Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2458883713

MATHEMATICS **0580/11**

Paper 1 (Core) **October/November 2018**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

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 or graphs.
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DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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For π, 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 56.

This document consists of **12** printed pages.

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1 Work out 8% of 140.

.....[1]

2 The exchange rate between dollars and euros (€) is $1 = €0.88$.

Change $350 into euros.

€ .....[1]

3 Simplify $\frac{a^5}{a^2}$.

.....[1]

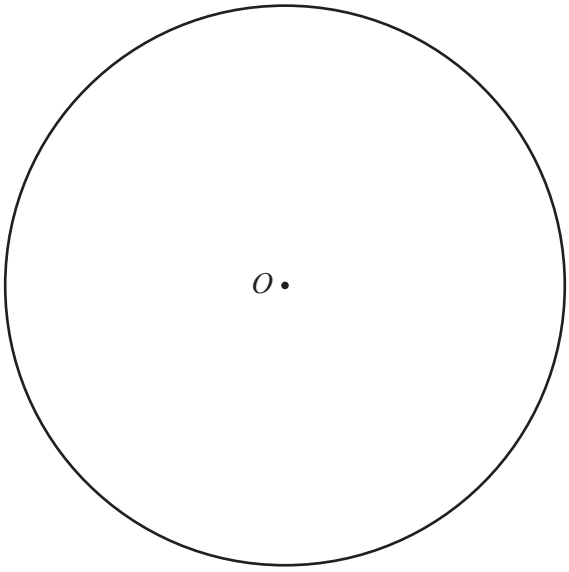
4 Write these in order of size, starting with the smallest.

0.38 $\frac{3}{8}$ 30% $\frac{7}{20}$

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

smallest

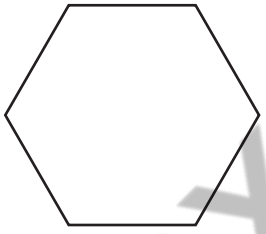
5 **(a)**



Measure the radius of the circle, centre O.
Give your answer in centimetres.

..... cm [1]

(b)



Write down the mathematical name of this polygon.

..... [1]

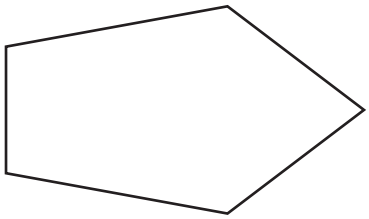
6 **(a)** Write 257 964 correct to the nearest thousand.

..... [1]

(b) Write 0.060 31 correct to 2 significant figures.

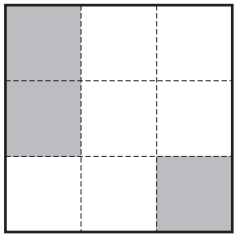
..... [1]

7 **(a)** Draw the line of symmetry on the shape below.



[1]

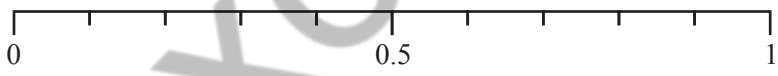
(b) Shade **one** more square so that this pattern has rotational symmetry of order 2.



[1]

8 A bag contains 50 counters.
10 of the counters are red.
One of the counters is taken from the bag at random.

(a) Draw an arrow (↓) on the scale to show the probability that this counter is red.



[1]

(b) Find the probability that the counter is **not** red.

..... [1]

9 **(a)** On Monday, the lowest temperature was –12 °C.
The highest temperature was 4 °C.

Work out the difference between these temperatures.

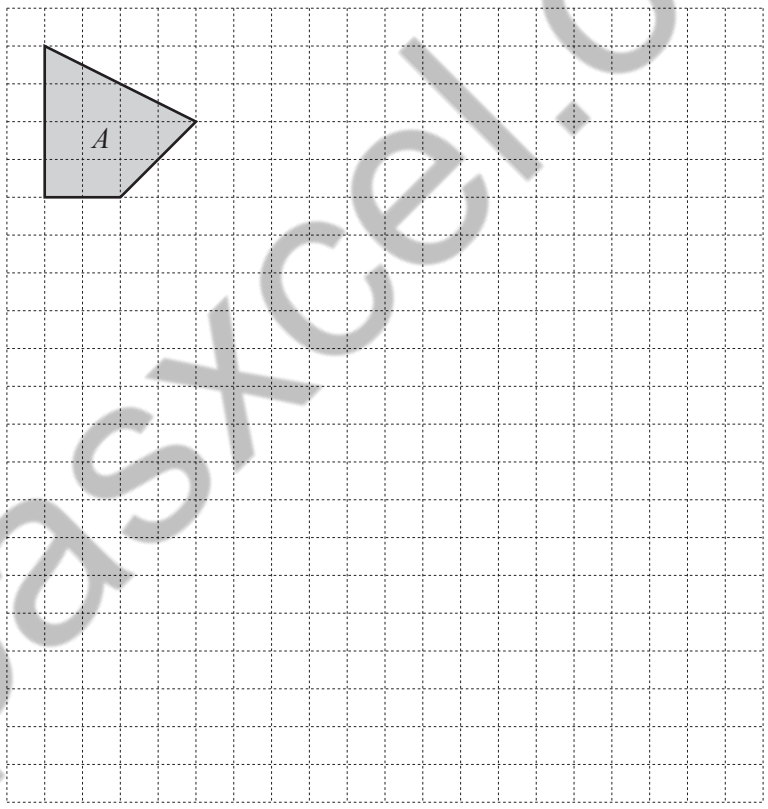
..... °C [1]

(b) On Tuesday, the highest temperature was –3 °C.
The lowest temperature was 8 °C lower than this.

Work out the lowest temperature on Tuesday.

..... °C [1]

10 Shape *A* is shown on the grid.



On the grid, enlarge shape *A* by scale factor 3. [2]

11 Work out.

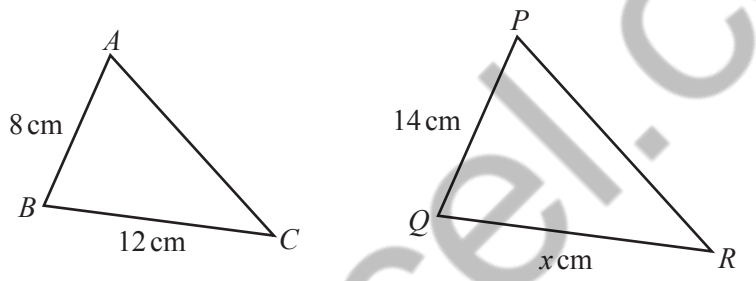
(a) $6\begin{pmatrix} 2 \\ -1 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $\begin{pmatrix} 5 \\ -3 \end{pmatrix} - \begin{pmatrix} 2 \\ 4 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

12



NOT TO SCALE

Triangle ABC is similar to triangle PQR.

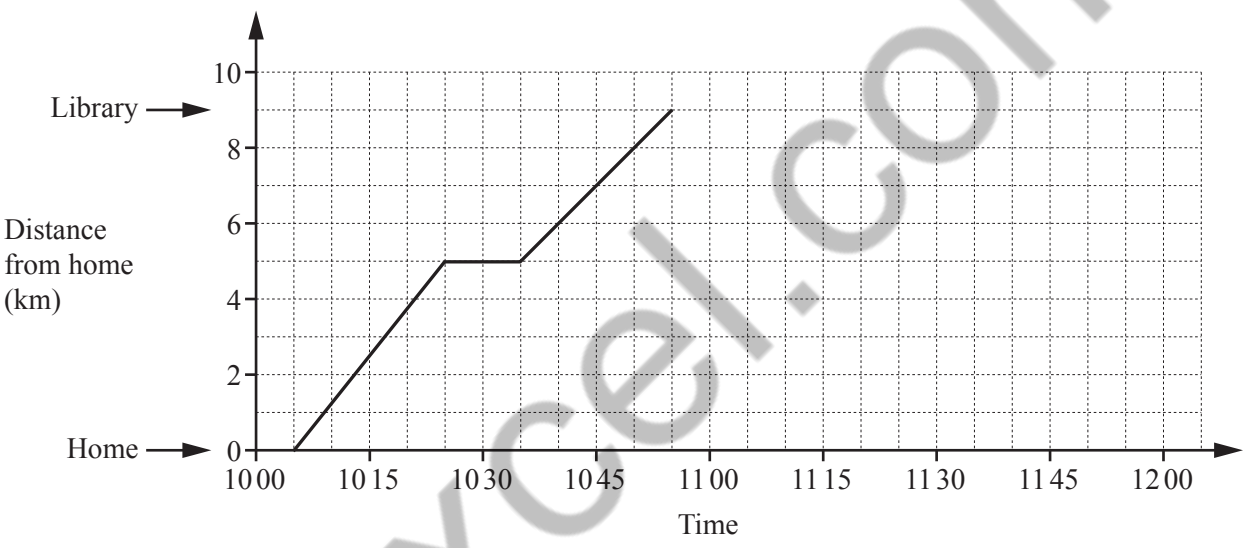
Find the value of x.

$x =$ ..... [2]

13 Calculate the size of one exterior angle of a regular 15-sided polygon.

..... [2]

14 Shohan cycles from home to the library.
He stops at the post office on the way.
The travel graph shows his journey.



(a) Write down the time Shohan arrives at the post office.

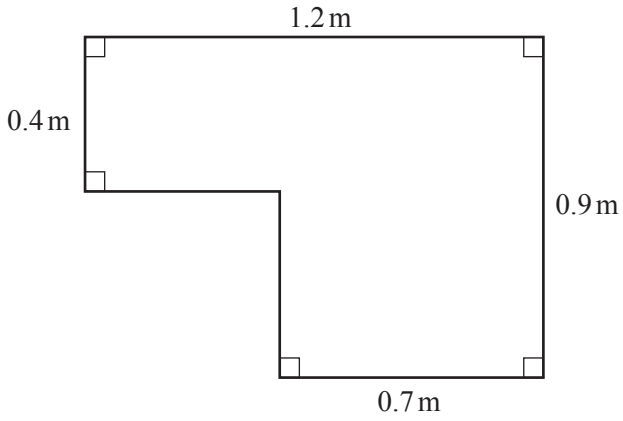
..... [1]

(b) Shohan stays at the library for 25 minutes.
He then cycles home at a constant speed of 18 km/h.

Complete the travel graph.

[2]

15 The diagram shows the top of a table.



NOT TO SCALE

(a) Calculate the perimeter.

..... m [1]

(b) Calculate the area.

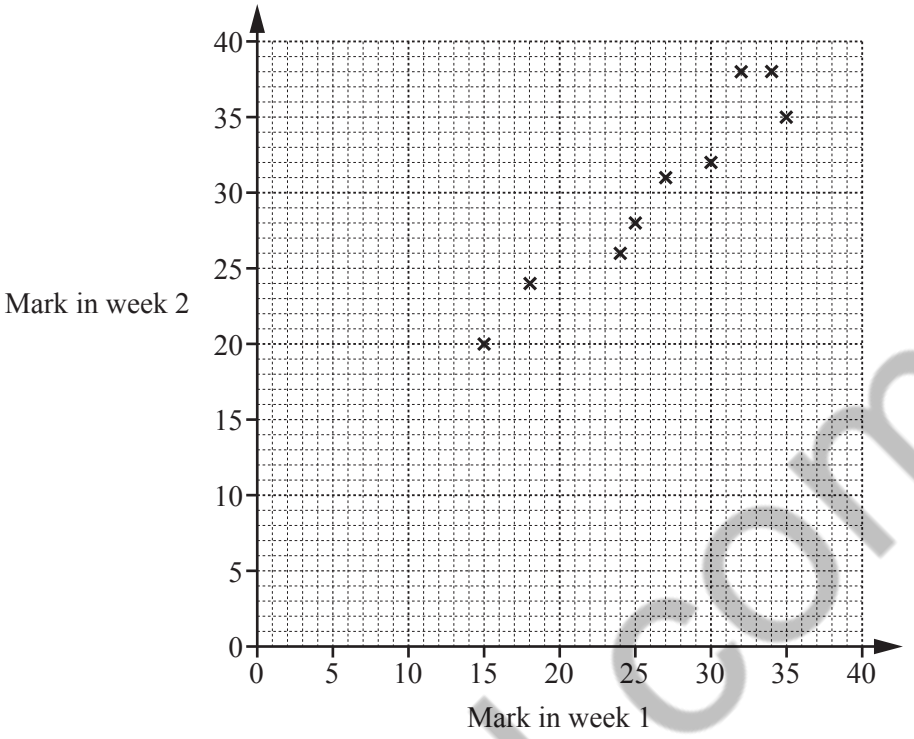
..... m^2 [2]

16 **Without using your calculator**, work out $\frac{3}{8} \div 2\frac{1}{4}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

17 A teacher gives her Spanish students a test each week.
Some of the students' marks for two weeks are shown in the scatter diagram.



(a) Leo scored 28 marks in week 1 and 30 marks in week 2.

On the scatter diagram, plot a point to show Leo's marks. [1]

(b) On the scatter diagram, draw a line of best fit. [1]

(c) Sonia scored 20 marks in week 1 but was absent in week 2.

