# Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education (9–1)

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

**MATHEMATICS** 0626/06

Paper 6 (Extended) **October/November 2018**

**2 hours**

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments
Tracing paper (optional)

## READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams and graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
**Electronic calculators should be used.**
If working is required for any question it must be shown below that question.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For $\pi$, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 96.

This document consists of **15** printed pages and **1** blank page.

**CAMBRIDGE**
International Examinations

**[Turn over**

**1** **(a)** **Use a straight edge and compasses only** for this question.
**Leave in all your construction arcs.**

Here is a scale drawing of a park.
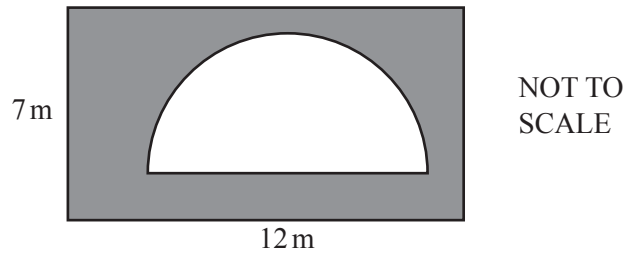
*A*

*B*

*C*

*D*
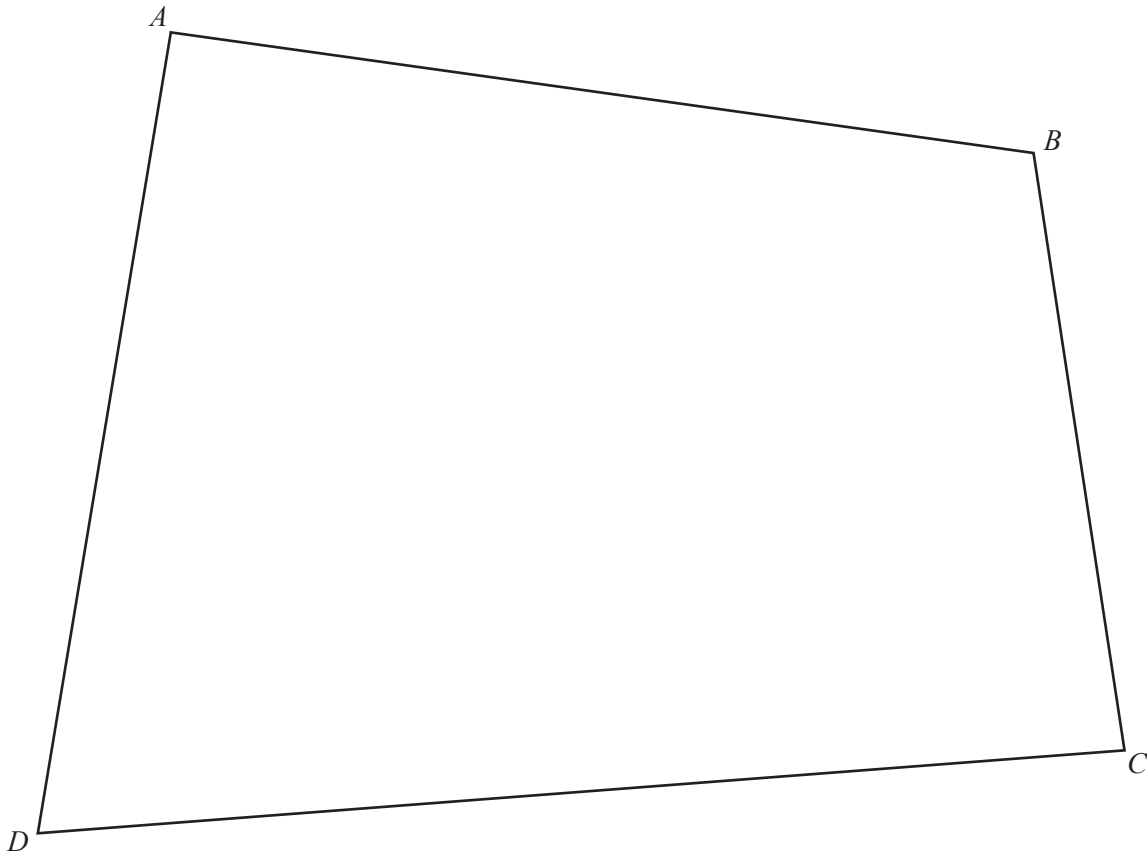
Nick wants to plant a tree in the park that is

- closer to *D* than it is to *C*

and

- the same distance from *DA* and *DC*.

