OCR
Oxford Cambridge and RSA

H

GCSE (9–1) Mathematics

J560/06 Paper 6 (Higher Tier)

Practice Paper – Set 3

Time allowed: 1 hour 30 minutes

2016

You may use:
- A scientific or graphical calculator
- Geometrical instruments
- Tracing paper

J560006

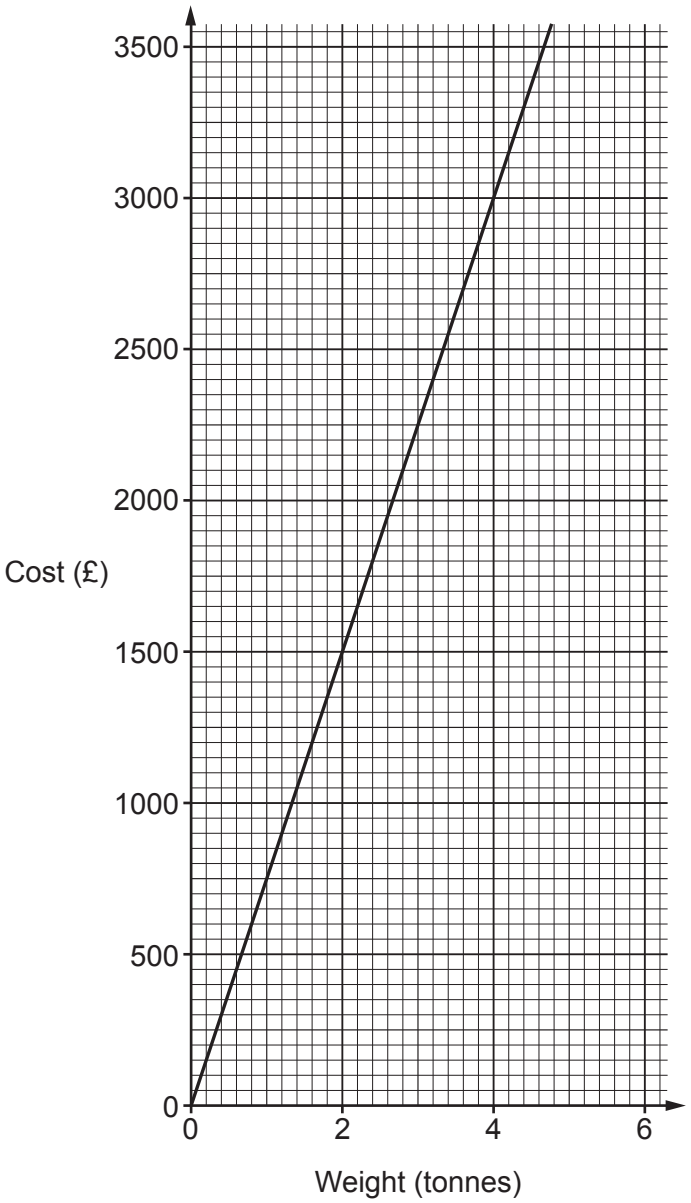
First name										
Last name										
Centre number						Candidate number				

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 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.

Answer **all** the questions

1 The graph below shows the cost of aluminium by weight.



(a) Write down the cost of 3 tonnes of aluminium.

(a) £ ..... **[1]**

(b) (i) Work out the cost of 17 tonnes of aluminium.

(b)(i) £ ..... **[3]**

(ii) What assumption have you made about the cost of aluminium in your calculations for part **(b)(i)**?

.....

.....

..... **[1]**

2 The probability of each outcome of a computer game is shown in the table below.

Outcome	Win	Lose	Draw
Probability	0.3	0.25	

(a) Complete the table. **[2]**

(b) Cynthia plays the game 30 times.

(i) Calculate the number of times Cynthia should expect to win.

(b)(i) ..... **[2]**

(ii) Cynthia wins the game 4 times.

She says

I should have won more times.

Explain why she may be wrong.

.....

..... **[1]**

3 The map shows two radio masts, Y and Z.

(a) Mast X is on a bearing of 132° from Y and on a bearing of 252° from Z.

