

SINGAPORE'S  
#1 HOME TUITION AGENCY

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# Cambridge IGCSE™

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**MATHEMATICS**

**0580/11**

Paper 1 (Core)

**October/November 2020**

**1 hour**

You must answer on the question paper.

You will need: Geometrical instruments

## INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use either your calculator value or 3.142.

## INFORMATION

- The total mark for this paper is 56.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

1 Write down the mathematical name for

(a) an angle which is less than  $90^\circ$ ,

..... [1]

(b) a polygon with 5 sides,

..... [1]

(c) a quadrilateral with exactly one pair of parallel sides.

..... [1]

2

hexagon regular perpendicular congruent isosceles

Put a ring around the word that describes two polygons that are the same shape and size. [1]

3 Write  $\frac{60}{105}$  in its simplest form.

MIND FLEX  
HOME TUITION

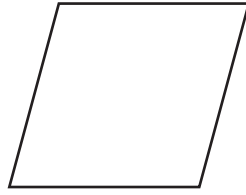
..... [1]

4 Calculate.

$$\sqrt{\frac{1}{0.01} - 8^2}$$

..... [1]

5 (a)

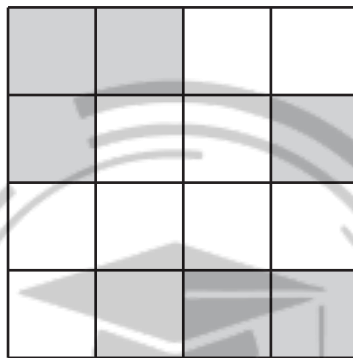


The diagram shows a rhombus.

On the diagram, draw all the lines of symmetry.

[2]

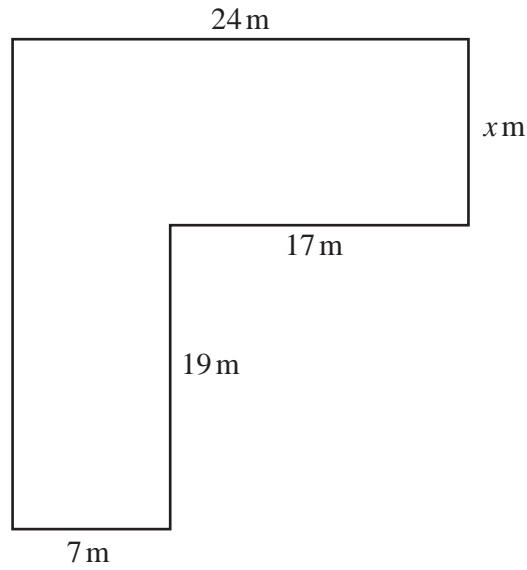
(b)



Shade two squares so that the diagram has rotational symmetry of order 2.

[1]