Construct and indicate clearly the locus of points where Nick can plant the tree. [5]

**(b)** A lawn in the park is a rectangle with length 12 m and width 7 m.
Part of the lawn is removed to make a flower bed in the shape of a semicircle of radius 4.2 m.

7 m

12 m

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Calculate the area of lawn remaining.

............................................. m² [3]

**(c)** This table shows the distribution of heights of trees in the park.

| Height ($h$ cm) | Frequency |
|---|---|
| $100 < h \leqslant 110$ | 7 |
| $110 < h \leqslant 120$ | 11 |
| $120 < h \leqslant 130$ | 23 |
| $130 < h \leqslant 140$ | 35 |
| $140 < h \leqslant 150$ | $x$ |
| $150 < h \leqslant 160$ | 25 |

Nick uses midpoints to calculate an estimate of the mean height of these trees.
His estimated mean is 136 cm.

Calculate $x$, the number of trees in the interval $140 < h \leqslant 150$.

$x =$ .................................................. [6]

**4**

2 **(a)** In April 2016 a company was valued at £79 000 000 000.

   **(i)** Write 79 000 000 000 in standard form.

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

   **(ii)** In April 2016 there were $7.1 \times 10^9$ people on the Earth.

   If the £79 000 000 000 had been shared equally between every person on the Earth, how much money would each person have received?

   £  .................................................. [2]