Mark accurately the position of mast X on the map. **[3]**

(b) The map scale is 2 cm represents 25 km.

(i) The scale can be written in the form 1 : *n*.

Find the value of *n*.

(b)(i) ..... **[2]**

(ii) Work out the actual distance between Y and Z.

(ii) .....km **[2]**

4 Use the formula

$$v = \sqrt{\frac{2GM}{r}}$$

to find the value of v when

$G = 6.67 \times 10^{-11}$
$M = 5.97 \times 10^{24}$
and $r = 6.4 \times 10^{6}$.

$v =$ ..... **[3]**

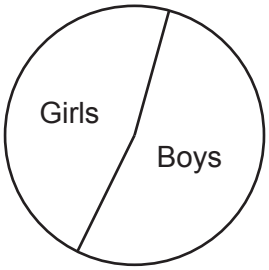
5 **(a)** Three schools provide this information.

- $\frac{3}{7}$ of the pupils at Harwood are girls.
- 42% of the pupils at Crompton are girls.
- The ratio of girls to boys at Astley is 4 : 5.

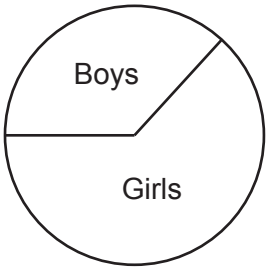
Write the schools in the order of their proportion of girls, lowest to highest.
Show how you reached your answer.

(a) .... **[4]**
lowest

(b) The pie charts below show the proportion of boys and girls at two other schools.



Beechfield



Kenwood

Neil says

The pie charts show that there are more girls at Kenwood than at Beechfield.

Explain why Neil may be wrong.

.....

.....

..... **[1]**

6 Edeston village has a population of 3500 people.
A new road is planned.
In a survey, school pupils are asked if they are for or against the new road.

	Number of pupils
For	36
Against	24

Hugo assumes responses from the whole village will be in the same proportion as those from the pupils.

(a) Use Hugo's assumption to calculate how many people in Edeston are against the new road.

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

(b) Explain why the responses from the whole village may **not** be in the same proportion as the responses from the pupils.

.....

.....

..... **[1]**

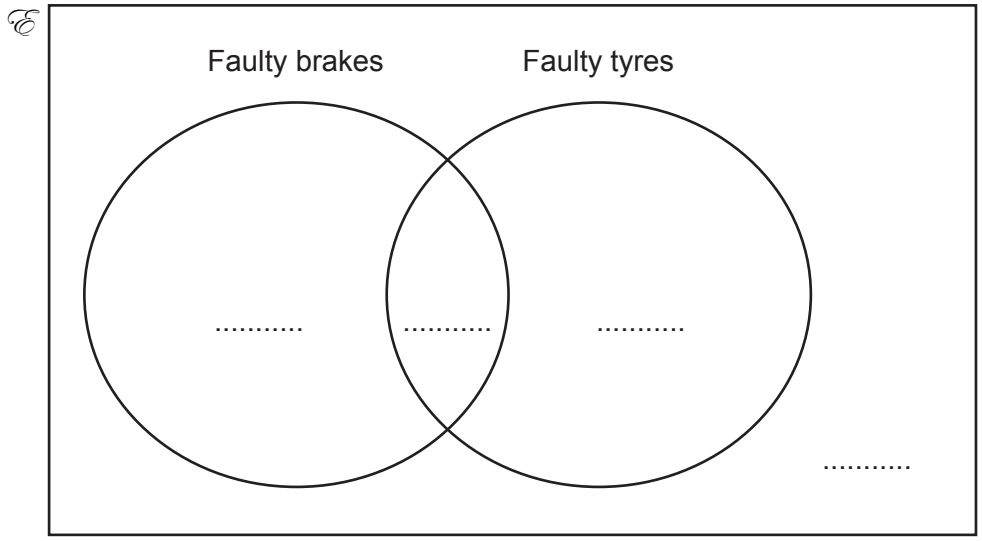
7 Show that the mean of 5 consecutive numbers is always equal to the median of the 5 numbers.