Use your line of best fit to estimate a mark for Sonia in week 2.

..... [1]

18 Jan invests $800 at a rate of 3% per year simple interest.

Calculate the value of her investment at the end of 4 years.

$ ..... [3]

19 These are the first five terms in a sequence.

8 11 14 17 20

(a) Find the next term.

..... [1]

(b) Find an expression for the nth term.

..... [2]

20 A water tank in the shape of a cuboid has length 1.5 metres and width 1 metre.
The water in the tank is 60 centimetres deep.

Calculate the number of litres of water in the tank.

..... litres [3]

21 **(a)** In 2016, the population of Nigeria was 187 000 000.

Write 187 000 000 in standard form.

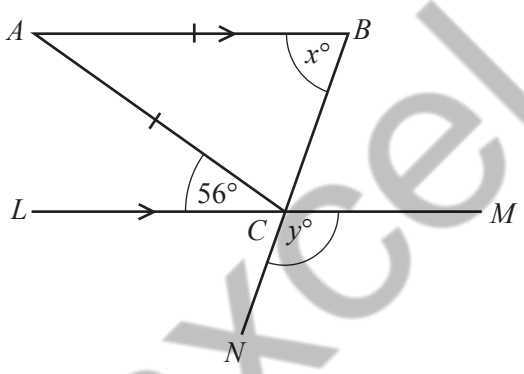
..... [1]

(b) In 2016, the population of South Africa was 5.50×10^7.
In 2016, the population of Kenya was 4.72×10^7.

Calculate the difference between the population of South Africa and the population of Kenya.
Give your answer in standard form.

..... [2]

22



NOT TO SCALE

The diagram shows an isosceles triangle ABC with $AB = AC$.
LCM and BCN are straight lines and LCM is parallel to AB.
Angle $ACL = 56°$.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [4]

Question 23 is printed on the next page.

23 **(a)** Expand the brackets and simplify fully.

$$5(x-3)+2(3x+1)$$

..... [2]

(b) Solve the simultaneous equations.
You must show all your working.

$$4x-y=14$$
$$3x+2y=5$$

$x =$ .....

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

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CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

8383126027

MATHEMATICS **0580/21**

Paper 2 (Extended) **October/November 2018**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
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For π, 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 70.

DC (LK/SW) 153146/2

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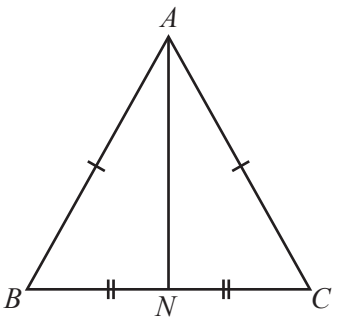
1 Carlos starts work at 21 20 and finishes at 06 15 the next day.

Calculate how long Carlos is at work.

..... h ..... min [1]

2



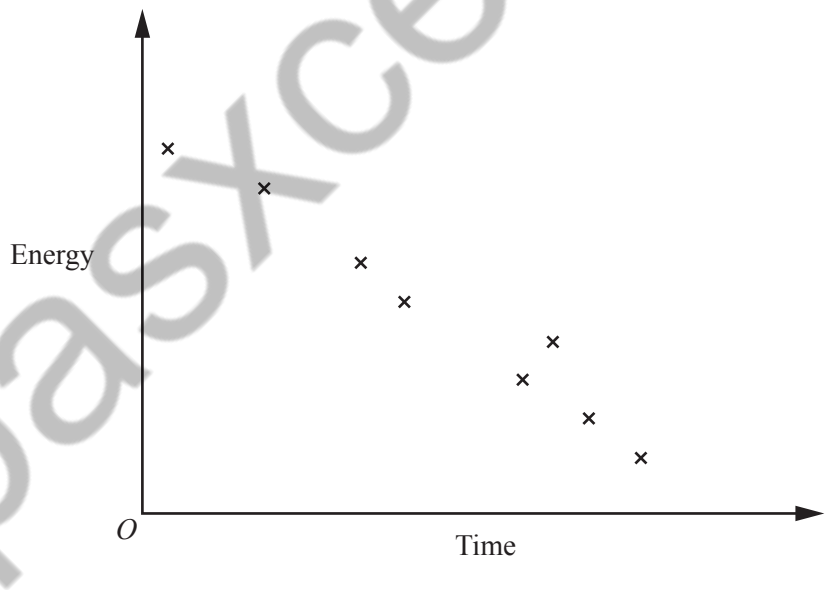
NOT TO SCALE

In the diagram, $AB = AC$ and $BN = NC$.

Complete the statement using a mathematical term.

Triangle ABN is ..... to triangle ACN. [1]

3



What type of correlation does the scatter diagram show?

.....[1]

4 Work out $(6.4 \times 10^7) + (9.6 \times 10^6)$.
Give your answer in standard form.

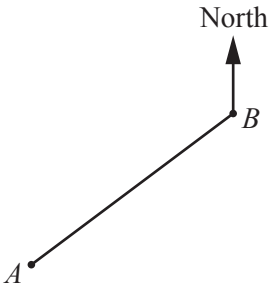
.....[2]

5 Expand and simplify.

$$(3x-7)(2x+9)$$

..... [2]

6



NOT TO SCALE

The bearing of A from B is 227°.

Find the bearing of B from A.

..... [2]

7 y is inversely proportional to x^3.
When $x = 2$, $y = 0.5$.

Find y in terms of x.

$y =$ ..... [2]

8 Saafia has a barrel containing 6000 millilitres of oil, correct to the nearest 100 ml.
She uses the oil to fill bottles which each hold exactly 50 ml.

Calculate the upper bound for the number of bottles she can fill.

..... [2]

9 Jan invests \$800 at a rate of 3% per year simple interest.

Calculate the value of her investment at the end of 4 years.

\$ ..... [3]

10 A water tank in the shape of a cuboid has length 1.5 metres and width 1 metre.
The water in the tank is 60 centimetres deep.

Calculate the number of litres of water in the tank.

..... litres [3]

11 These are the first five terms in a sequence.

8 11 14 17 20

(a) Find the next term.

..... [1]

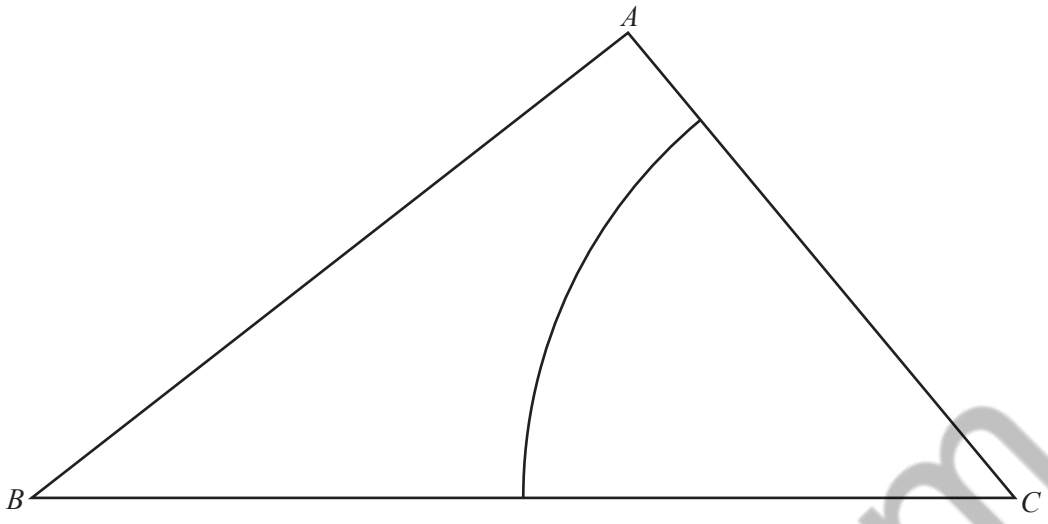
(b) Find an expression for the nth term.

..... [2]

12 Find the integer values of n that satisfy the inequality $15 \leqslant 4n < 28$.

..... [3]

13



The diagram shows a triangle ABC and an arc with centre C and radius 6.5 cm.

(a) **Using a straight edge and compasses only**, construct the locus of points inside the triangle that are equidistant from BA and BC. [2]

(b) Shade the region inside the triangle that is

- more than 6.5 cm from C

and

- nearer to BA than to BC. [1]

14 **Without using your calculator**, work out $\frac{3}{8} \div 2\frac{1}{4}$.

You must show all your working and give your answer as a fraction in its simplest form.

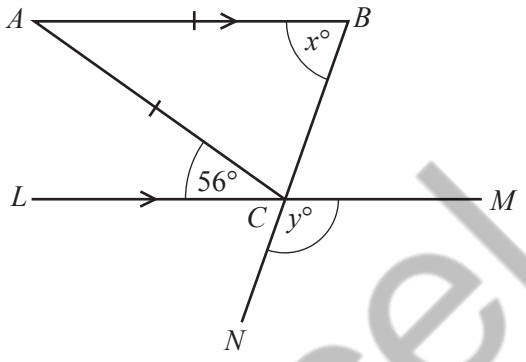
..... [3]

15 Write as a single fraction in its simplest form.

$$\frac{x-5}{3}+\frac{6}{x+2}$$

..... [3]

16



NOT TO SCALE

The diagram shows an isosceles triangle ABC with $AB = AC$.
LCM and BCN are straight lines and LCM is parallel to AB.
Angle $ACL = 56°$.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [4]

17 **(a)** $t^x \times t^2 = t^{10}$

Find the value of x.

$x =$ ..... [1]

(b) Simplify.

(i) $\left(\frac{4}{x}\right)^{-2}$

..... [1]

(ii) $a^3b^7 \div a^6b^2$

..... [2]

18 Solve the simultaneous equations.
You must show all your working.

$$2x + 3y = -12$$
$$5x + 2y = 14$$

$x =$ .....

$y =$ ..... [4]

19 Use the quadratic formula to solve the equation $3x^2 + 7x - 11 = 0$.
You must show all your working and give your answers correct to 2 decimal places.

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

20 $\mathbf{M} = \begin{pmatrix} 8 & 2 \\ 7 & 3 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 4 & -1 \\ -3 & 5 \end{pmatrix}$

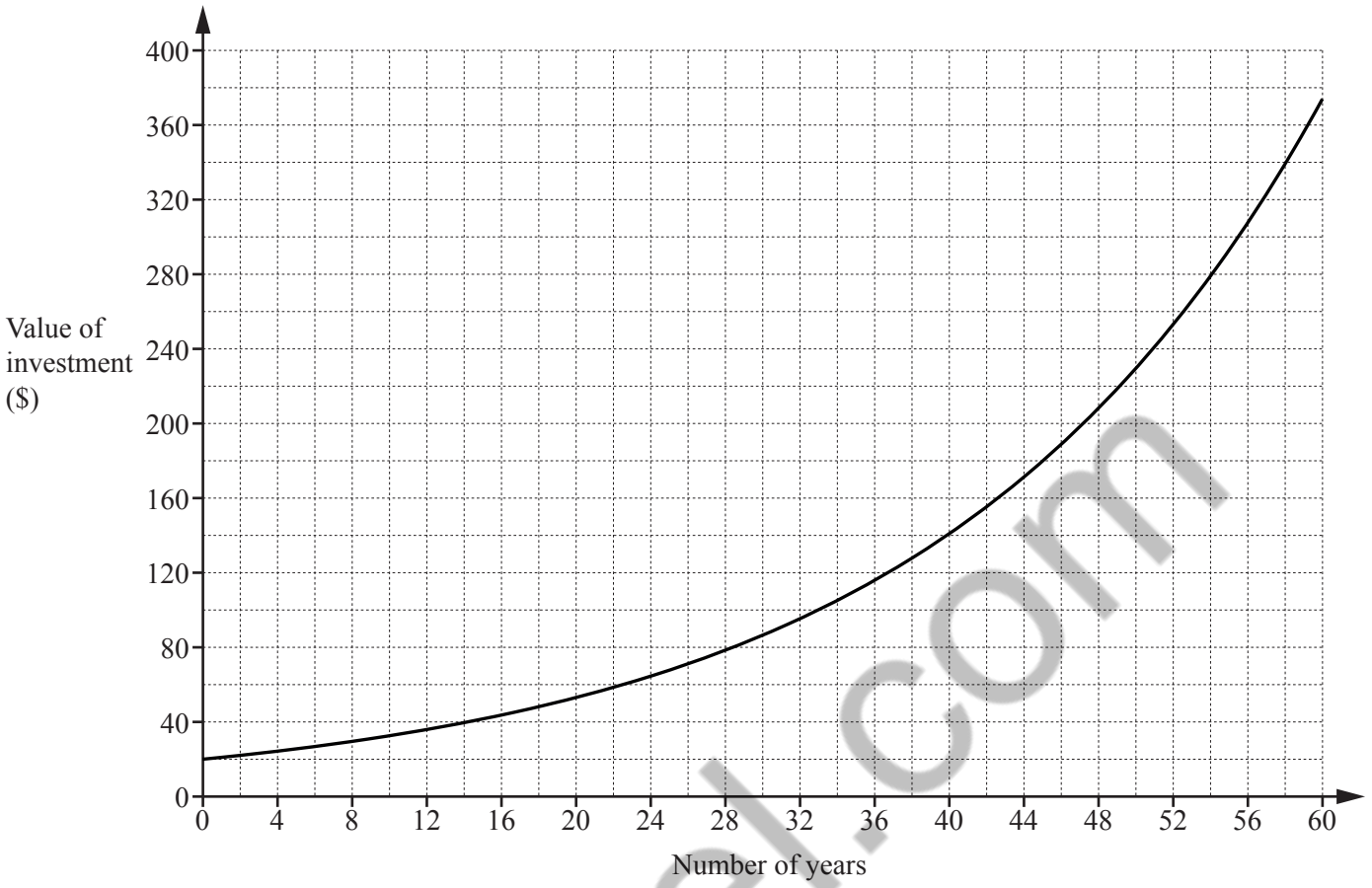
(a) Find **MN**.