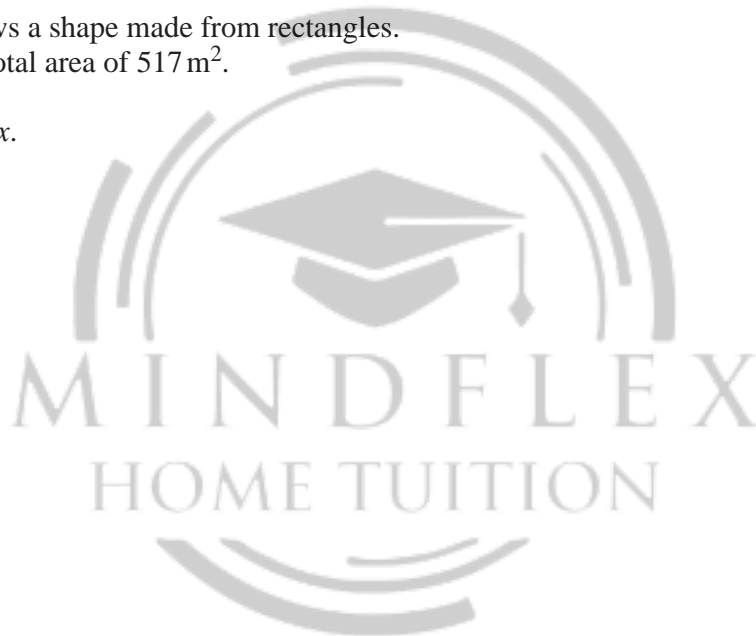
6



NOT TO  
SCALE

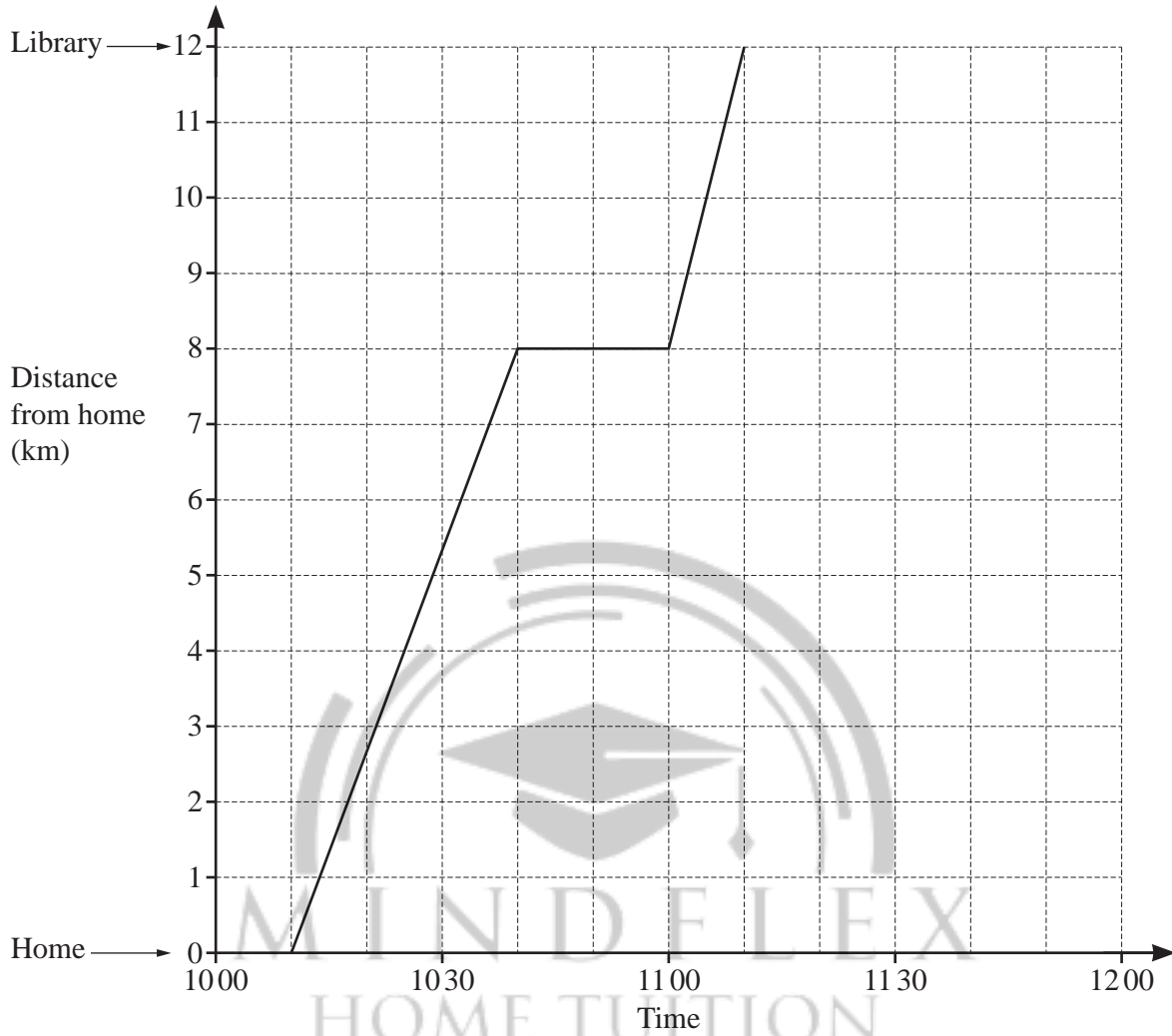
The diagram shows a shape made from rectangles.  
The shape has a total area of  $517 \text{ m}^2$ .

Find the value of  $x$ .



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

- 7 Hua cycles from her home to the library.  
The travel graph shows this journey.



- (a) At what time does she start her journey?

..... [1]

- (b) (i) Find her distance from home when she stops for a rest.

..... km [1]

- (ii) How long does she stop for a rest?

..... min [1]

- (c) Hua stays at the library for 10 minutes.  
She then cycles home at a constant speed of 24 km/h.

Complete the travel graph.

[2]

- 8 A field,  $ABC$ , is in the shape of a triangle.  
 $AC = 500\text{ m}$  and  $BC = 650\text{ m}$ .

**Using a ruler and compasses only**, complete the scale drawing of the field  $ABC$ .  
Leave in your construction arcs.  
Use a scale of  $1\text{ cm}$  to represent  $100\text{ m}$ .  
The side  $AB$  has been drawn for you.



Scale:  $1\text{ cm}$  to  $100\text{ m}$

[3]

- 9 Alan and Beth share  $\$1190$  in the ratio Alan : Beth =  $5 : 2$ .  
Work out how much Alan receives.

\$ ..... [2]



10 Work out.

(a)  $\begin{pmatrix} 2 \\ -3 \end{pmatrix} + \begin{pmatrix} 5 \\ -1 \end{pmatrix}$

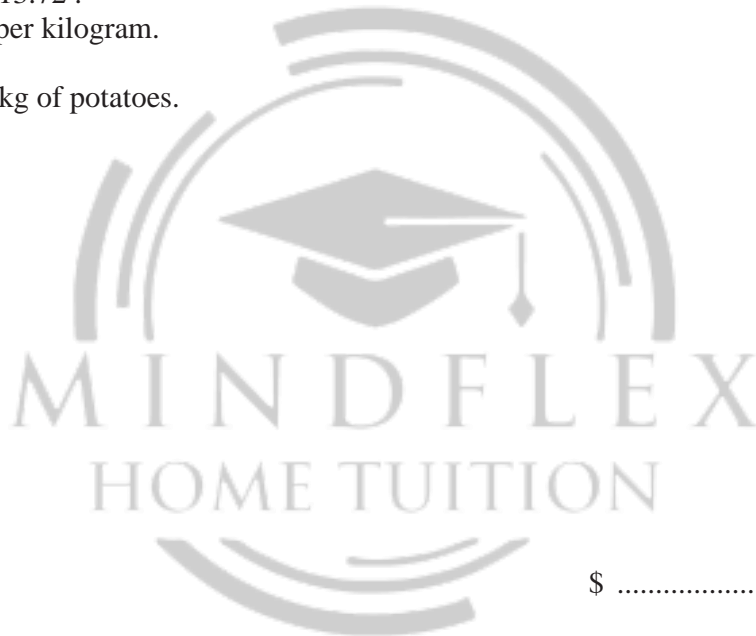
$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [1]