[4]

8 A mechanic tests the brakes and tyres of 60 cars.
A car passes the test if both the brakes **and** the tyres are not faulty.

- 18 cars pass the test.
- 20 cars have faulty brakes.
- 29 cars have faulty tyres.

(a) Put this information into the Venn diagram below.



[3]

(b) One of these cars is chosen at random.
What is the probability that this car has faulty brakes, given that the car failed the test?

(b) ..... **[2]**

9 Simplify fully.

(a) $k^3 \times k^2$

(a) ..... **[1]**

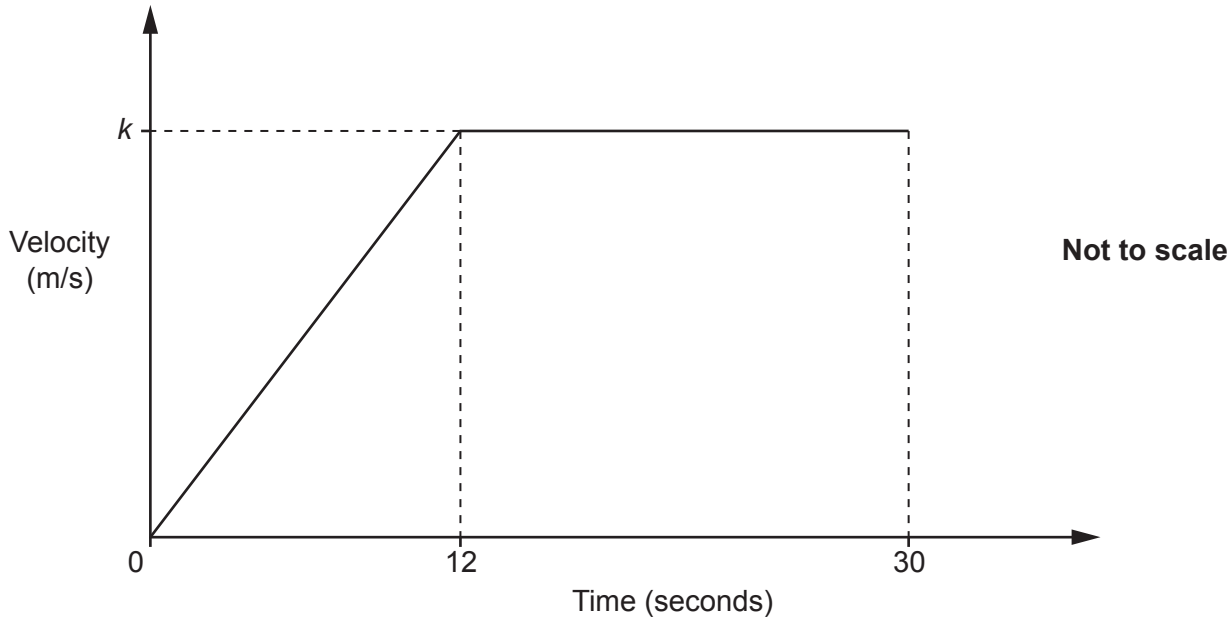
(b) $3m^5 \times 4m^{-\frac{1}{2}}$

(b) ..... **[2]**

(c) $\dfrac{(p^3 \times 5p^4)^2}{p^{-3}}$

(c) ..... **[3]**

10 The graph below shows the velocity of a train during the first 30 seconds after it leaves a station.



(a) Show that the train travels a total distance of 24k metres during the 30 seconds. **[3]**

A signal box is 410 metres from the station.

(b) At the end of this 30 second period, the train passes the signal box.

Find the value of k.
Give your answer correct to 3 significant figures.

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

(c) You may use this formula.

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

(i) A second train passes the station at a velocity of 13 m/s.
It accelerates at a constant rate after passing the station and 25 seconds later it passes the signal box.

Find the acceleration.

