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0626/06

October/November 2018

2 hours

Additional Materials: Geometrical instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

For π , use either your calculator value or 3.142.

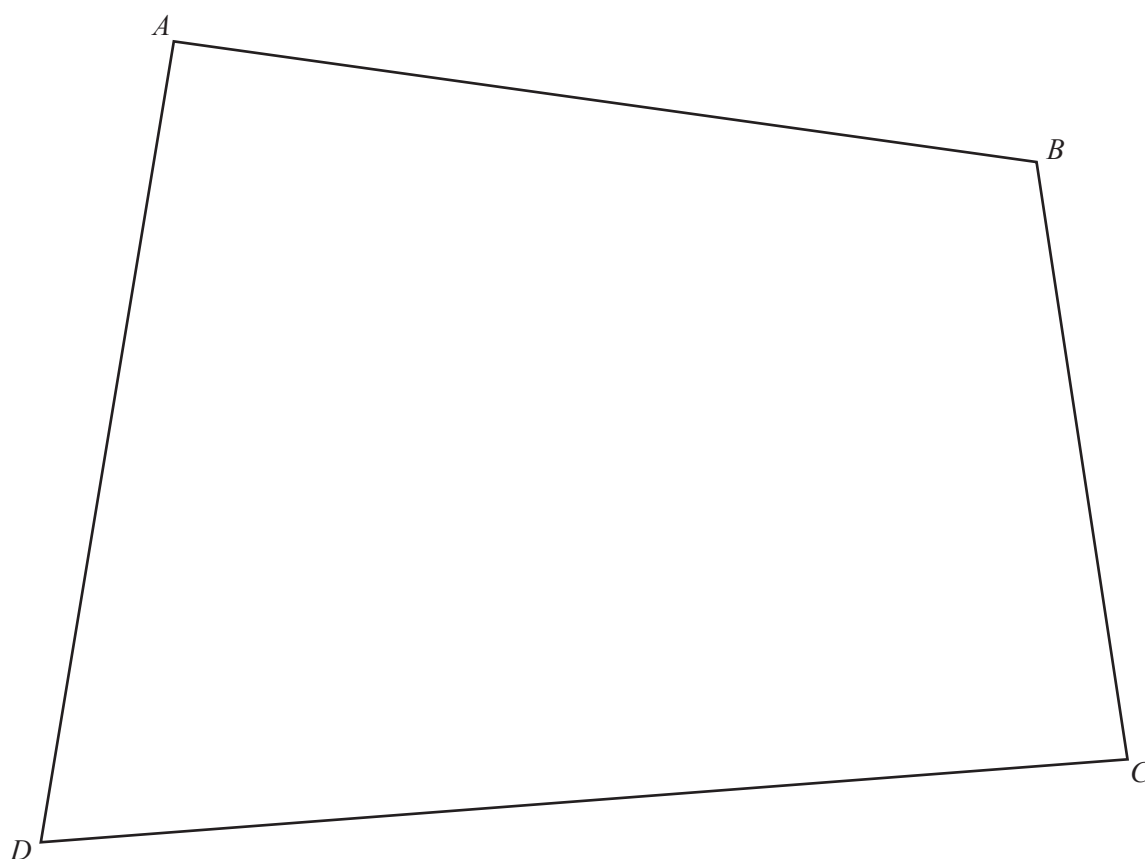
The total of the marks for this paper is 96.

This syllabus is regulated for use in England as a Cambridge International Level 1/Level 2 (9–1) Certificate.

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

- 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.



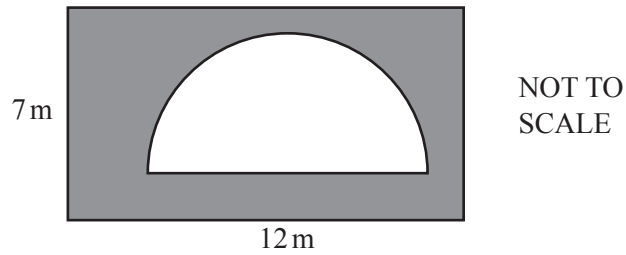
Nick wants to plant a tree in the park that is

- 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.



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
$100 < h \leq 110$	7
$110 < h \leq 120$	11
$120 < h \leq 130$	23
$130 < h \leq 140$	35
$140 < h \leq 150$	x
$150 < h \leq 160$	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 $140 < h \leq 150$.