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

$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [1]

11 Rangan buys 3.6 kg of potatoes and 2.8 kg of leeks.  
The total cost is \$13.72 .  
Leeks cost \$2.65 per kilogram.

Find the cost of 1 kg of potatoes.



\$ ..... [3]

12  $T = \frac{49.2 - 9.59}{4.085 \times 2.35}$

By writing each number correct to 1 significant figure, work out an estimate for  $T$ .  
You must show all your working.

..... [2]

13 (a) Write 18 as the product of its prime factors.

..... [2]

(b) At a bus stop

- a red bus arrives every 18 minutes
- and
- a blue bus arrives every 24 minutes.

At 1047 a red bus and a blue bus arrive.

Find the next time when a red bus and a blue bus arrive together.

..... [3]

14 Without using a calculator, work out  $2\frac{2}{3} \times 2\frac{3}{4}$ .

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

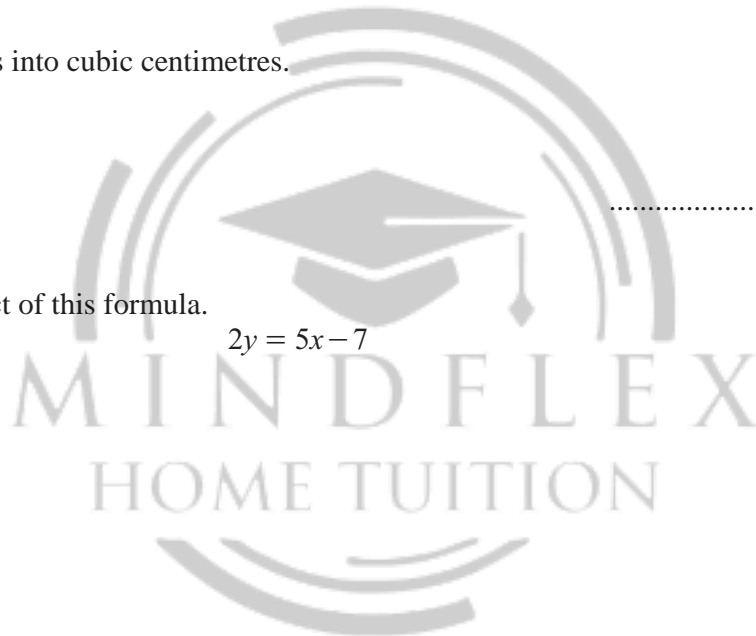
..... [3]

15 Change 4.37 litres into cubic centimetres.

..... cm<sup>3</sup> [1]

16 Make  $x$  the subject of this formula.

$$2y = 5x - 7$$



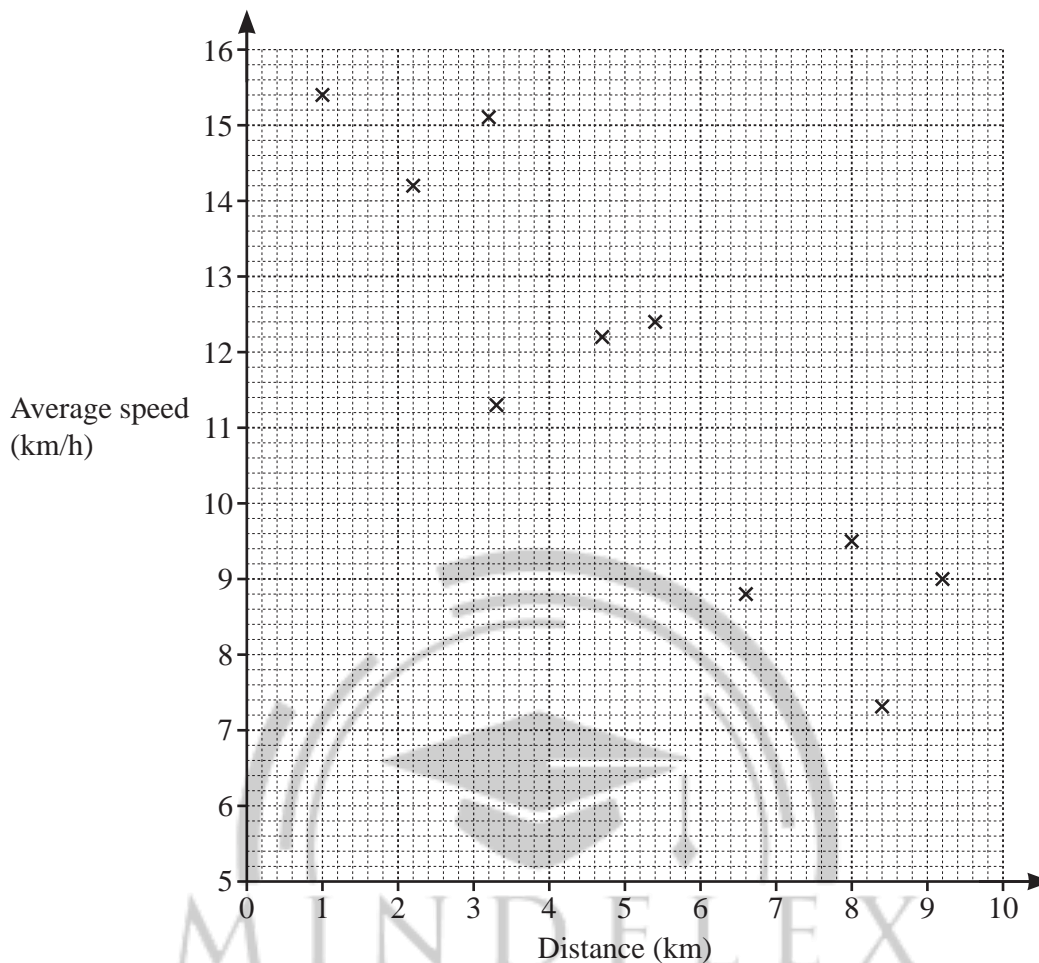
$x =$  ..... [2]