**(b)** On average, the company earns £1400 every second.

   At this rate, how much will the company earn in 7 days?
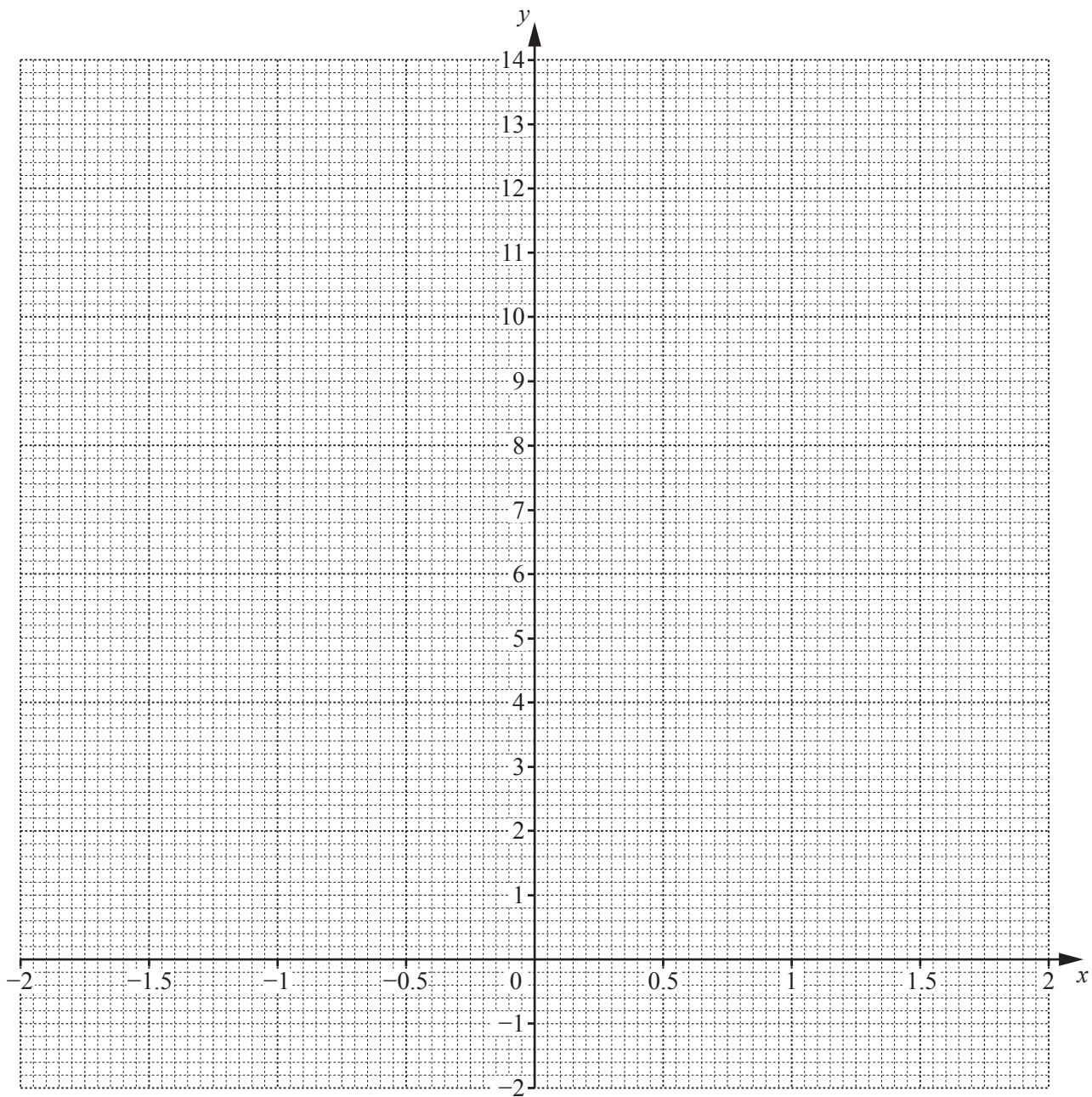   Give your answer in standard form, correct to 2 significant figures.

   £  .................................................. [3]

**3** **(a)** Complete the table of values for $y = 3x^2 - x - 1$.

| $x$ | $-2$ | $-1.5$ | $-1$ | $-0.5$ | $0$ | $0.5$ | $1$ | $1.5$ | $2$ |
|-----|------|--------|------|--------|-----|-------|-----|-------|-----|
| $y$ | 13 | 7.25 | | 0.25 | $-1$ | $-0.75$ | 1 | | 9 |

[2]

**(b)** On the grid, draw the graph of $y = 3x^2 - x - 1$ for $-2 \leqslant x \leqslant 2$.



[3]

**(c)** Use your graph to solve the equation $3x^2 - x - 1 = 0$.

.................................................. [2]

**6**

4 **(a)** A yacht sails 8.3 km north, then $x$ km west and then 14.1 km directly back to its starting point.

Calculate the total distance the yacht has sailed.

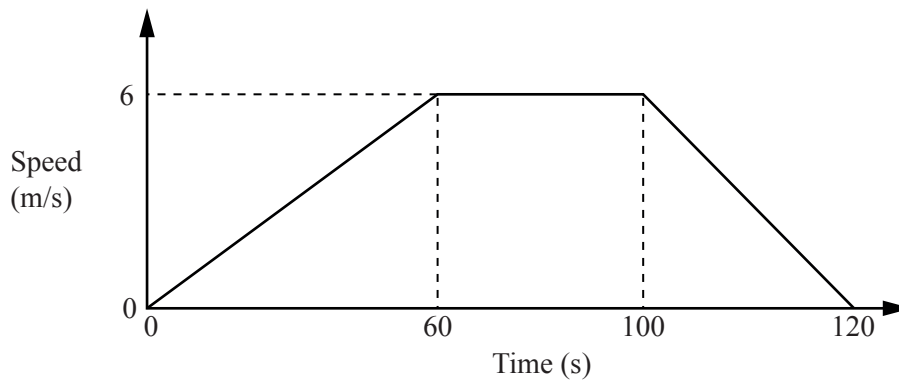........................................... km [4]

**(b)** Another yacht sails at an average speed of 14 km/h.

Calculate the time it takes this yacht to sail 45 km.
Give your answer in hours and minutes, correct to the nearest minute.