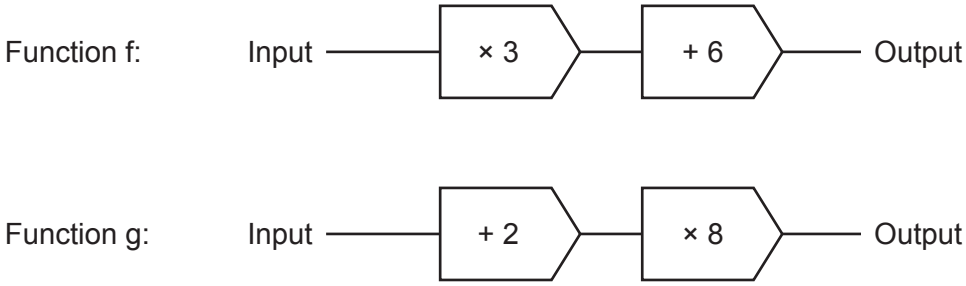
(c)(i) ..... m/s^2 **[3]**

(ii) A third train passes the station at 15 m/s before accelerating at a constant rate of 0.4 m/s^2 until it passes the signal box.

Find, to the nearest second, the time taken for the train to pass the signal box.

(ii) ..... seconds **[5]**

11 Two functions, f and g, are represented by these function machines.



(a) x is put into function f.
The output from function f is then put into function g.

Find a simplified expression for the output from function g.

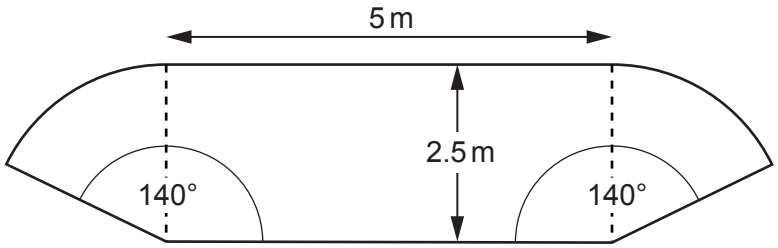
(a) ..... **[2]**

(b) A number is chosen.
This number is put into both function f and function g.
The output from both functions is the same.

Work out the number that was chosen.

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

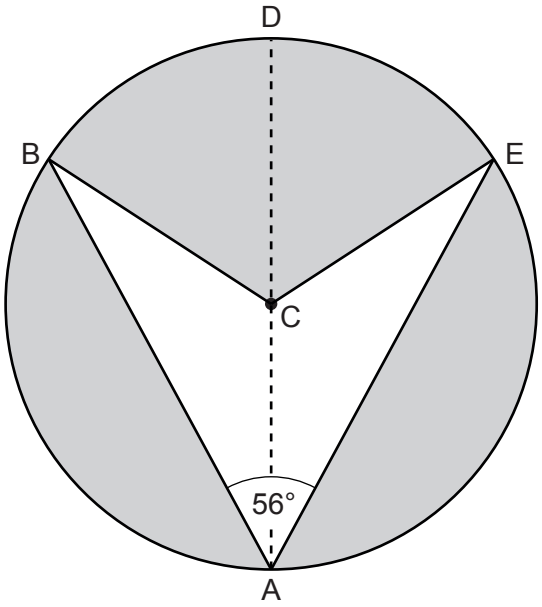
12 The design is a rectangle with a sector of a circle at each end, as shown below.



Not to scale

Show that the perimeter of the design is 19.4 m, correct to 3 significant figures. **[4]**