17 Trina invests \$16 000 at a rate of 5% per year compound interest.

Work out the value of her investment at the end of 4 years.

\$ ..... [2]

- 18 Aisha records the distance she runs and her average speed. The results are shown in the scatter diagram.



- (a) The table shows the results of four more runs.

Distance (km)	4.2	5.7	7.1	8.8
Average speed (km/h)	13.4	11.8	9.8	8.3

On the scatter diagram, plot these points.

[2]

- (b) What type of correlation is shown in the scatter diagram?

..... [1]

- (c) On the scatter diagram, draw a line of best fit.

[1]

- (d) Use your line of best fit to estimate her average speed when she runs a distance of 6 km.

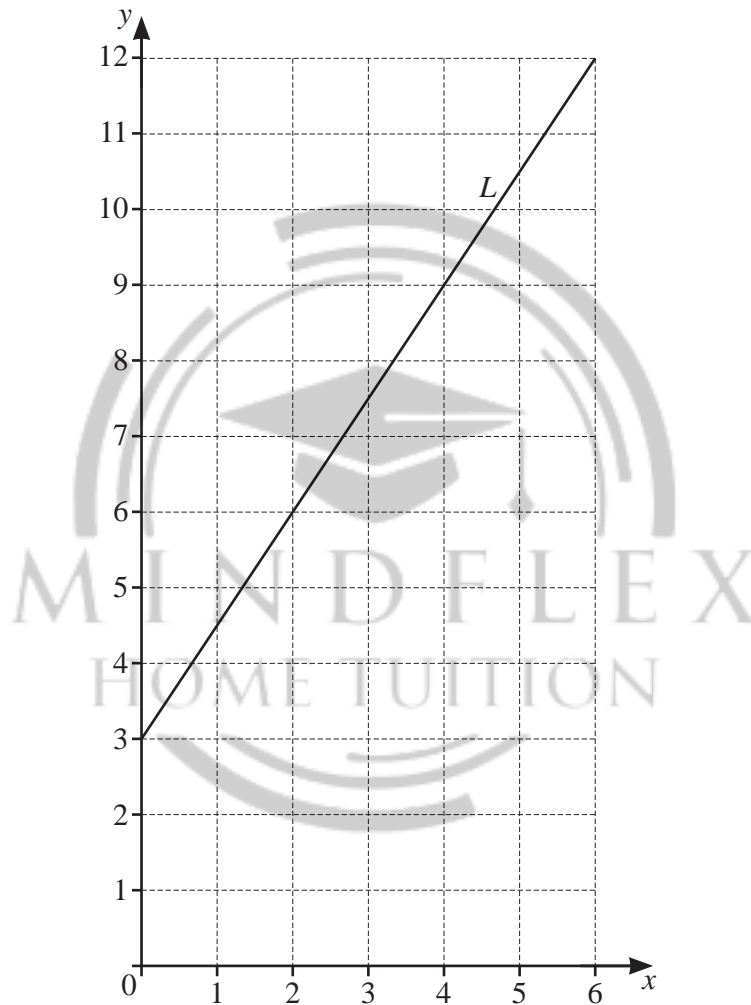
..... km/h [1]

19 A circle has a circumference of 56 mm.

Work out the radius of this circle.

..... mm [2]

20

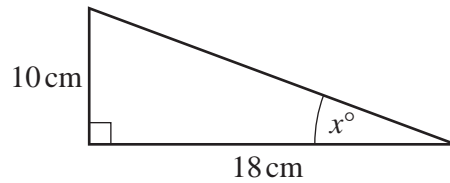


Find the equation of line  $L$  in the form  $y = mx + c$ .

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

**Question 21 is printed on the next page.**

21 (a)

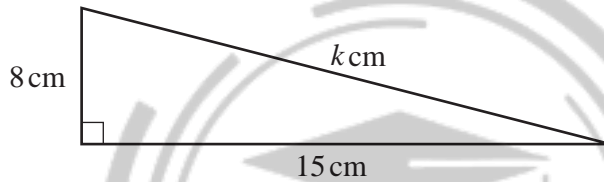


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Calculate the value of  $x$ .