.................... hours .................... minutes [3]

**(c)** This speed–time graph represents the 120 seconds of motion of a boat.

Speed
(m/s)

6

0

0        60        100       120

Time (s)

Calculate the total distance travelled by the boat.

.............................................. m [3]

**(d)** A motor boat travels on a triangular course $PQR$.

$Q$ is 9 km due north of $P$.
$QR = 16$ km and $RP = 18$ km.

Calculate the bearing of $R$ from $Q$.

North

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$Q$        16 km

$R$

9 km

18 km

$P$
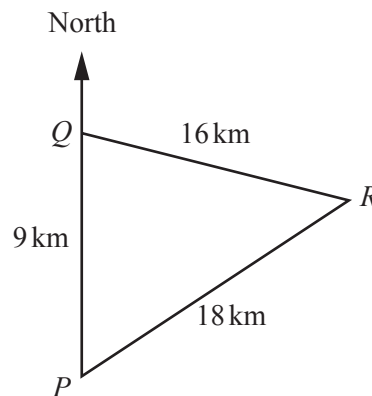
.................................................. [5]

**5** **(a)** A straight line, $L$, passes through point $A$ ($-2$, $-8$) and point $B$ (5, 6).

**(i)** Find the length of the line segment $AB$.

$AB =$ .................................................. [3]

**(ii)** Find the equation of the line $L$.
Give your answer in the form $y = mx + c$.

$y =$ .................................................. [3]

**(b)** $Q$ is the midpoint of the line segment $PR$.
$P$ is the point ($-1$, 3) and $Q$ is the point (5, 1).

Find the coordinates of point $R$.

$R =$ (.............. , ..............) [2]

**6**  **(a)**  The cost, £*c*, of a circular pizza is directly proportional to the square of its diameter, *d* inches.
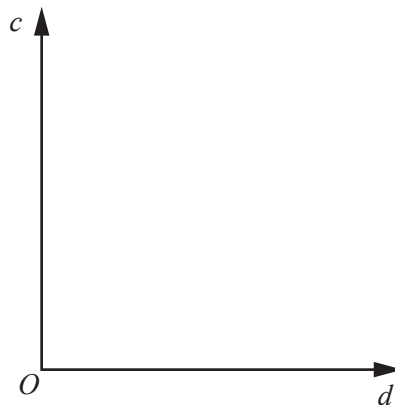A pizza with diameter 10 inches costs £8.

**(i)**  Find a formula for *c* in terms of *d*.

$c =$  .................................................... [2]

**(ii)**  Work out the cost of a pizza with diameter 12 inches.

£  .................................................... [1]

**(iii)**  Sketch the graph of *c* against *d*.



[1]

**(b)**  *P* is inversely proportional to *V*.
When *P* = 8, *V* = 72.

Find the value of *P* when *P* = *V*.

$P =$  .................................................... [3]

   **[Turn over**

**7** **(a)** Harry has a bag containing 7 black counters and 3 white counters.
He chooses a counter at random, notes its colour and replaces it in the bag.
He then chooses a second counter at random.

Calculate the probability that Harry chooses **at least one** white counter.

.................................................... [4]

**(b)** Arlene has two bags containing coloured counters.
Bag A has 4 green counters, 6 red counters and 2 yellow counters.
Bag B has 3 green counters and 3 red counters.

She takes a counter at random from Bag A and places it into Bag B.
She then takes a counter at random from Bag B and places it into Bag A.

Find the probability that, after these two moves, Bag A has 4 green counters, 6 red counters and 2 yellow counters.