$\mathbf{MN} =$ ( ) [2]

(b) Find $\mathbf{M}^{-1}$.

$\mathbf{M}^{-1} =$ ( ) [2]

21



When Heidi was born, her grandfather invested some money in an account that paid compound interest. The graph shows the exponential growth of this investment.

(a) Use the graph to find

(i) the original amount of money invested,

$ ..... [1]

(ii) the number of years it took for the original amount to double,

..... years [1]

(iii) the value of the investment after 54 years.

$ ..... [1]

(b) This account earned compound interest at a rate of r% per year.

Use your answers to **part (a)(i)** and **part (a)(ii)** to write down an equation in terms of r.
You do not have to solve your equation.

..... [2]

22 A group of 200 people were asked which city they would like to visit next.
The table shows the results.

City	London	Paris	New York	Tokyo
Number of people	50	48	56	46

(a) A person from the group is chosen at random.

Write down the probability that this person would like to visit either Paris or Tokyo next.

..... [2]

(b) Two people are chosen at random from the group of 200.

Find the probability that one person would like to visit London next and the other person would like to visit New York next.
Give your answer as a percentage.

..... % [3]

23 $f(x) = 7 + 3x$ $g(x) = x^4$ $h(x) = 3^x$

(a) $h(3x) = k^x$

Find the value of k.

$k =$ ..... [2]

(b) Find the value of x when $f(x) = g(2)$.

$x =$ ..... [2]

(c) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

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CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
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The total of the marks for this paper is 104.

1 Lena owns a café.

(a) One day, Lena records the drinks she sells in one hour.

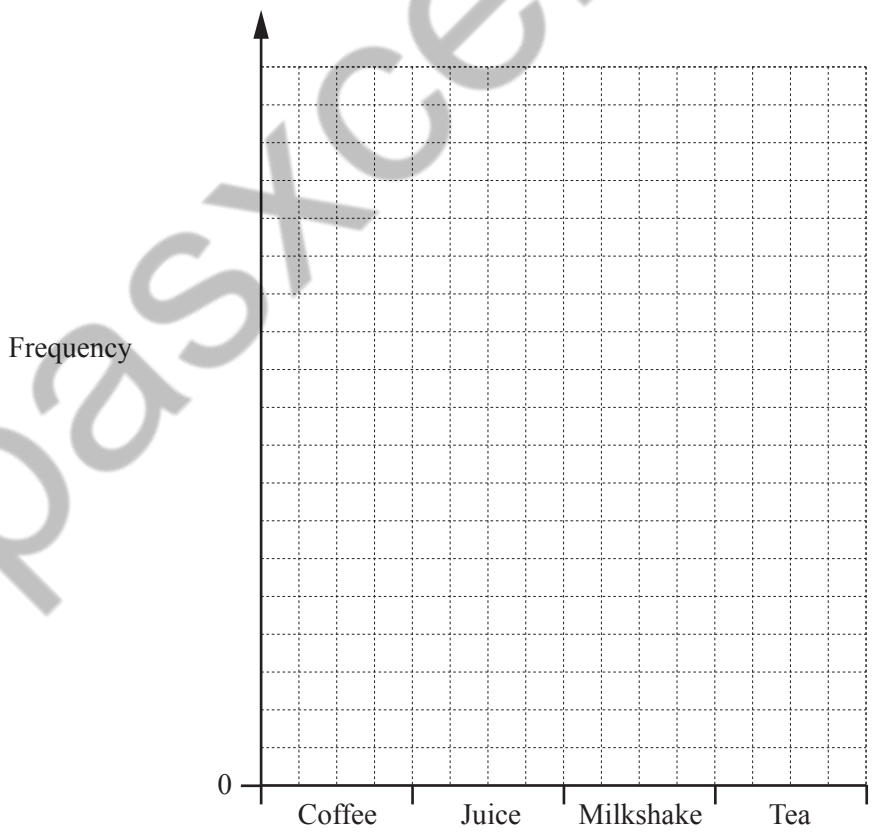
Tea	Tea	Coffee	Juice	Milkshake	Milkshake	Coffee	Coffee
Milkshake	Coffee	Tea	Juice	Tea	Coffee	Tea	Juice
Milkshake	Tea	Milkshake	Tea	Coffee	Tea	Milkshake	Coffee

(i) Complete the frequency table.
You may use the tally column to help you.

Drink	Tally	Frequency
Coffee		
Juice		
Milkshake		
Tea		
	Total	24

[2]

(ii) Draw a bar chart to show this information.
Complete the scale on the frequency axis.



[3]

(b) This table shows the opening hours of the café.

Day	Opening hours
Monday to Thursday	08 30 to 17 00
Friday and Saturday	08 30 to 19 00
Sunday	09 00 to 18 00

(i) Work out the total number of hours the café is open in one week.

..... hours [2]

(ii) Lena is in the café for 40 hours each week.
Ron is in the café when Lena is not there.

Calculate the percentage of the total opening hours that Ron is in the café each week.

.....% [2]

(c) Saddak buys 3 cups of tea and 2 cookies for $6.95 .
A cup of tea costs $1.75 .

Work out the cost of one cookie.

$ ..... [2]

(d) The price of a cake is $2.60 .
At the end of the day, Lena reduces the price of each cake by 35%.

Calculate the reduced price of a cake.

$ ..... [2]

2 **(a)** Write down all the factors of 18.

..... [2]

(b) Write down a prime number between 40 and 50.

..... [1]

(c) Calculate $1.09 + \frac{7.85}{6.21 - 4.37}$.

Give your answer correct to 1 decimal place.

..... [2]

(d) Find the value of

(i) $\sqrt{2.89}$,

..... [1]

(ii) 14^3,

..... [1]

(iii) 4^{-2}.

..... [1]

(e) (i) $126 = 2 \times 3^2 \times k$

Find the value of k.

$k =$ ..... [1]

(ii) Write 90 as the product of its prime factors.

..... [2]

(iii) Find the lowest common multiple (LCM) of 90 and 126.

..... [2]

3 **(a)** The table gives some information about the numbers of visitors at a leisure centre one day.

	Adult	Child	Total
Male		144	240
Female	129		260
Total	225	275	500

(i) Complete the table. [1]

(ii) Work out how many more child visitors than adult visitors there are.

..... [1]

(iii) Write down the fraction of visitors that are adults.
Give your answer in its lowest terms.

..... [2]

(iv) Write the ratio number of males : number of females.
Give your answer in its simplest form.

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

(v) One of these visitors is selected at random.

Find the probability that this visitor is a male child.

..... [1]

(b) The number of people in each of 150 cars entering the leisure centre car park is recorded. The table shows the results.

Number of people	1	2	3	4	5
Frequency	44	43	30	25	8

(i) Write down the mode.

..... [1]

(ii) Calculate the mean.

..... [3]

(c) In a survey of 50 visitors to the leisure centre, 18 used the gym.
One day, 1500 people visited the leisure centre.

Calculate an estimate for the number of people who used the gym on this day.

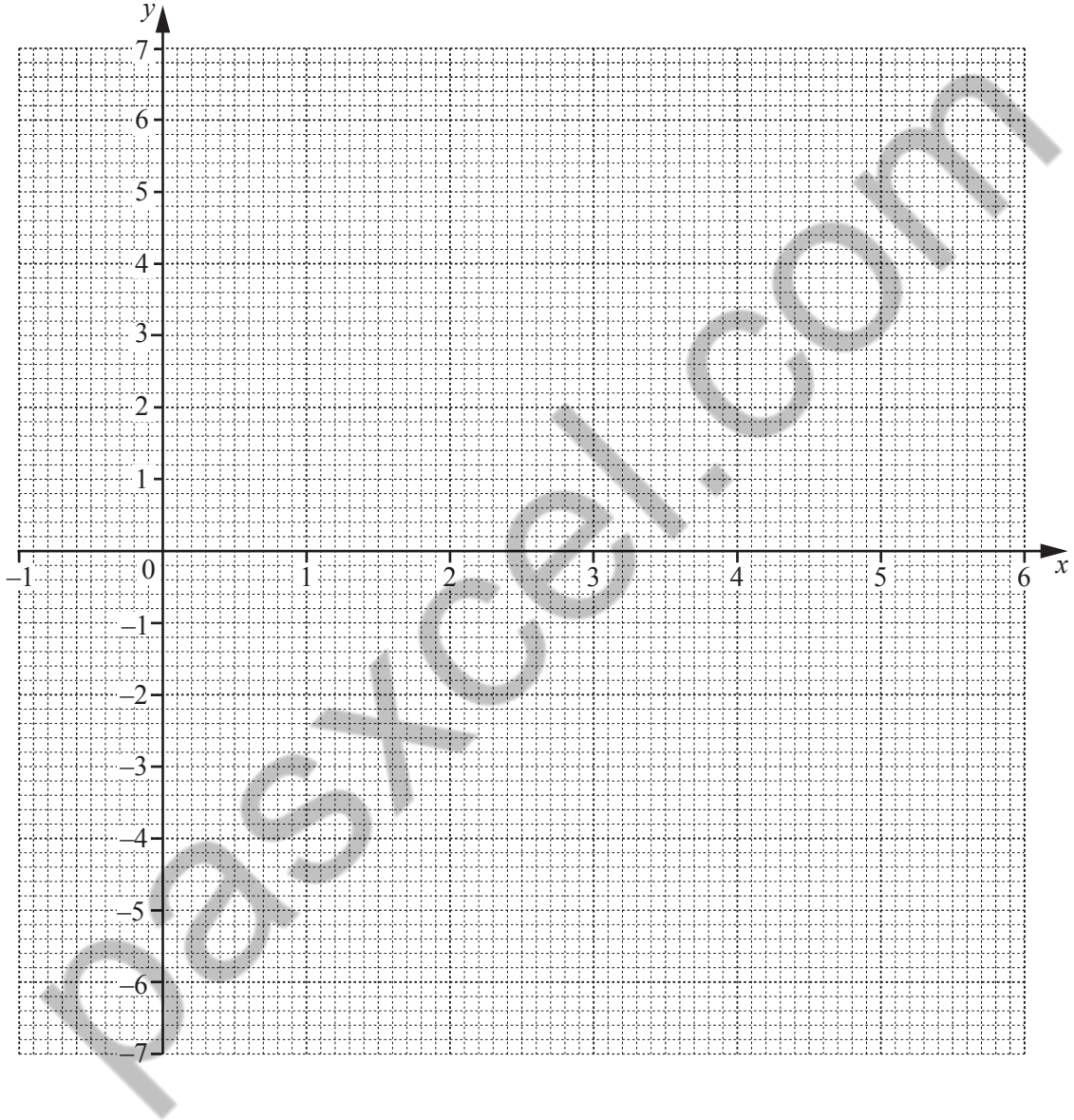
..... [2]

4 **(a)** **(i)** Complete the table of values for $y = x^2 - 5x$.

x	–1	0	1	2	3	4	5	6
y			–4	–6	–6	–4	0	

[2]

(ii) On the grid, draw the graph of $y = x^2 - 5x$ for $-1 \leqslant x \leqslant 6$.



[4]

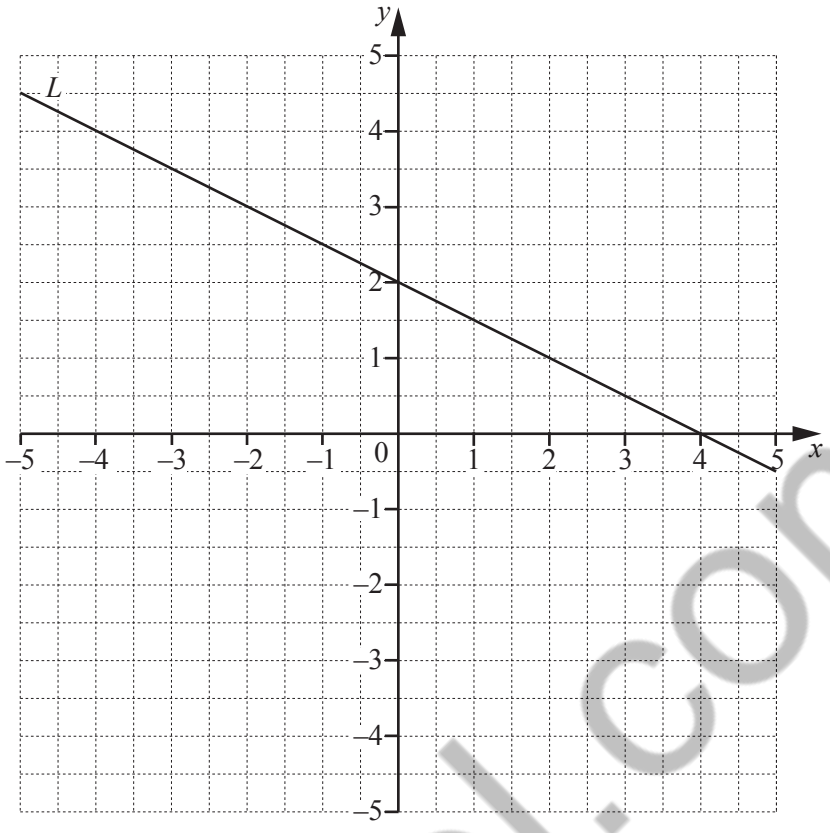
(iii) Write down the co-ordinates of the lowest point of your graph.