$x = \dots\dots\dots$  [2]

(b)



NOT TO  
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Calculate the value of  $k$ .

$k = \dots\dots\dots$  [2]

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# Cambridge IGCSE™

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**MATHEMATICS**

**0580/11**

Paper 1 (Core)

**October/November 2020**

MARK SCHEME

Maximum Mark: 56

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**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 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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This document consists of **6** printed pages.

### 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.



Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

### Abbreviations

cao – correct answer only

dep – dependent

FT – follow through after error

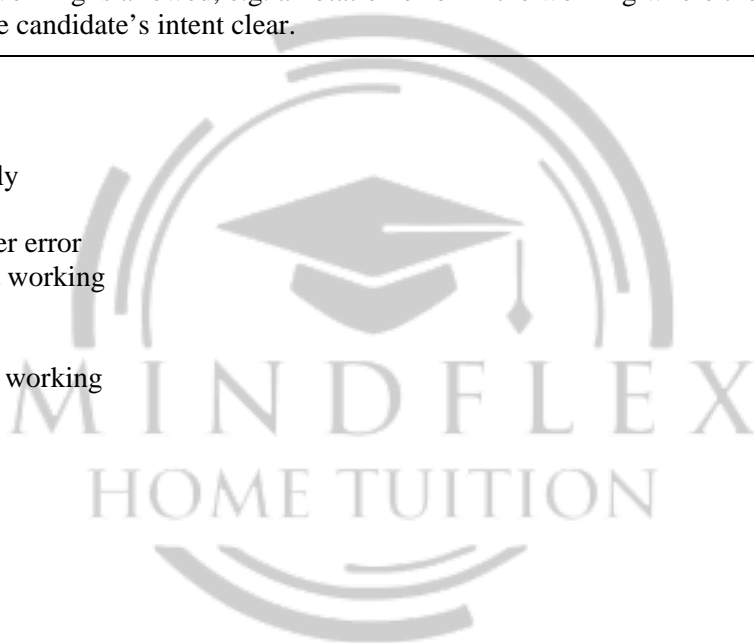
isw – ignore subsequent working

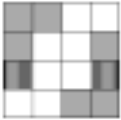
oe – or equivalent

SC – Special Case

nfw – not from wrong working

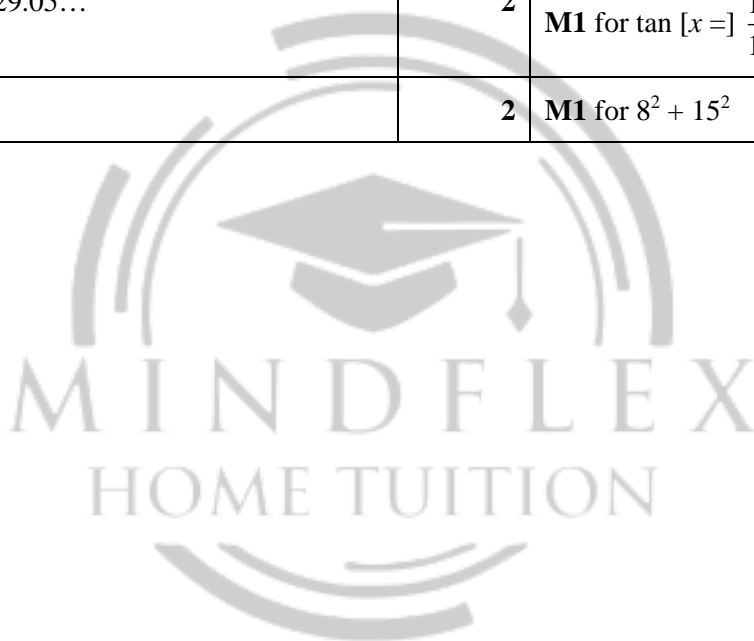
soi – seen or implied



Question	Answer	Marks	Partial Marks
1(a)	Acute	1	
1(b)	Pentagon	1	
1(c)	Trapezium	1	
2	Congruent indicated only	1	
3	$\frac{4}{7}$ cao	1	
4	6	1	
5(a)	Two diagonal lines only	2	<b>B1</b> for one correct line <b>with</b> one incorrect or missing line or for two correct lines <b>with</b> maximum one incorrect line
5(b)		1	
6	16	4	Accept any correct method e.g. <b>M1</b> for $19 \times 7$ <b>M1</b> for $517 - their\ 133$ <b>M1</b> for $their\ 384 \div 24$
7(a)	10 10 [am]	1	
7(b)(i)	8	1	
7(b)(ii)	20	1	
7(c)	Line from (11 10, 12) to (11 20, 12) <b>and ruled</b> line from ( <i>their</i> 11 20, 12) to ( <i>their</i> 11 20 + 30, 0)	2	<b>B1</b> for either line correct  If zero scored, <b>B1</b> for 30 [min] or half an hour or 0.5 [hours]
8	Correct triangle constructed with $AC = 5$ cm and $BC = 6.5$ cm and intersecting arcs	3	<b>B2</b> for correct triangle with no/incorrect arcs or <b>SC2</b> for accurate triangle with arcs but sides interchanged or <b>B1</b> for 6.5 [cm] or 5 [cm] soi
9	850[.00]	2	<b>M1</b> for $\frac{1190}{5+2}$