13 A white arrowhead is painted on a grey circle.



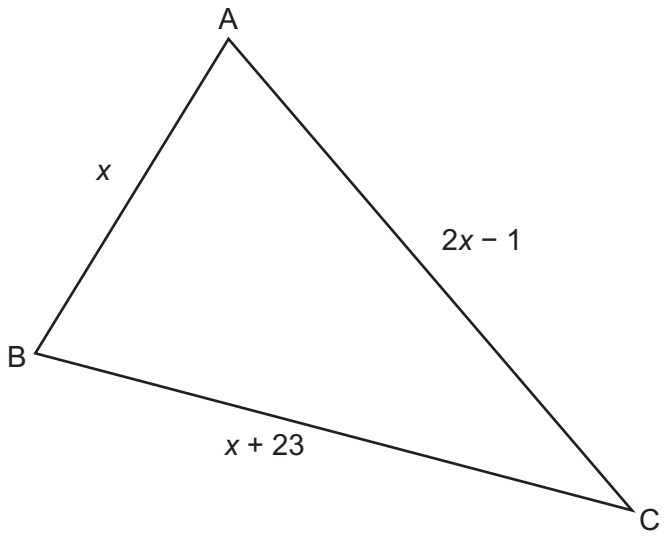
Not to scale

Points A, B, D and E are on the circumference of the circle, centre C.
AD is a line of symmetry.
Angle BAE is 56°.

Calculate the percentage of the circle that is painted white.

..... % **[6]**

14 Triangle ABC has sides x, $x + 23$ and $2x - 1$.



Not to scale

(a) Verify that, for $x = 33$, triangle ABC is right-angled. **[3]**

(b) Show that there is only one value of x which makes triangle ABC isosceles. **[6]**

15 Javier invests £2400 at a rate of 3.2% per year compound interest.

Calculate the total amount of **interest** he will have earned after 4 years.
Give your answer correct to the nearest penny.

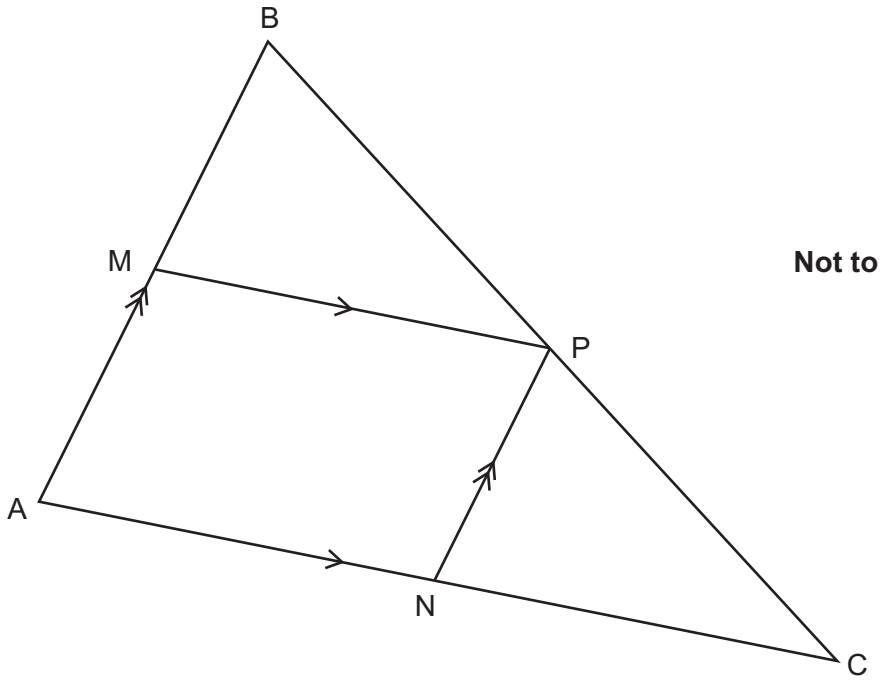
£ ..... **[4]**

16 **(a)** Show that $\sqrt[15]{8^5} = 2$. **[2]**

(b) Write $\sqrt[8]{27 \times 3}$ in the form 3^k, where k is a fraction in its simplest form.

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

17 In the diagram, P is the midpoint of BC.
MP is parallel to AC.
NP is parallel to AB.



Not to scale

Prove that triangle MBP is congruent to triangle NPC. **[4]**

18 (a) The growth of a population of bacteria is given by the formula

$$P = 30\,000 \times 2.3^t$$

where P is the population t hours after 10am.

Calculate the population at 4pm on the same day.

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

(b) Another population of bacteria grows by k% each day.
After 3 days, the population has doubled.

Find the value of k.

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

END OF QUESTION PAPER