$x =$ [6]

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 7.1×10^9 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.

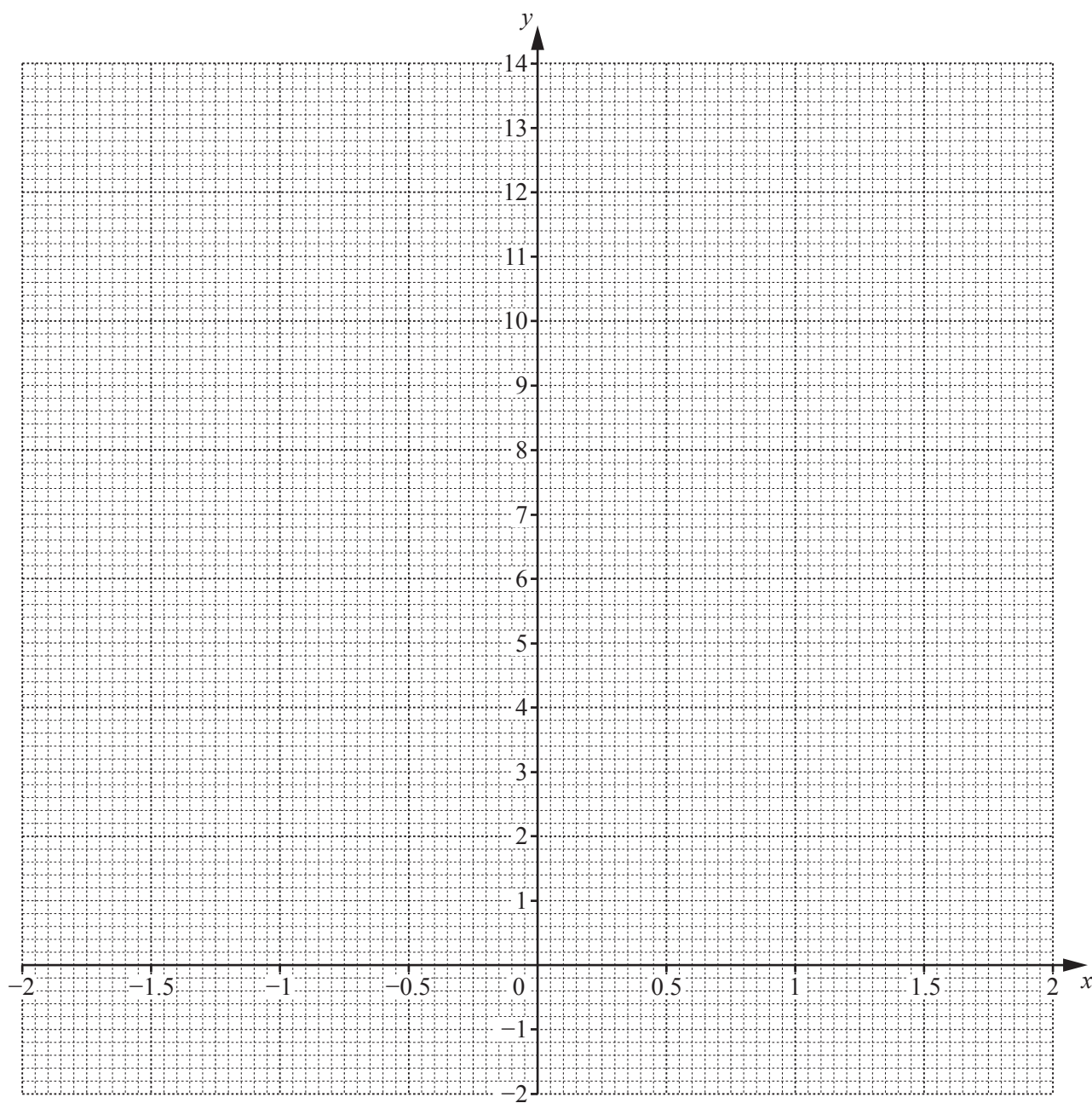
£ [3]

- 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 $-2 \leq x \leq 2$.