Question	Answer	Marks	Partial Marks
10(a)	$\begin{pmatrix} 7 \\ -4 \end{pmatrix}$	1	
10(b)	$\begin{pmatrix} 8 \\ -20 \end{pmatrix}$	1	
11	1.75	3	<b>M2</b> for $(13.72 - 2.8 \times 2.65) \div 3.6$ oe or <b>M1</b> for $2.8 \times 2.65$
12	$\frac{50-10}{4 \times 2}$	<b>M1</b>	Allow <b>M1</b> for 3 out of 4 values correctly rounded or for all correct but with any trailing zeros
	5	<b>A1</b>	dep on $\frac{50-10}{4 \times 2}$
13(a)	$2 \times 3^2$ or $2 \times 3 \times 3$	2	<b>B1</b> for 2, 3, 3 may be seen in a factor tree or table
13(b)	1159	3	<b>B2</b> for $2^3 \times 3^2$ soi by 72 or 1[h] 12[min] or correct times of <b>both</b> buses to 11 59 or <b>B1</b> for correct times of <b>one</b> bus to 11 59 or <b>M1</b> for $2^3 \times 3$ or for 18, 36, 54 [...] <b>and</b> 24, 48 [...] or listing times of next 4 red buses <b>and</b> next 3 blue buses, follow through max 1 error or omission in each list
14	$\frac{8}{3}$ and $\frac{11}{4}$ oe improper fractions	<b>M1</b>	
	$\frac{88}{12}$ oe improper fraction	<b>A1</b>	
	$7\frac{1}{3}$ cao final answer	<b>A1</b>	Dep on first <b>A1</b> If <b>M0</b> scored, <b>SC1</b> for $\frac{8}{3}$ or $\frac{11}{4}$ oe improper fraction
15	4370	1	
16	$[x =] \frac{2y+7}{5}$ oe or $[x =] \frac{2y}{5} + \frac{7}{5}$ oe final answer	2	<b>M1</b> for $2y + 7 = 5x$ oe or $\frac{2y}{5} = x - \frac{7}{5}$ oe
17	19448.1[0] final answer	2	<b>M1</b> for $16000 (1 + \frac{5}{100})^4$ oe

Question	Answer	Marks	Partial Marks
18(a)	4 points correctly plotted	2	<b>B1</b> for 2 or 3 points correctly plotted
18(b)	Negative	1	
18(c)	Correct ruled line of best fit	1	
18(d)	10 to 12	1	<b>FT</b> <i>their</i> straight line of best fit
19	8.91 or 8.911 to 8.913	2	<b>M1</b> for $\frac{56}{2\pi}$
20	[y =] 1.5x + 3 final answer	2	<b>M1</b> for $\frac{\text{rise}}{\text{run}}$ using correct values or <b>B1</b> for [y =] 1.5x + c or [y =] kx + 3, k ≠ 0 as final answer
21(a)	29.1 or 29.05...	2	<b>M1</b> for tan [x =] $\frac{10}{18}$
21(b)	17	2	<b>M1</b> for 8 <sup>2</sup> + 15 <sup>2</sup>





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## MATHEMATICS

0580/21

Paper 2 (Extended)

October/November 2020

1 hour 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

### INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use either your calculator value or 3.142.

### INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has 12 pages. Blank pages are indicated.

1 Simplify.

$$3a + 7b - 4a + b$$

..... [2]

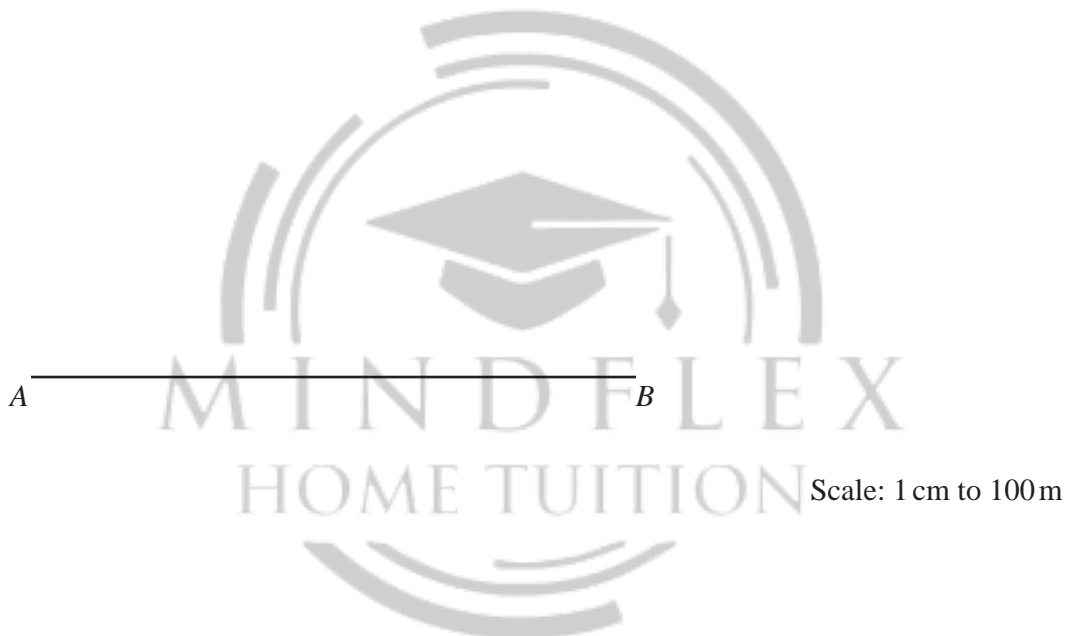
2 A field,  $ABC$ , is in the shape of a triangle.  
 $AC = 500$  m and  $BC = 650$  m.