(..... , ...) [1]

(iv) Use your graph to solve the equation $x^2 - 5x = 3$.

x = ... or x = ... [2]

(b)



Line L is drawn on the grid.

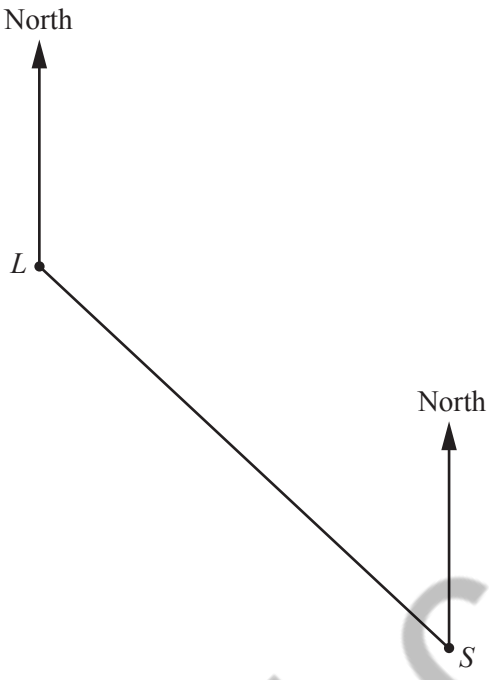
(i) Find the equation of line L in the form $y = mx + c$.

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

(ii) Line P is parallel to line L and passes through the point $(0, -1)$.

On the grid above, draw line P for $-5 \leqslant x \leqslant 5$. [2]

5 **(a)** The scale drawing shows the positions of a lighthouse L and a ship S.
The scale is 1 centimetre represents 5 kilometres.



Scale: 1 cm to 5 km

(i) Work out the actual distance, in kilometres, from S to L.

..... km [2]

(ii) Measure the bearing of S from L.

..... [1]

(iii) Another ship, T, is 22 km from L on a bearing of 210°.

Mark and label the position of T on the scale drawing. [2]

(b) In this part, use a ruler and compasses only and show your construction arcs clearly.

The scale drawing shows the positions of two yachts, P and Q.
The scale is 1 centimetre represents 100 metres.

Scale: 1 cm to 100 m

(i) Construct the locus of points equidistant from P and Q. [2]

(ii) Another yacht, Y, is

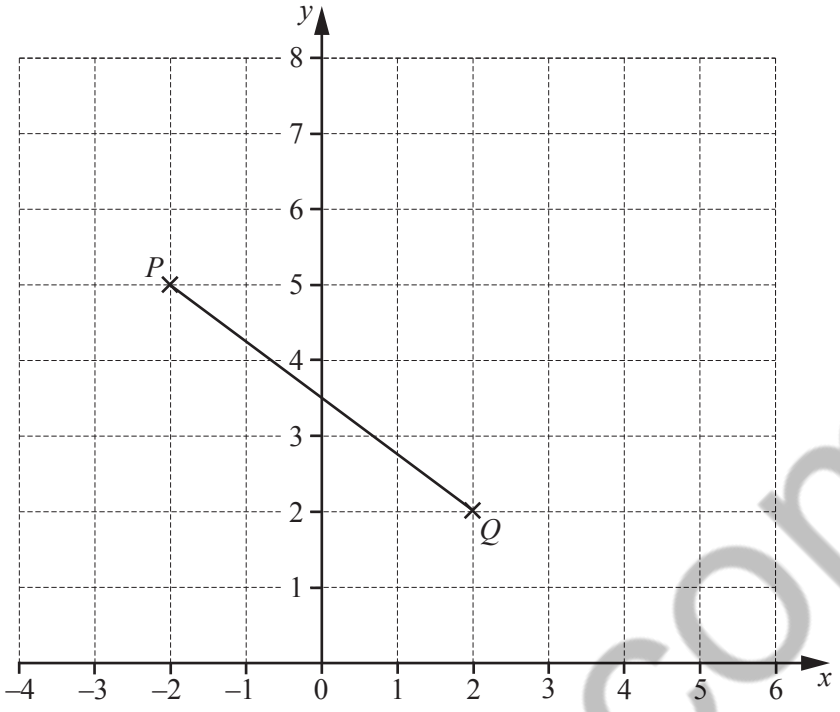
- closer to P than to Q

and

- less than 700 m from Q.

On the scale drawing, construct and shade the region where yacht Y is. [3]

6 (a)



(i) Write down the co-ordinates of point P.

(..... , ...) [1]

(ii) Write down the column vector $\overrightarrow{PQ}$.

$\overrightarrow{PQ} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(iii) $\overrightarrow{QR} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

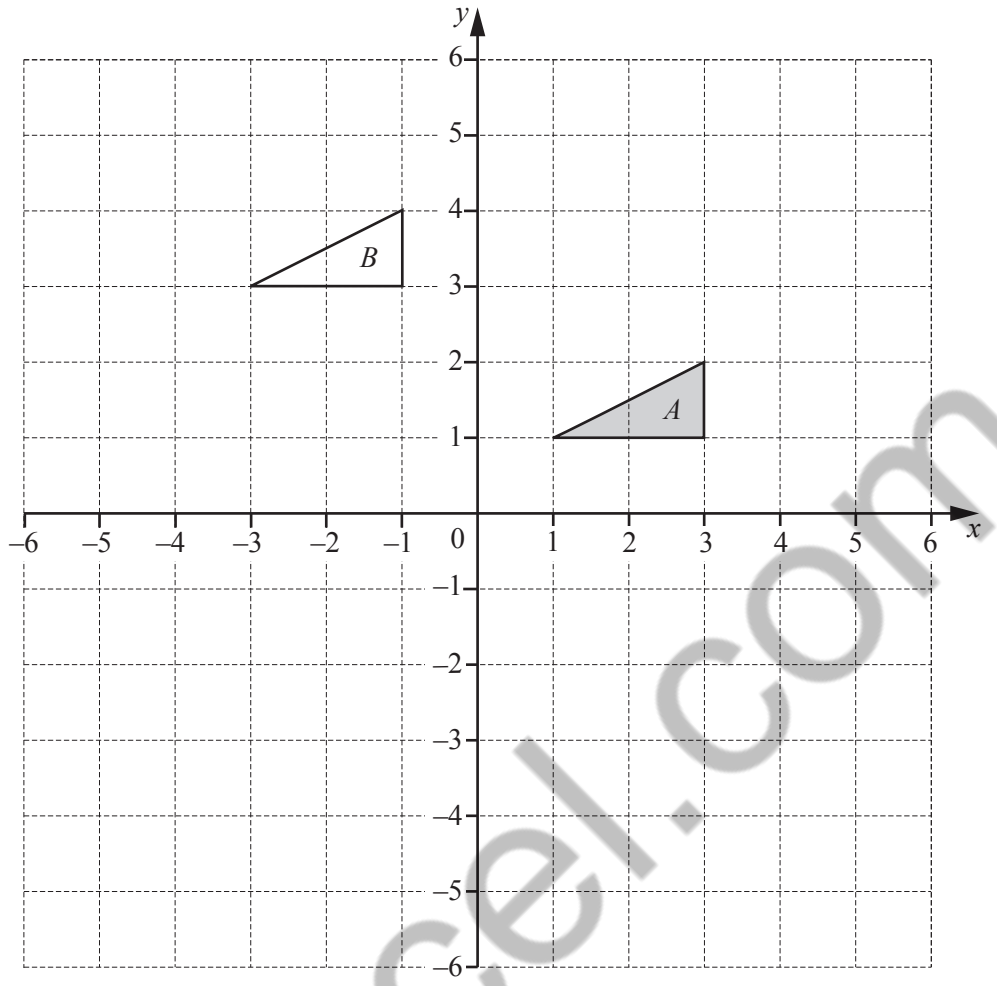
On the grid, plot point R. [1]

(iv) $PQRS$ is a parallelogram.

On the grid, complete the parallelogram $PQRS$.
Write down the co-ordinates of point S.

(..... , ...) [2]

(b)



(i) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [2]

(ii) On the grid, draw the image of triangle A after a reflection in the line $y = -1$. [2]

(iii) On the grid, draw the image of triangle A after a rotation through 180° about (0, 0). [2]

7 Nora makes a birthday cake.

(a) Nora has a packet containing 250 g of cherries.

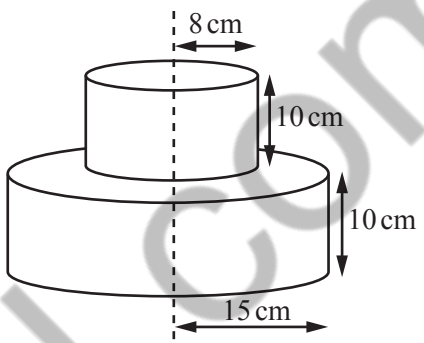
She uses $\frac{7}{10}$ of the cherries in the cake.

Find the mass of cherries she has left.

..... g [2]

(b) The cake is made by putting a small cylinder of cake on top of a large cylinder of cake.

The radius of the large cylinder is 15 cm.
The radius of the small cylinder is 8 cm.
The height of each cylinder is 10 cm.



NOT TO SCALE

(i) Calculate the total volume of the cake.

..... cm^3 [3]

(ii) Nora wraps a ribbon around the large cylinder.
The ribbon is 4 cm longer than needed to go all the way around this cylinder.

Calculate the length of this ribbon.

..... cm [3]

(c) The mass, m grams, of the cake is 1250 g, correct to the nearest 10 g.

Complete this statement about the value of m.

..... $\leqslant m <$ ..... [2]

8 **(a)** Simplify.

$4c + 2d - c + 6d$

..... [2]

(b) $h = 5m - 2n$

Calculate h when $m = 4$ and $n = -6$.

..... [2]

(c) Solve.

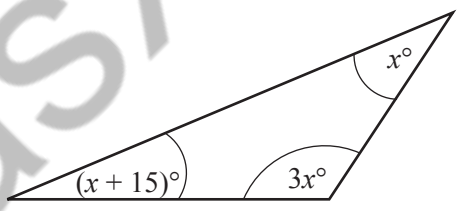
$7(x - 3) = 56$

$x =$ ..... [2]

(d) Make t the subject of the formula $r = 6t + 7$.

$t =$ ..... [2]

(e) The diagram shows a triangle.



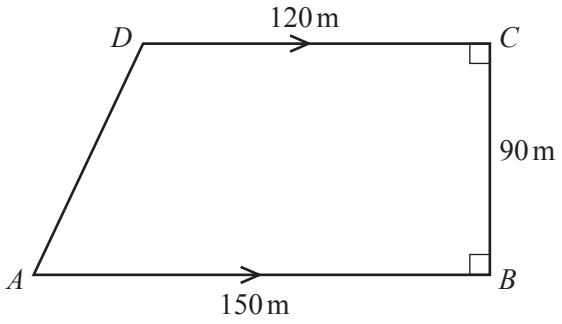
NOT TO SCALE

Use the diagram to write down an equation and solve it to find the value of x.

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

Question 9 is printed on the next page.

9



NOT TO SCALE

The diagram shows a field in the shape of a trapezium.
$AB = 150$ m, $BC = 90$ m and $CD = 120$ m.
Angle ABC = angle $BCD = 90°$.

(a) Calculate the area of the field.

.....m^2 [2]

(b) (i) Show that $AD = 95$ m, correct to the nearest metre.

[3]

(ii) A fence is built around the perimeter of the field.
It costs \$48 to build each 5-metre section of the fence.

Calculate the cost of building this fence.

\$ ..... [3]

Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

2578031092

MATHEMATICS **0580/41**

Paper 4 (Extended) **October/November 2018**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

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 or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
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 π, 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 130.

1 Marianne sells photos.

(a) The selling price of each photo is \$6.

(i) The selling price for each photo is made up of two parts, printing cost and profit.
For each photo, the ratio printing cost : profit = 5 : 3.

Calculate the profit she makes on each photo.

\$ ..... [2]

(ii) Calculate her profit as a percentage of the selling price.

.....% [1]

(iii) Calculate the selling price of a photo in euros (€) when the exchange rate is €1 = \$1.091 .

€ ..... [2]

(b) Marianne sells two sizes of photo.
These photos are mathematically similar rectangles.
The smaller photo has length 15 cm and width 12 cm.
The larger photo has area 352.8 cm^2.

