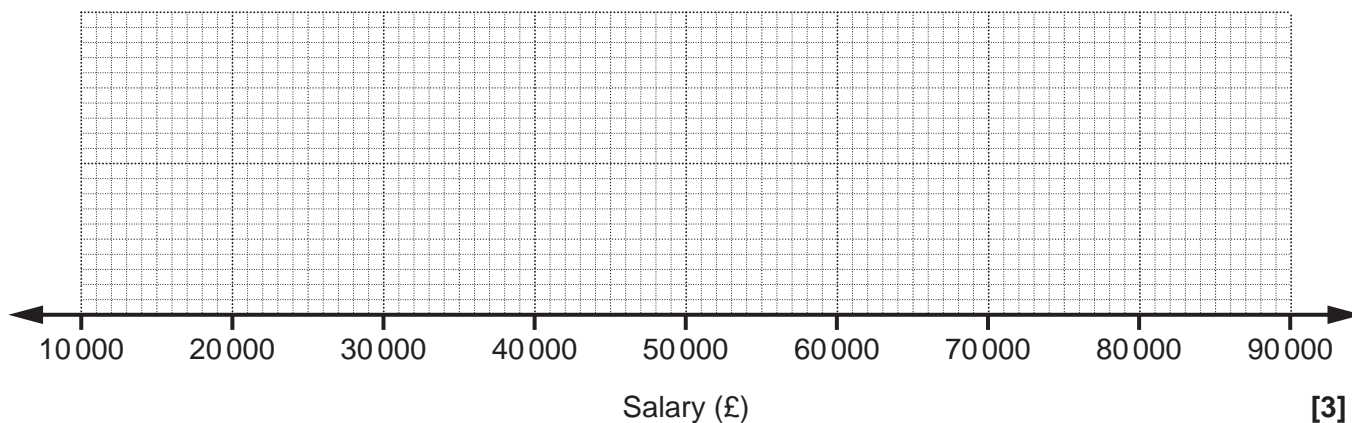
Salary (£) **[3]**

(d) Make two different comparisons between the distribution of the salaries at Bexbridge Biscuits and the salaries at Camford Cookies.

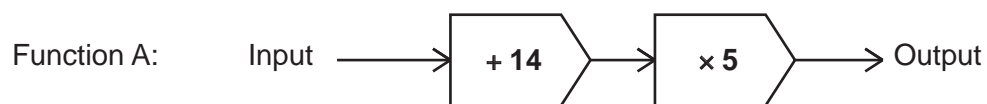1:..

....

2:..

.... **[2]**

18

17 Here is a function.

Function A: Input ———→ ⟩ **+ 14** ⟩ —→ ⟩ **× 5** ⟩ ——→ Output

(a) The **output** of function A is x.

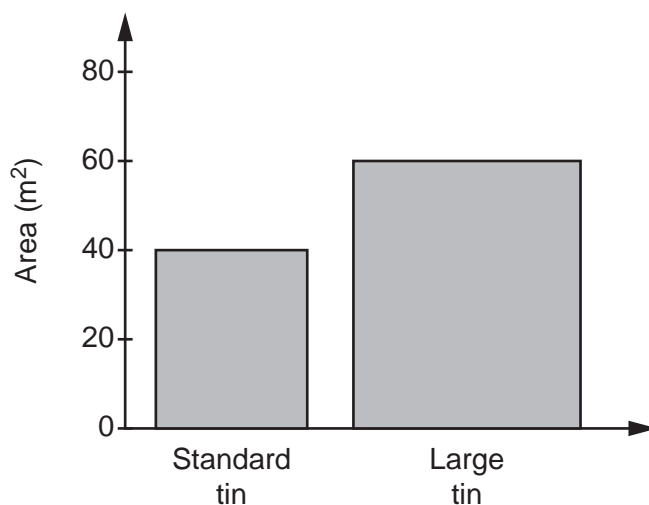Write an algebraic expression, in terms of x, for the input of function A.

(a) .... **[2]**

(b) A number, k, is put into function A.
The output is also k.

Find the value of k.

(b) $k =$ .... **[3]**

18 Percy sells paint in standard tins and large tins.
The standard tin covers $40\,\text{m}^2$ and the large tin covers $60\,\text{m}^2$.

(a) Percy publishes this chart showing the area that can be covered with each tin of paint.

Explain why the chart is misleading.

....

.... **[1]**

(b) The standard tin and the large tin are mathematically similar.
The **volume** of the large tin is 50% more than the volume of the standard tin.
Both tins are cylinders.
The radius of the standard tin is $10\,\text{cm}$.

Calculate the radius of the large tin.

(b) .... cm **[4]**

Turn over

19 Show that $\dfrac{2x^2 + 13x + 20}{2x^2 + x - 10}$ simplifies to $\dfrac{x + a}{x - b}$ where a and b are integers. **[4]**

END OF QUESTION PAPER