**Using a ruler and compasses only**, complete the scale drawing of the field  $ABC$ .

Leave in your construction arcs.

Use a scale of 1 cm to represent 100 m.

The side  $AB$  has been drawn for you.



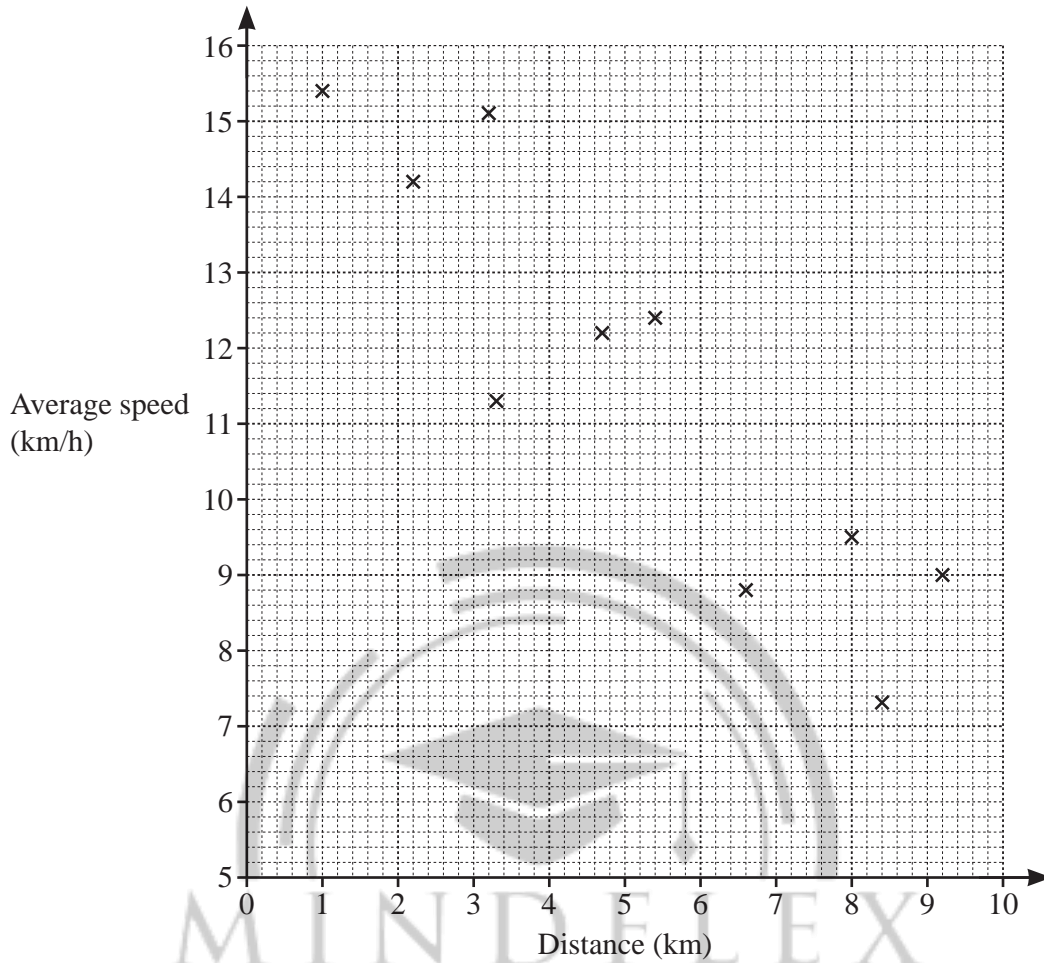
[3]

3 Rangan buys 3.6 kg of potatoes and 2.8 kg of leeks.  
The total cost is \$13.72 .  
Leeks cost \$2.65 per kilogram.

Find the cost of 1 kg of potatoes.

\$ ..... [3]

- 4 Aisha records the distance she runs and her average speed. The results are shown in the scatter diagram.



- (a) The table shows the results of four more runs.

Distance (km)	4.2	5.7	7.1	8.8
Average speed (km/h)	13.4	11.8	9.8	8.3

On the scatter diagram, plot these points.

[2]

- (b) What type of correlation is shown in the scatter diagram?

..... [1]

- (c) On the scatter diagram, draw a line of best fit.

[1]

- (d) Use your line of best fit to estimate her average speed when she runs a distance of 6 km.

..... km/h [1]

5  $T = \frac{49.2 - 9.59}{4.085 \times 2.35}$

By writing each number correct to 1 significant figure, work out an estimate for  $T$ .  
You must show all your working.

..... [2]

6 **Without using a calculator**, work out  $2\frac{2}{3} \times 2\frac{3}{4}$ .

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



..... [3]

7 Make  $x$  the subject of this formula.

$$2y = 5x - 7$$

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



- 8 (a) 1, 2, 3, 5 and 7 are all common factors of two numbers.

Write down the digit that the two numbers must end in.

..... [1]

- (b) Write 84 as a product of its prime factors.