Calculate the length of the larger photo.

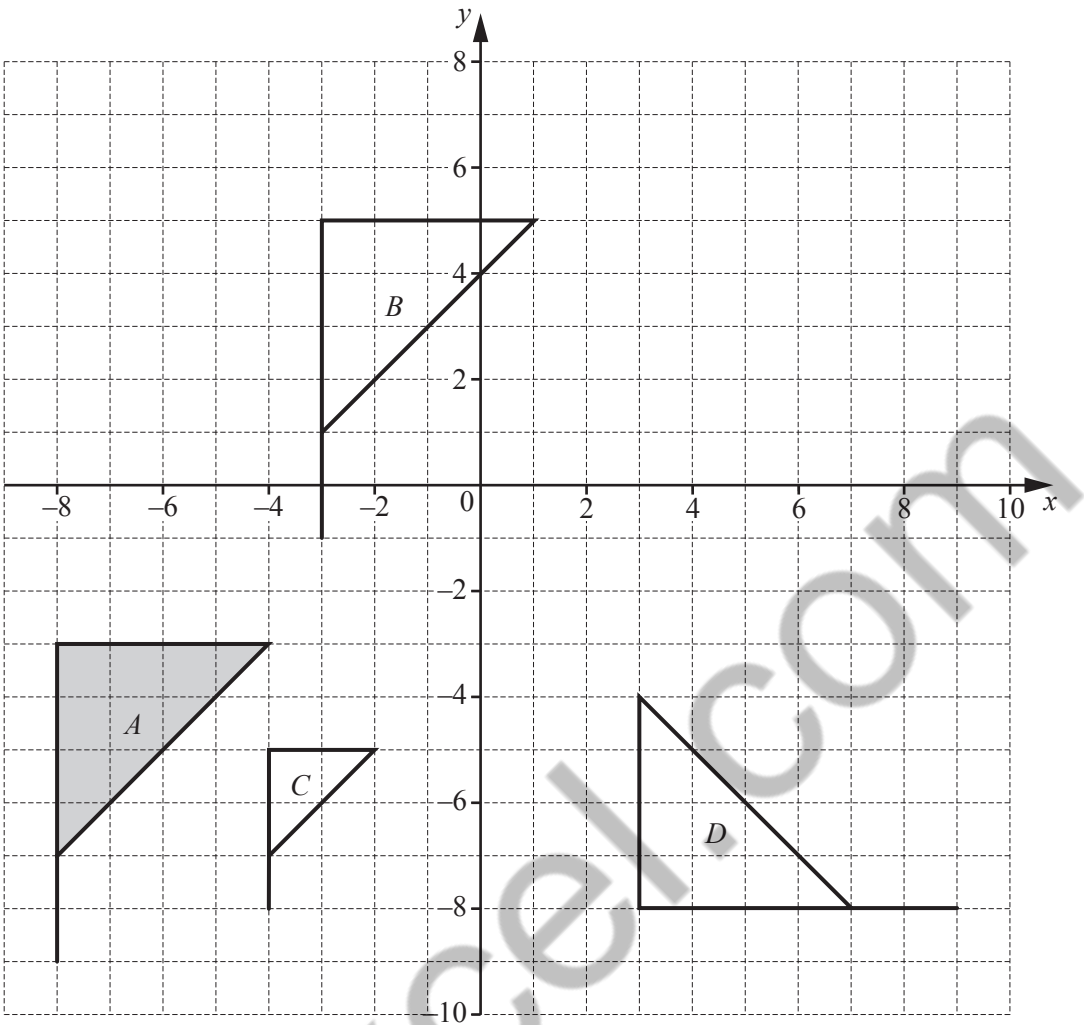
..... cm [3]

(c) In a sale, Marianne buys a new camera for \$483.
This is a reduction of 8% on the original price.

Calculate the original price of the camera.

\$ ..... [3]

2



(a) Describe fully the **single** transformation that maps

(i) flag *A* onto flag *B*,

.....

..... [2]

(ii) flag *A* onto flag *C*,

.....

..... [3]

(iii) flag *A* onto flag *D*.

.....

..... [3]

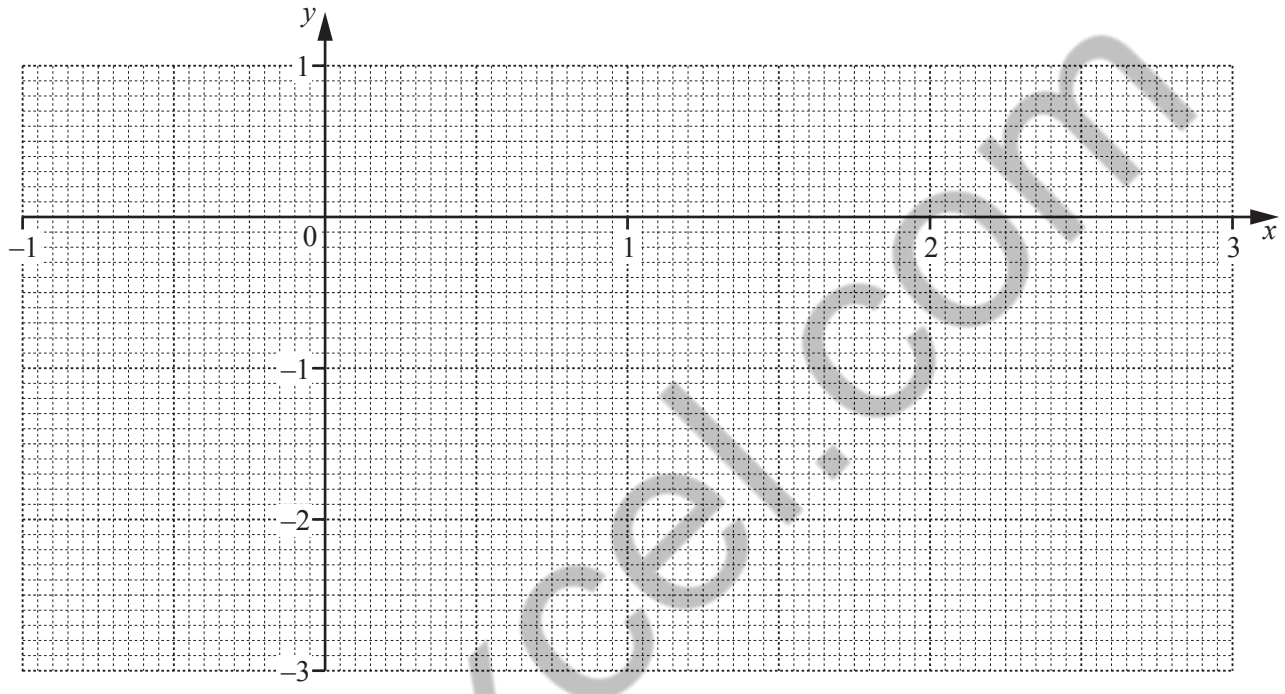
(b) Draw the reflection of flag *A* in the line $y = -1$. [2]

3 The table shows some values of $y = x^3 - 3x^2 + x$.

x	−0.75	−0.5	−0.25	0	0.5	1	1.5	2	2.5	2.75
y	−2.9	−1.4	−0.5		−0.1	−1	−1.9		−0.6	

(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + x$ for $-0.75 \leqslant x \leqslant 2.75$. [4]



(c) Use your graph to complete the inequalities in x for which $y > -1$.

..... $< x <$ ..... and $x >$ ..... [3]

(d) The equation $x^3 - 3x^2 + 2x - 1 = 0$ can be solved by drawing a straight line on the grid.

(i) Write down the equation of this line.

..... [2]

(ii) On the grid, draw this line and use it to solve the equation $x^3 - 3x^2 + 2x - 1 = 0$.

$x =$ ..... [3]

(e) By drawing a suitable tangent, find an estimate for the gradient of the graph of $y = x^3 - 3x^2 + x$ at $x = -0.25$.

..... [3]

4 A school nurse records the height, h cm, of each of 180 children.
The table shows the information.

Height (h cm)	$60 < h \leqslant 70$	$70 < h \leqslant 90$	$90 < h \leqslant 100$	$100 < h \leqslant 110$	$110 < h \leqslant 115$	$115 < h \leqslant 125$
Frequency	8	26	35	67	28	16

(a) Calculate an estimate of the mean.
Give your answer correct to 1 decimal place.

..... cm [4]

(b) In a histogram showing the information, the height of the bar for the interval $60 < h \leqslant 70$ is 0.4 cm.

Calculate the height of the bar for each of the following intervals.

$115 < h \leqslant 125$ ..... cm

$110 < h \leqslant 115$ ..... cm

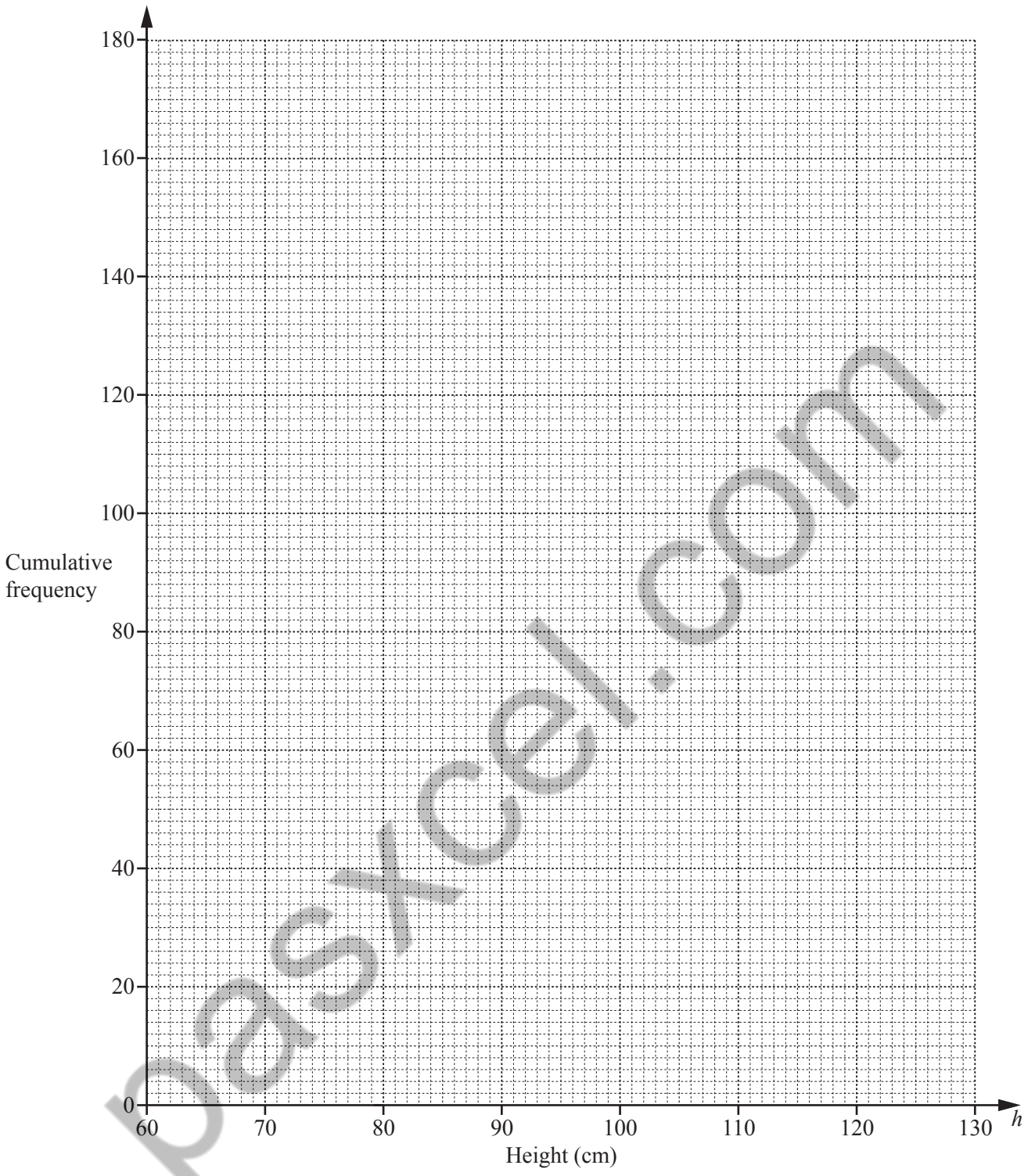
$70 < h \leqslant 90$ ..... cm [3]

(c) Complete the cumulative frequency table below.

Height (h cm)	$h \leqslant 70$	$h \leqslant 90$	$h \leqslant 100$	$h \leqslant 110$	$h \leqslant 115$	$h \leqslant 125$
Cumulative frequency						180

[2]

(d) On the grid opposite, draw a cumulative frequency diagram.