.................................................... [4]

**8** **(a)** Sketch the graph of $x^2 + y^2 = 25$.
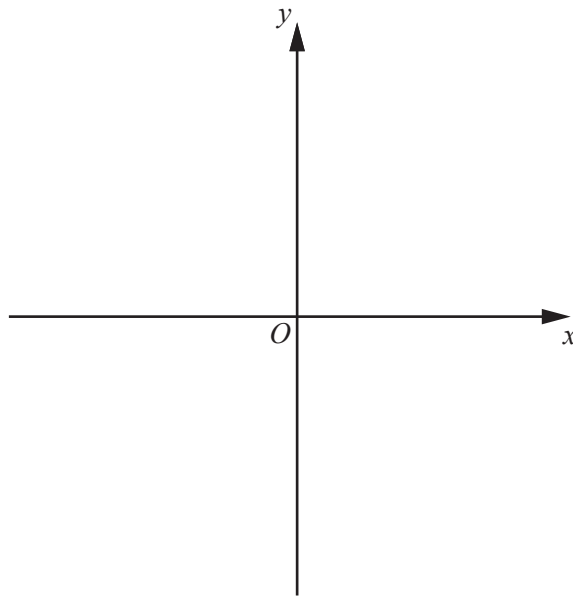


[2]

**(b)** **(i)** Solve these simultaneous equations.

$$x^2 + y^2 = 25$$
$$y = 3x - 2$$

You must show all your working.
Give your answers correct to 2 decimal places.

$x =$ ......................... $y =$ .........................

$x =$ ......................... $y =$ ......................... [7]

**(ii)** What do your answers to **part (i)** tell you about the graphs $x^2 + y^2 = 25$ and $y = 3x - 2$?

.................................................................................................................................................. [1]
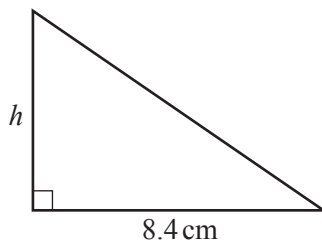
**9** **(a)** A regular pentagon has sides of length 4.2 cm correct to 1 decimal place.

Find the lower bound of the perimeter of the pentagon.

.......................................... cm [2]

**(b)**

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*h*

8.4 cm

The length of the base of a right-angled triangle is 8.4 cm correct to 1 decimal place.
The area of the triangle is 20.0 cm² correct to 1 decimal place.

Find the upper bound of the height, *h*, of the triangle.
Show the values you have used in your calculation.

.......................................... cm [3]

**10 (a)**
$$3\mathbf{A} + 4\begin{pmatrix} 1 & 7 \\ -2 & 5 \end{pmatrix} = \begin{pmatrix} -2 & 28 \\ 4 & 29 \end{pmatrix}$$

Find **A**.

$$\mathbf{A} = \begin{pmatrix} & \\ & \end{pmatrix}$$ [3]

**(b)**
$$\mathbf{B} = \begin{pmatrix} 2^{2x} & 32 \\ 2 & 2^{10x} \end{pmatrix}$$

The determinant of **B** is 0.

Find the value of $x$.

$x = $ .................................................. [4]

**11**  Models of trains are made to different scales.

  **(a)**  A model train that is made to a scale of 1 : 76.2  is called an OO model.

   **(i)**  A piston rod on the real train is 1.4 m long.

   Show that the rod on the OO model is less than 2 cm long.

[2]

   **(ii)**  The water tank in the OO model has a capacity of 8 millilitres.

   Find the capacity of the water tank in the real train.
   Give your answer in litres.

.......................................  litres [3]

  **(b)**  Two other models of the same train are made to different scales.

  A TT model is made to a scale of 1 : 120.
  A ZO model is made to a scale of 1 : 60.
  The two models are painted with the same thickness of paint.

  Khadeeja says:

   I will need 100% more paint for the TT model than for the ZO model.

  Explain why Khadeeja is wrong and calculate the correct percentage.

  ..................................................................................................................................................

  ..................................................................................................................................................

Correct percentage =  ...................................................[4]

**16**

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