[3]

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

..... [2]

- 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]

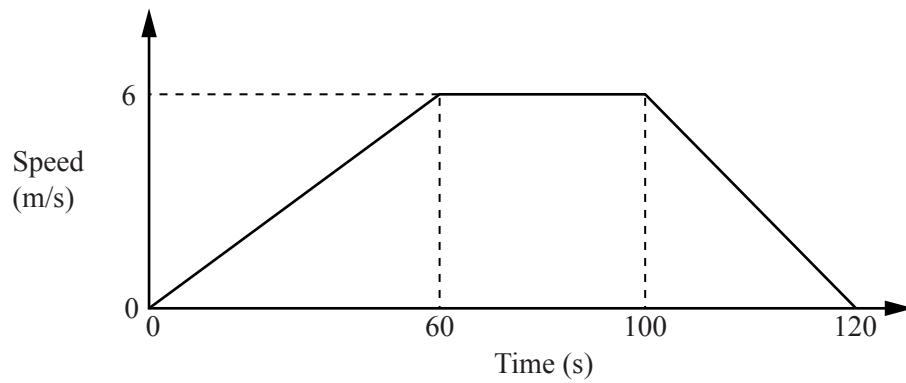
- (b) Another yacht sails at an average speed of 14 km/h.

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.



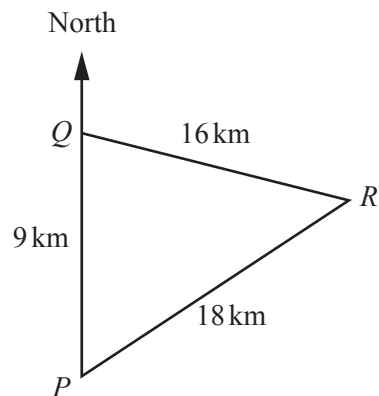
Calculate the total distance travelled by the boat.

..... 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 .



NOT TO
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..... [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 .

$R = (\text{.....}, \text{.....})$ [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.

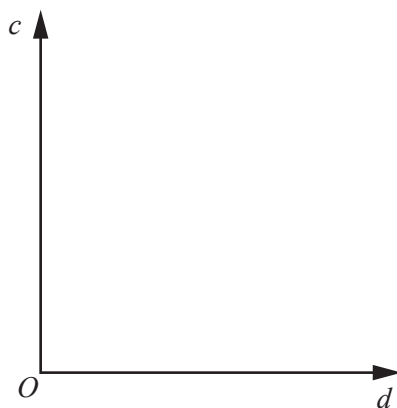
(i) Find a formula for c in terms of d .

$c =$ [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]

- 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]

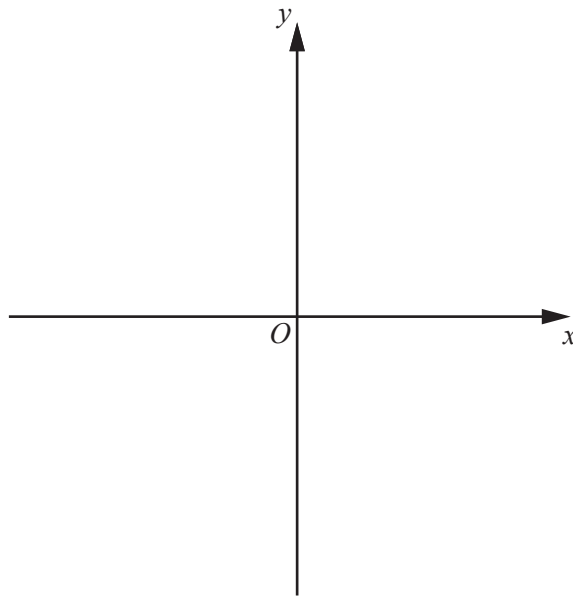
- (b) Arlene has two bags containing coloured counters.
Bag A has 4 green counters, 6 red counters and 2 yellow counters.
Bag B has 3 green counters and 3 red counters.

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.

$$\begin{aligned} x^2 + y^2 &= 25 \\ y &= 3x - 2 \end{aligned}$$

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

$$x = \dots\dots\dots y = \dots\dots\dots$$

$$x = \dots\dots\dots y = \dots\dots\dots [7]$$

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

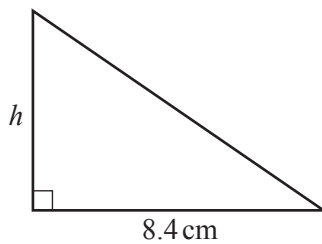
..... [1]

- 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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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 cm^2 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 $\mathbf{A}$.

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

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

The determinant of $\mathbf{B}$ is 0.

Find the value of x .

$$x = \dots\dots\dots [4]$$

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]

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