[3]

(e) Use your cumulative frequency diagram to find an estimate of

(i) the interquartile range,

..... cm [2]

(ii) the 70th percentile,

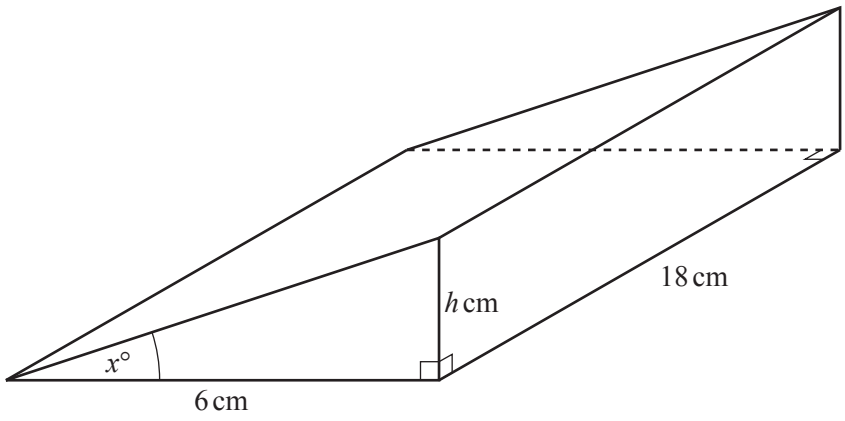
..... cm [2]

(iii) the number of children with height greater than 106 cm.

..... [2]

[Turn over

5



The diagram shows a prism with length 18 cm and volume 253.8 cm^3.
The cross-section of the prism is a right-angled triangle with base 6 cm and height h cm.

(a) (i) Show that the value of h is 4.7 .

[3]

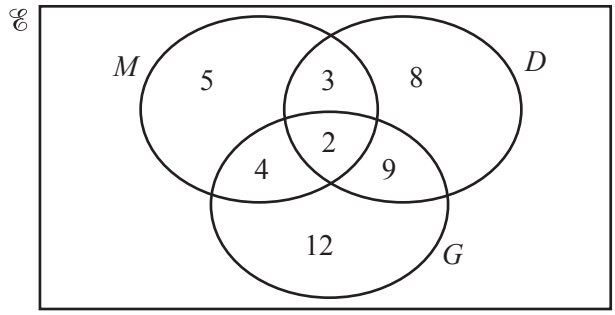
(ii) Calculate the value of x.

x = ... [2]

(b) Calculate the total surface area of the prism.

..... cm^2 [6]

6 (a)



The Venn diagram above shows information about the number of students who study Music (M), Drama (D) and Geography (G).

(i) How many students study Music?

..... [1]

(ii) How many students study exactly two subjects?

..... [1]

(iii) Two students are chosen at random from those who study Drama.

Calculate the probability that they both also study Music.

..... [3]

(iv) In the Venn diagram above, shade $M \cap D'$. [1]

(b) (i) $\mathscr{E} = \{x : x \text{ is an integer and } 1 \leqslant x \leqslant 10\}$

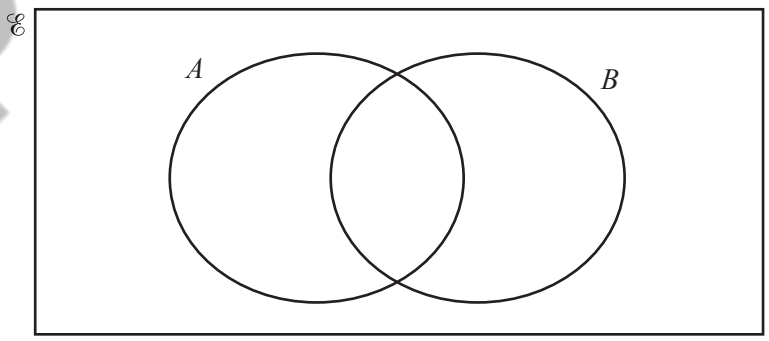
$A = \{x : x \text{ is even}\}$

$4 \in A \cap B$

$\mathrm{n}(A \cap B) = 1$

$(A \cup B)' = \{1, 7, 9\}$

Complete the Venn diagram below using this information.

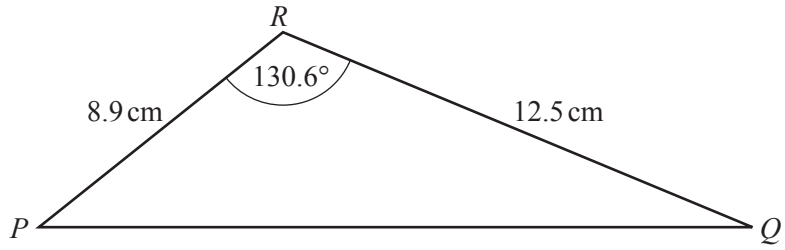


[4]

(ii) Use your Venn diagram to complete the statement.

$B = \{.....\}$ [1]

7 **(a)**

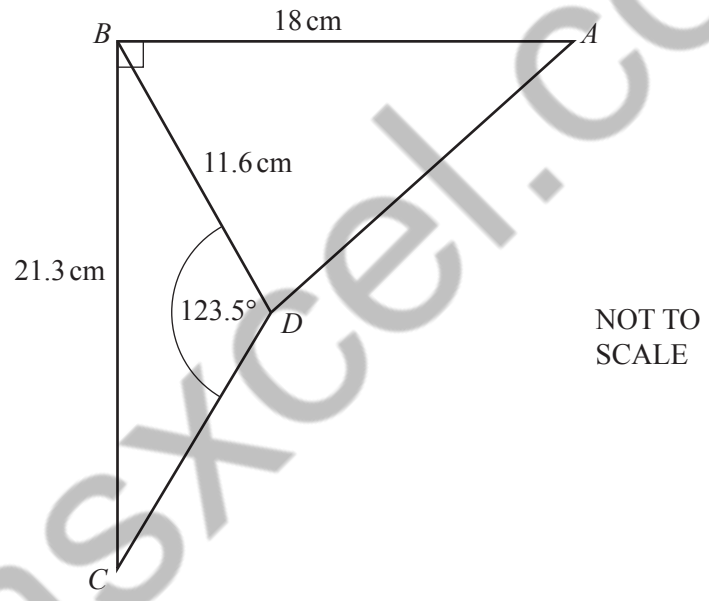


NOT TO SCALE

Calculate the area of triangle PQR.

..... cm^2 [2]

(b)



NOT TO SCALE

In the diagram, $AB = 18$ cm, $BC = 21.3$ cm and $BD = 11.6$ cm.
Angle $BDC = 123.5°$ and angle ABC is a right angle.

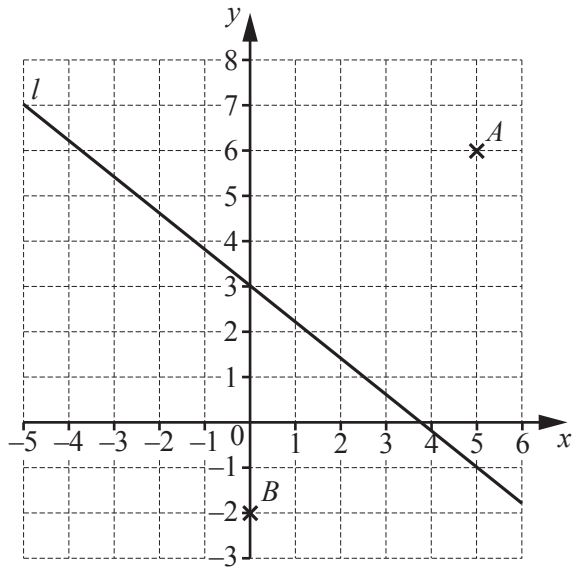
(i) Calculate angle BCD.

Angle BCD = ... [3]

(ii) Calculate AD.

AD = ... cm [5]

8



(a) Write down the co-ordinates of A.

(..... , ...) [1]

(b) Find the equation of line l in the form $y = mx + c$.

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

(c) Write down the equation of the line parallel to line l that passes through the point B.

..... [2]

(d) C is the point (8, 14).

(i) Write down the equation of the line perpendicular to line l that passes through the point C.

..... [3]

(ii) Calculate the length of AC.

..... [3]

(iii) Find the co-ordinates of the mid-point of BC.

(..... , ...) [2]

9 Paulo and Jim each buy sacks of rice but from different shops.
Paulo pays \$72 for sacks costing \$$m$ each.
Jim pays \$72 for sacks costing \$(m + 0.9) each.

(a) (i) Find an expression, in terms of m, for the number of sacks Paulo buys.

..... [1]

(ii) Find an expression, in terms of m, for the number of sacks Jim buys.

..... [1]

(b) Paulo buys 4 more sacks than Jim.

Write down an equation, in terms of m, and show that it simplifies to $10m^2 + 9m - 162 = 0$.

[4]

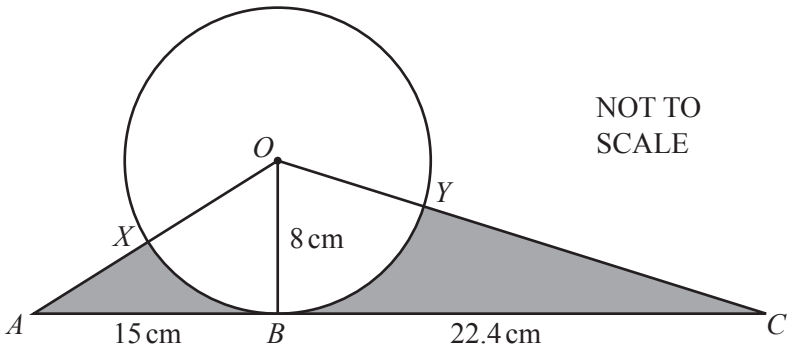
(c) (i) Solve $10m^2 + 9m - 162 = 0$.

m = ... or m = ... [3]

(ii) Find the number of sacks of rice that Paulo buys.

..... [1]

10



The diagram shows a circle, centre O.
The straight line ABC is a tangent to the circle at B.
$OB = 8$ cm, $AB = 15$ cm and $BC = 22.4$ cm.
AO crosses the circle at X and OC crosses the circle at Y.

(a) Calculate angle XOY.

Angle XOY = ... [5]

(b) Calculate the length of the arc XBY.

..... cm [2]

(c) Calculate the total area of the two shaded regions.

..... cm^2 [4]

Question 11 is printed on the next page.

11 **(a)** Factorise $5m^2 - 20p^4$.

..... [3]

(b) Make P the subject of the formula $A = P + \frac{PRT}{100}$.

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

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MATHEMATICS **0580/11**

Paper 1 (Core) **October/November 2018**

MARK SCHEME

Maximum Mark: 56

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

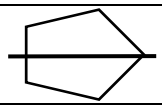
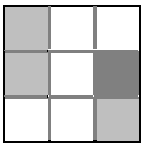
GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Abbreviations
cao – correct answer only
dep – dependent
FT – follow through after error
isw – ignore subsequent working
oe – or equivalent
SC – Special Case
nfww – not from wrong working
soi – seen or implied

Question	Answer	Marks	Partial Marks
1	11.2 oe	**1**	
2	308	**1**	
3	a^3 cao	**1**	
4	30%, $\frac{7}{20}$, $\frac{3}{8}$, 0.38	**2**	**B1** for three in correct order or **M1** for 0.35 **and** 0.375
5(a)	3.7	**1**	
5(b)	[Regular] hexagon	**1**	
6(a)	258 000	**1**	
6(b)	[0].060 cao	**1**	
7(a)		**1**	
7(b)		**1**	
8(a)	Arrow at 0.2	**1**	
8(b)	0.8 oe	**1**	
9(a)	16	**1**	
9(b)	–11	**1**	
10	Correct ruled enlargement	**2**	**B1** for two sides correct or for enlargement incorrect scale factor
11(a)	$\begin{pmatrix}12\\-6\end{pmatrix}$	**1**	
11(b)	$\begin{pmatrix}3\\-7\end{pmatrix}$	**1**	

Question	Answer	Marks	Partial Marks
12	21 nfww	**2**	**B1** for $\frac{x}{14}=\frac{12}{8}$ oe, or better or scale factor, i.e. 1.75 or $\frac{4}{7}$ oe seen
13	24 nfww	**2**	**M1** for 360 ÷ 15 If zero scored, **SC1** for answer of 156
14(a)	10 25	**1**	
14(b)	Graph completed correctly	**2**	**B1** for line from (10 55, 9) to (11 20, 9) **B1 FT** for line from (*their* 11 20, 9) to (*their* 11 20 + 30 min, 0)
15(a)	4.2	**1**	
15(b)	0.83 [m^2] or 8300 cm^2	**2**	**M1** for 0.4 × 1.2 + (0.9 – 0.4) × 0.7 or 0.7 × 0.9 + (1.2 – 0.7) × 0.4 or 1.2 × 0.9 – (0.9 – 0.4) × (1.2 – 0.7) or for one of the above, consistently using cm e.g. 40 × 120 + (90 – 40) × 70
16	$\frac{3}{8}\times\frac{4}{9}$ oe **or** $\frac{3}{8}\div\frac{18}{8}$ oe with common denominator	**M2**	**B1** for $\frac{9}{4}$ oe seen or **M1** for $\frac{3}{8}\times$ *their* $\frac{4}{9}$
	$\frac{1}{6}$ cao	**A1**	
17(a)	Point (28 , 30) marked	**1**	
17(b)	Ruled line of best fit	**1**	
17(c)	22 to 26	**1**	**FT** *their* ruled line of best fit with positive gradient
18	896	**3**	**M2** for $800+\frac{800\times4\times3}{100}$ oe or **M1** for $\frac{800\times4\times3}{100}$ oe
19(a)	23	**1**	
19(b)	$3n + 5$ oe	**2**	**B1** for $3n + j$ or $kn + 5$, $k \neq 0$

Question	Answer	Marks	Partial Marks
20	900	**3**	**M2** for $\frac{150\times100\times60}{1000}$ oe or **M1** for 150 × 100 × 60 or 1.5 [× 1] × 0.6 or **B1** for figs 9
21(a)	1.87×10^8	**1**	
21(b)	7.8×10^6	**2**	**B1** for answer figs 78
22	[x =] 62	**2**	**B1** for 56 identified as angle A or **M1** for $\frac{(180-56)}{2}$
	[y =] 118	**2**	**FT** for 2 marks *their* acute x + *their* y =180 or 56 + *their* acute x = *their* y or **B1** for any of ACB, BCM or LCN = 62 or *their* acute x or **M1** for 180 – 62 or 180 – *their* acute x or 56 + 62 or 56 + *their* acute x
23(a)	$11x - 13$ final answer	**2**	**B1** for $5x - 15$ or $6x + 2$ or for answer of $11x + j$ or $kx - 13$
23(b)	Correctly eliminating one variable	**M1**	
	[x =] 3	**A1**	
	[y =] –2	**A1**	If zero scored, **SC1** for 2 values satisfying one of the original equations or for 2 correct answers with no working

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MATHEMATICS **0580/21**

Paper 2 (Extended) **October/November 2018**

MARK SCHEME

Maximum Mark: 70

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1	8[h] 55[min]	**1**	
2	Congruent	**1**	
3	Negative	**1**	
4	7.36×10^7	**2**	**B1** for figs 736
5	$6x^2 + 13x - 63$ final answer	**2**	**M1** for 3 correct terms of $6x^2 - 14x + 27x - 63$
6	[0]47	**2**	**B1** for 133 or 47 seen or **M1** for 227 – 180 oe
7	$\frac{4}{x^3}$ oe final answer	**2**	**M1** for $y = \frac{k}{x^3}$ oe
8	121 nfww	**2**	**M1** for $(6000 + 50) \div 50$ or **B1** for 6050 seen
9	896	**3**	**M2** for $800 + \frac{800 \times 4 \times 3}{100}$ oe or **M1** for $\frac{800 \times 4 \times 3}{100}$ oe
10	900	**3**	**M2** for $\frac{150 \times 100 \times 60}{1000}$ oe or **M1** for $150 \times 100 \times 60$ or $1.5[\times 1] \times 0.6$ or **B1** for figs 9
11(a)	23	**1**	
11(b)	$3n + 5$ oe	**2**	**B1** for $3n + j$ or $kn + 5$, $k \neq 0$
12	4, 5, 6	**3**	**B2** for 1 error or 1 omission or **M2** for $3.75 \leqslant n < 7$ oe or **M1** for $3.75 \leqslant n$ or $n < 7$ or better

Question	Answer	Marks	Partial Marks
13(a)	Correct angle bisector at *B* with two pairs of correct arcs reaching *AC*	**2**	**B1** for accurate with no/wrong arcs or for two pairs of correct arcs with no or wrong line or short line
13(b)	Correct region shaded	**1**	
14	$\frac{3}{8}\times\frac{4}{9}$ oe **or** $\frac{3}{8}\div\frac{18}{8}$ oe with common denominator	**M2**	**B1** for $\frac{9}{4}$ oe seen or **M1** for $\frac{3}{8}\times \textit{their}\,\frac{4}{9}$
	$\frac{1}{6}$ cao	**A1**	
15	$\frac{x^2-3x+8}{3(x+2)}$ or $\frac{x^2-3x+8}{3x+6}$ final answer	**3**	**B1** for common denominator $3(x + 2)$ **M1** for $(x-5)(x+2)+3\times6$
16	[x =] 62	**2**	**B1** for 56 identified as angle *A* or **M1** for $\frac{(180-56)}{2}$
	[y =] 118	**2**	**FT** for 2 marks *their* acute x + *their* y =180 or 56 + *their* acute x = *their* y or **B1** for any of *ACB*, *BCM* or *LCN* = 62 or *their* acute x or **M1** for 180 – 62 or 180 – *their* acute x or 56 + 62 or 56 + *their* acute x
17(a)	8	**1**	
17(b)(i)	$\frac{x^2}{16}$ final answer	**1**	
17(b)(ii)	$a^{-3}b^5$ or $\frac{b^5}{a^3}$ final answer	**2**	**B1** for $a^{-3}b^k$ or a^kb^5
18	for correctly equating one set of coefficients	**M1**	
	for correct method to eliminate one variable	**M1**	
	[x =] 6 [y =] −8	**A2**	**A1** for each If **M0** scored, **SC1** for 2 values satisfying one of the original equations **or** if no working shown, but 2 correct answers given

Question	Answer	Marks	Partial Marks
19	$\frac{-7 \pm \sqrt{(7)^2 - 4(3)(-11)}}{2 \times 3}$	**B2**	**B1** for $\sqrt{(7)^2 - 4(3(-11))}$ or better and **B1** for $\frac{-7+\sqrt{q}}{2(3)}$ or $\frac{-7-\sqrt{q}}{2(3)}$
	–3.41 and 1.08 cao	**B2**	**B1** for each If **B0**, **SC1** for –3.4 and 1.1 or –3.409 and 1.076 or –3.4089... and 1.0756.... or 3.41 and –1.08 or –3.41 and 1.08 seen in working
20(a)	$\begin{pmatrix} 26 & 2 \\ 19 & 8 \end{pmatrix}$	**2**	**B1** for 2 or 3 correct elements
20(b)	$\frac{1}{10}\begin{pmatrix} 3 & -2 \\ -7 & 8 \end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix} 3 & -2 \\ -7 & 8 \end{pmatrix}$ soi or det = 10 soi
21(a)(i)	20	**1**	
21(a)(ii)	14	**1**	**FT** part **(i)** providing 20 < part **(i)** ⩽ 40
21(a)(iii)	280	**1**	
21(b)	$2[\times 20] = [20]\left(1+\frac{r}{100}\right)^{14}$ oe isw	**2**	**FT** 2 marks for 2[*their* **(a)(i)**]=[*their* **(a)(i)**]$\left(1+\frac{r}{100}\right)^{\textit{their}\textbf{(a)(ii)}}$ **M1** for $n(x)^{14}$ or $n(x)^{\textit{their}\textbf{(a)(ii)}}$ oe seen isw
22(a)	$\frac{94}{200}$ oe	**2**	**M1** for $\frac{46}{200}+\frac{48}{200}$ oe
22(b)	14.1 or 14.07…	**3**	**M2** for $2\left(\frac{50}{200}\times\frac{56}{199}\right)$ oe or **M1** for $\frac{50}{200}\times\frac{56}{199}$ oe
23(a)	27	**2**	**M1** for 3^{3x} seen
23(b)	3	**2**	**M1** for $7 + 3x = 2^4$
23(c)	$\frac{x-7}{3}$ oe final answer	**2**	**M1** for $x = 7 + 3y$ or $y - 7 = 3x$ or $-3x = 7 - y$ or $\frac{y}{3} = \frac{7}{3} + x$

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 2018**

MARK SCHEME

Maximum Mark: 104

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Question	Answer	Marks	Partial Marks
1(a)(i)	7, 3, 6, 8	**2**	**B1** for 3 correct in frequency column or for 2 correct if they all sum to 24 or for all correct tallies if frequency column blank or for 7, 3, 6, 8 seen in tally column with frequency column blank or incorrect.
1(a)(ii)	Correct bar chart with scaled frequency axis	**3**	**B1** for correctly scaled frequency axis **B1FT** all heights correct **B1** equal width bars and gaps
1(b)(i)	64	**2**	**B1** for two from 8.5, 10.5 and 9 soi
1(b)(ii)	37.5	**2**	**M1** for $\frac{their(\mathbf{b})(\mathbf{i})-40}{their(\mathbf{b})(\mathbf{i})}$ oe If 0 scored, **SC1** for answer 62.5
1(c)	[0].85	**2**	**M1** for $6.95 - 3 \times 1.75$ oe
1(d)	1.69	**2**	**M1** for $2.6\times\left(1-\frac{35}{100}\right)$ oe
2(a)	1, 2, 3, 6, 9, 18	**2**	**B1** for four or more correct and no extras or six correct and one extra
2(b)	41 or 43 or 47	**1**	
2(c)	5.4	**2**	**B1** for 5.35[6…] or 5.36
2(d)(i)	1.7	**1**	
2(d)(ii)	2744	**1**	
2(d)(iii)	0.0625 or $\frac{1}{16}$	**1**	
2(e)(i)	7	**1**	

Question	Answer	Marks	Partial Marks
2(e)(ii)	$2 \times 3^2 \times 5$ or $2 \times 3 \times 3 \times 5$	**2**	**M1** for a complete factor tree or 2, 3, 3, 5 clearly identified as factors or **B1** for a correct product that equals 90
2(e)(iii)	630	**2**	**B1** for $630k$, where $k \geqslant 2$ or for list of multiples of 90 and 126 to at least 630
3(a)(i)	**96** 144 240 129 **131** 260 225 275 500	**1**	both correct
3(a)(ii)	50	**1**	
3(a)(iii)	$\frac{9}{20}$	**2**	**B1** for $\frac{225}{500}$ or $\frac{45}{100}$ or 0.45
3(a)(iv)	12 : 13	**2**	**B1** for 240 : 260 oe If 0 scored, **SC1** for answer 13 : 12
3(a)(v)	$\frac{144}{500}$ oe	**1**	
3(b)(i)	1	**1**	
3(b)(ii)	2.4	**3**	**M1** for $44 \times 1 + 43 \times 2 + 30 \times 3 + 25 \times 4 + 5 \times 8$ **M1dep** for *their* $360 \div 150$
3(c)	540	**2**	**M1** for $\frac{18}{50}[\times 1500]$ or $\frac{1500}{50}[\times 18]$
4(a)(i)	6, 0, 6	**2**	**B1** for two correct
4(a)(ii)	Correct curve	**4**	**B3FT** for 7 or 8 correctly plotted points or **B2FT** for 5 or 6 correctly plotted points or **B1FT** for 3 or 4 correctly plotted points
4(a)(iii)	(2.5, –6.4 to –6.1)	**1**	
4(a)(iv)	–0.7 to –0.4, 5.4 to 5.7	**2**	**FT** their curve **B1** for each
4(b)(i)	$y = -\frac{1}{2}x + 2$ oe	**3**	**M2** for gradient = $-\frac{1}{2}$ oe soi or **M1** for rise / run or gradient = $\frac{1}{2}$ and **B1** for $y = mx + 2$, $m \neq 0$

Question	Answer	Marks	Partial Marks
4(b)(ii)	Correct ruled line for $-5 \leqslant x \leqslant 5$	**2**	**B1** for line through (0, –1) or line parallel to line L or correct short line at least from (–4, 1) to (4, –3)
5(a)(i)	37	**2**	**B1** for 7.4
5(a)(ii)	133	**1**	
5(a)(iii)	T plotted correctly	**2**	**B1** for T 4.4 cm from L **B1** for bearing 210°
5(b)(i)	Correct perpendicular bisector of PQ	**2**	**B1** for correct bisector with wrong/no arcs or for no line and two pairs of correct arcs or for short bisector with correct/incorrect/no arcs
5(b)(ii)	Arc centre Q, radius 7 cm	**2**	**B1** for short arc centre Q , radius 7 cm
	Correct region shaded	**1**	
6(a)(i)	(–2, 5)	**1**	
6(a)(ii)	$\begin{pmatrix} 4 \\ -3 \end{pmatrix}$	**1**	
6(a)(iii)	(5, 4) plotted	**1**	
6(a)(iv)	Parallelogram $PQRS$ correctly drawn	**B1**	**FT** *their R*
	(1, 7)	**B1**	**FT** *their S* dep on first **B1**
6(b)(i)	Translation $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$	**2**	**B1** for each
6(b)(ii)	Correct reflection vertices (3, –3), (1, –3), (3, –4)	**2**	**B1** for reflection in line $x = -1$ or $y = k$
6(b)(iii)	Correct rotation vertices (–3, –1), (–1, –1), (–3, –2)	**2**	**B1** for correct orientation but wrong position
7(a)	75	**2**	**M1** for $\left(1-\frac{7}{10}\right)\times 250$ oe or **B1** for answer 175
7(b)(i)	9080 or 9079 to 9081	**3**	**M2** for $\pi\times 8^2\times 10+\pi\times 15^2\times 10$ soi or **M1** for $\pi\times 8^2$ [$\times 10$ or $\times 20$] soi or $\pi\times 15^2$ [$\times 10$ or $\times 20$] soi

Question	Answer	Marks	Partial Marks
7(b)(ii)	98.2 or 98.3 or 98.24 to 98.26	**3**	**M1** for $2\times\pi\times15$ soi **M1** for *their* circumference + 4
7(c)	1245, 1255	**2**	**B1** for one correct or both values correct but reversed
8(a)	$3c + 8d$	**2**	**B1** for $3c$ or $8d$
8(b)	32	**2**	**M1** for $5 \times 4 - 2 \times -6$ or better
8(c)	11	**2**	**M1** for $x - 3 = 8$ or $7x - 21 = 56$ or better
8(d)	$\frac{r-7}{6}$ oe	**2**	**M1** for $6t = r - 7$ or $\frac{r}{6} = t + \frac{7}{6}$
8(e)	$3x + x + x + 15 = 180$ or better leading to $[x =]$ 33	**4**	**M1** for $3x + x + x + 15$ or better **M1** for *their* expression = 180 **M1** for rearranging *their* equation to $ax = b$ If 0 scored, **SC2** for 33 nfww
9(a)	12 150	**2**	**M1** for $\frac{1}{2}\times(120+150)\times90$ oe
9(b)(i)	$[AD =]\sqrt{90^2+(150-120)^2}$	**M2**	or **M1** for $90^2+(150-120)^2$
	= 94.9 or 94.8[…]	**A1**	
9(b)(ii)	4368	**3**	**M2** for $\frac{95+120+150+90}{5}\times48$ oe or **M1** for 95 + 120 + 150 + 90 soi or 455 or $\frac{95}{5}$ and $\frac{120}{5}$ and $\frac{150}{5}$ and $\frac{90}{5}$

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/41**

Paper 4 (Extended) **October/November 2018**

MARK SCHEME

Maximum Mark: 130

Published

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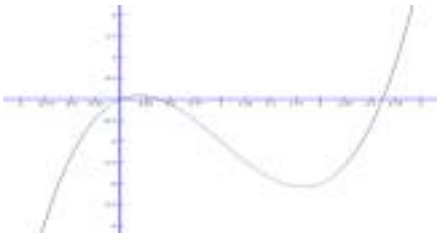
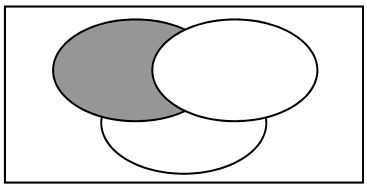
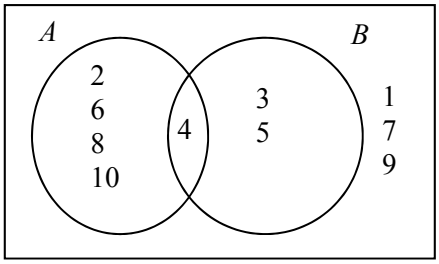
Question	Answer	Marks	Partial Marks
1(a)(i)	2.25 final answer	**2**	**M1** for $\frac{3}{5+3}$ or $\frac{6}{5+3}$ oe
1(a)(ii)	37.5	**1**	**FT** *their* $\frac{\textbf{(a)(i)}}{6}\times 100$
1(a)(iii)	5.5[0] or 5.499 to 5.500	**2**	**M1** for $6 \div 1.091$
1(b)	21	**3**	**M2** for $15\times\sqrt{\frac{352.8}{15\times 12}}$ oe or **SC2** for answer 16.8 or **M1** for $\sqrt{\frac{352.8}{15\times 12}}$ or $\sqrt{\frac{15\times 12}{352.8}}$ seen or **M1** for a correct implicit statement for the length
1(c)	525	**3**	**M2** for $\frac{483}{100-8}[\times 100]$ oe or **M1** for 483 associated with 92 [%]
2(a)(i)	Translation $\begin{pmatrix}5\\8\end{pmatrix}$	**2**	**B1** for each Accept 5 right and 8 up
2(a)(ii)	Enlargement [sf] 0.5 oe [centre] (0, –7)	**3**	**B1** for each
2(a)(iii)	Rotation 90 [anticlockwise] oe Origin oe	**3**	**B1** for each
2(b)	Image at (–8, 1) (–8, 5) (–8, 7) (–4, 1)	**2**	**B1** for reflection of flag *A* in the line $x = -1$ or $y = k$ or for vertices of triangle in correct place but not joined

Question	Answer	Marks	Partial Marks
3(a)	0 –2 0.9	**3**	**B1** for each
3(b)	Correct curve 	**4**	**B3 FT** for 9 or 10 points or **B2 FT** for 7 or 8 points or **B1 FT** for 5 or 6 points
3(c)	−0.45 to –0.35 1 2.35 to 2.45	**3**	**FT** *their* graph **B1** for each in the correct position If zero scored, **SC1FT** for 3 correct values
3(d)(i)	$y = 1 - x$ oe	**2**	**B1** for $y = 1 - kx$ oe, $k \neq 0$ or $y = k - x$ oe or $1 - x$
3(d)(ii)	Correct ruled line and 2.25 to 2.4	**3**	**B2FTdep** for correct ruled line or **B1 dep** for line through (0, 1) when extended but not $y = 1$ or with gradient –1.1 to –0.9 or correct line but freehand or **SC2** for $y = x - 1$ ruled after answer $[y =] x - 1$ in **(d)(i)** **and** **B1** for 2.25 to 2.4
3(e)	Correct tangent and 1.7 to 3.7	**3**	No daylight between tangent and curve at $x = –0.25$. Point of contact is the midpoint between two vertices of daylight and this point of contact must be between –0.35 and –0.15 **B2** for close attempt at tangent at $x = –0.25$ and answer in range OR **B1** for ruled tangent at $x = –0.25$, no daylight Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = –0.35$ and –0.15 and **M1** dep on **B1** or close attempt at tangent at $x = –0.25$ for $\frac{rise}{run}$
4(a)	100.2 nfww	**4**	**M1** for midpoints soi 65, 80, 95, 105, 112.5, 120 **M1** for use of $\sum fx$ with x in correct interval including both boundaries **M1**dep for $\sum fx \div 180$ dep on previous **M1**
4(b)	0.8 2.8 0.65	**3**	**B1** for each If zero scored, **SC1** for 1.6, 5.6 and 1.3 seen

Question	Answer	Marks	Partial Marks
4(c)	8 34 69 136 164	**2**	**B1** for one error **FT** other values or for 3 or 4 correct
4(d)	Correct diagram	**3**	**B1FT** for correct vertical placement for 6 plots **B1** for correct horizontal placement for 6 plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points If zero scored, **SC1FT** for 5 out of 6 correct plots
4(e)(i)	15 to 17	**2**	**B1** for [LQ =] 93 to 94 or [UQ =] 109 to 110
4(e)(ii)	107 to 109	**2**	**B1** for 126 seen
4(e)(iii)	66 to 72	**2**	**FT** their graph for 2 marks **B1** for answer 106 to 114 or **B1FT** *their* graph reading at 106 cm seen
5(a)(i)	[h =] $253.8 \div 18 \div \left(\frac{6}{2}\right)$ or [h =] $\frac{253.8 \times 2}{6 \times 18}$ or [h =] $\frac{253.8}{18 \times \frac{6}{2}}$	**3**	For **M3** no errors at any stage **M2** for $253.8 = \frac{1}{2} \times 6 \times h \times 18$ oe (no previous errors) or **M1** for triangle area = $\frac{1}{2} \times 6 \times h$ soi
5(a)(ii)	38.1 or 38.06 to 38.08	**2**	**M1** for $\tan = \frac{4.7}{6}$ oe
5(b)	358 or 357.9 to 358	**6**	**M1** for $6^2 + 4.7^2$ **M1** for $\sqrt{6^2 + 4.7^2} \times 18$ [× 2] **M1** for 6 × 18 [× 2] **M1** for 4.7 × 18 **M1** for $2 \times \frac{1}{2} \times 6 \times 4.7$ oe
6(a)(i)	14	**1**	
6(a)(ii)	16	**1**	
6(a)(iii)	$\frac{20}{462}$ oe	**3**	**M2** for $\frac{5}{22} \times \frac{4}{21}$ or **M1** for $\frac{5}{22}$ seen

Question	Answer	Marks	Partial Marks
6(a)(iv)	Correct shading 	**1**	
6(b)(i)	Fully correct Venn diagram 	**4**	**B1** for each correct region
6(b)(ii)	3 4 5	**1**	**FT** *their* **(b)(i)**
7(a)	42.2 or 42.23....	**2**	**M1** for $\frac{1}{2}\times 8.9\times 12.5\times \sin 130.6$ oe
7(b)(i)	27[.0] or 27.00 to 27.01	**3**	**M2** for $\frac{11.6\times \sin 123.5}{21.3}$ or **M1** for $\frac{11.6}{\sin BCD}=\frac{21.3}{\sin 123.5}$ oe
7(b)(ii)	15.9 or 15.90 to 15.91	**5**	**M1** for angle *ABD* = *their* angle *BCD* + 33.5 **and** **M2** for $11.6^2+18^2-2\times 11.6\times 18\times\cos(\textit{their}ABD)$ or **M1** for implicit version **A1** for 252.9 to 253
8(a)	(5, 6)	**1**	
8(b)	$[y=]-\frac{4}{5}x+3$ nfww	**3**	**B2** for $[y=]-\frac{4}{5}x+c$ nfww or **M1** for $\frac{rise}{run}$ using any two of (–5, 7) (0, 3) and (5, –1) **and B1** for $[y=]mx+3$ $(m\neq 0)$

Question	Answer	Marks	Partial Marks
8(c)	$y = -\frac{4}{5}x - 2$ oe	**2**	**FT** *their* gradient from **8(b)** **B1** for y = (*their* gradient)$x + c$ (c not 0) or for $y = mx - 2$ $(m \neq 0)$ or for $-\frac{4}{5}x - 2$ alone
8(d)(i)	$y = \frac{5}{4}x + 4$ oe	**3**	**M1** for $-\frac{1}{\textit{their}\ \text{gradient}}$ from **8(b)** **M1** for (8, 14) substituted into *their* $y = mx + c$ or $\frac{y-14}{x-8} = m$ or better
8(d)(ii)	8.54 or 8.544...	**3**	**M2** for $(14 - \textit{their}\,6)^2 + (8 - \textit{their}\,5)^2$ or better or **M1** for $14 - \textit{their}\,6$ and $8 - \textit{their}\,5$ seen
8(d)(iii)	(4, 6)	**2**	**B1** for each
9(a)(i)	$\frac{72}{m}$	**1**	
9(a)(ii)	$\frac{72}{m+0.9}$	**1**	
9 (b)	$\frac{72}{m} - \frac{72}{m+0.9} = 4$ oe	**M1**	**FT** *their* **(a)(i)** and **(a)(ii)** if expressions in m
	$72(m+0.9) - 72m = 4m(m+0.9)$ oe	**M1**	**Dependent** on **M1** and **correct** fractions
	$[72m - 72m] + 64.8 = 4m^2 + 3.6m$ oe nfww	**A1**	
	Correct completion to $10m^2 + 9m - 162 = 0$	**A1**	
9(c)(i)	3.6 and –4.5 final answer	**3**	**B2** for $(2m+9)(5m-18)$ or $\frac{-9 \pm \sqrt{(9)^2 - 4(10)(-162)}}{2 \times 10}$ or better or **B1** for $(am+b)(cm+d)$ where ac = 10 and either $bd = -162$ or $ad + bc = 9$ or for $\sqrt{(9)^2 - 4(10)(-162)}$ or better or $\frac{-9 \pm \sqrt{q}}{2(10)}$ or better
9(c)(ii)	20	**1**	

Question	Answer	Marks	Partial Marks
10(a)	132.26 to 132.28 or 132.3	**5**	**B1** for angle *ABO* or angle *CBO* = 90 soi **M1** for tan [*XOB*] = $\frac{15}{8}$ oe **M1** for tan [*BOY*] = $\frac{22.4}{8}$ oe **A1** for [*BOY* =]70.3… or [*XOB* =] 61.9….
10(b)	18.4 or 18.5 or 18.43 to 18.48	**2**	**M1** for $\frac{\textit{their}\ \textbf{(a)}}{360} \times 2 \times \pi \times 8$ oe
10(c)	75.7 to 75.9	**4**	**M1** for $\frac{1}{2}(15 + 22.4) \times 8$ oe **M2** for $\frac{\textit{their}\ (\textbf{a})}{360} \times \pi \times 8^2$ oe or **M1** for one sector either $\frac{\textit{inv}\tan\left(\frac{15}{8}\right)}{360} \times \pi \times 8^2$ oe or $\frac{\textit{inv}\tan\left(\frac{22.4}{8}\right)}{360} \times \pi \times 8^2$ oe
11(a)	$5\left(m - 2p^2\right)\left(m + 2p^2\right)$ final answer	**3**	**M2** for $(5m + k)(m + j)$ where $kj = -20p^4$ or $5j + k = 0$ or **M1** for $5\left(m^2 - 4p^4\right)$ seen
11(b)	[*P* =] $\frac{100A}{100 + TR}$ final answer	**3**	**M1** for 100*A* = 100*P* + *PRT* or for *A* = *P*(1+ $\frac{RT}{100}$) **M1** for 100*A* = *P*(100 + *RT*) or for $\frac{A}{1 + \frac{RT}{100}} = P$ or for 100*A* = *P*(1 + *RT*) after 100*A* = *P* + *PRT* as first step