..... [2]

- 9 (a) Ahmed increases 40 by 300%.

From this list, put a ring around the correct calculation.

$40 \times 1.300$        $40 \times 3$        $40 \times 400$        $40 \times 4$        $40 \times 300$

[1]

- (b) Ahmed finds the magnitude of the vector  $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ .

From this list, put a ring around the correct calculation.

$\sqrt{2^2 + -3^2}$        $2^2 - 3^2$        $\sqrt{2^2 - 3^2}$        $2^2 + (-3)^2$        $\sqrt{2^2 + (-3)^2}$

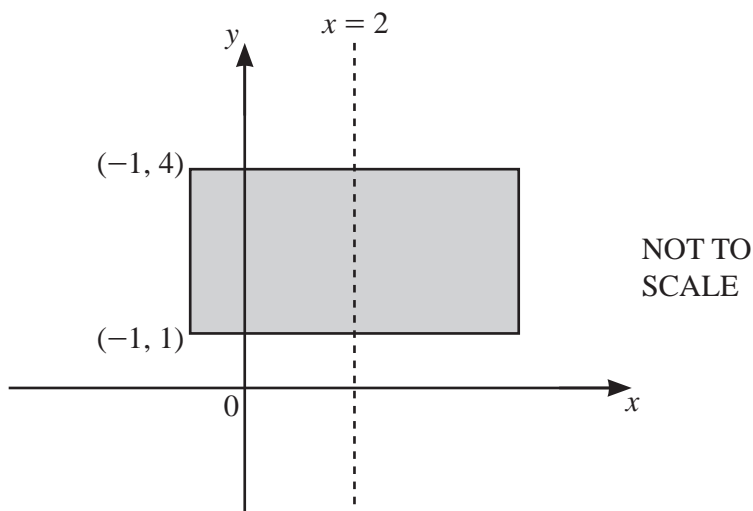
[1]

- 10 A town has a population of 45 000.  
This population increases exponentially at a rate of 1.6% per year.

Find the population of the town at the end of 5 years.  
Give your answer correct to the nearest hundred.

..... [3]

11



The diagram shows a rectangle with a line of symmetry at  $x = 2$ .  
Two vertices of the rectangle are at  $(-1, 1)$  and  $(-1, 4)$ .

The shaded region is defined by the inequalities  $a \leq x \leq b$  and  $c \leq y \leq d$ .

Find the values of  $a, b, c$  and  $d$ .

- $a = \dots\dots\dots$
- $b = \dots\dots\dots$
- $c = \dots\dots\dots$
- $d = \dots\dots\dots$  [2]

12 The interior angle of a regular polygon with  $n$  sides is  $156^\circ$ .

Work out the value of  $n$ .

$n = \dots\dots\dots$  [2]

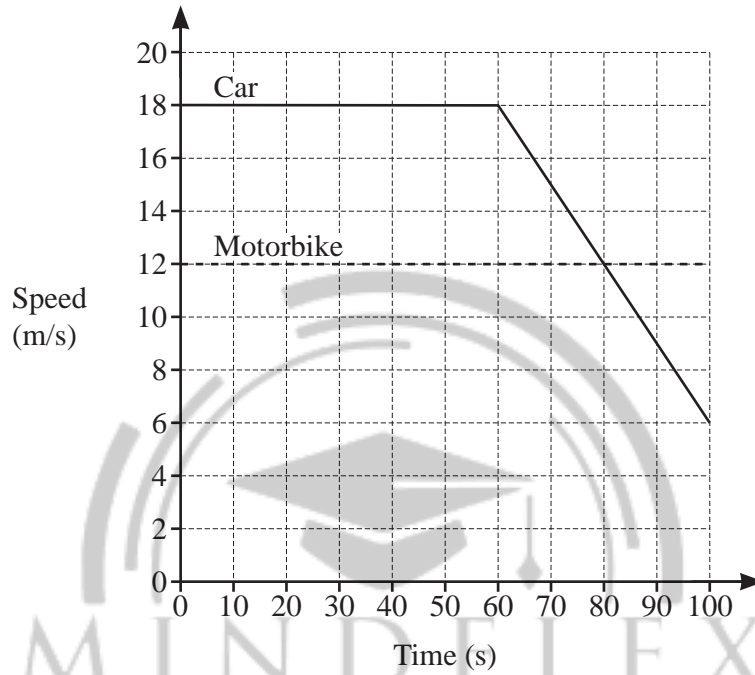
13 Write the recurring decimal  $0.1\dot{7}$  as a fraction in its simplest form.  
You must show all your working.

$\dots\dots\dots$  [3]

14 Find the gradient of a line that is perpendicular to  $8y + 4x = 5$ .

..... [2]

15



The diagram shows the speed–time graph for 100 seconds of the journey of a car and of a motorbike.

(a) Find the deceleration of the car between 60 and 100 seconds.

.....  $\text{m/s}^2$  [1]

(b) Calculate how much further the car travelled than the motorbike during the 100 seconds.

..... m [3]

16 Factorise  $6x^2 + 7x - 20$ .

..... [2]

17 (a)  $f(x) = 3x^2 + a$  where  $a$  is an integer.  
 $f(-2) = 19$

Find the value of  $a$ .

$a =$  ..... [2]

(b)  $g(x) = 2x + 7$        $h(x) = 3x - 8$

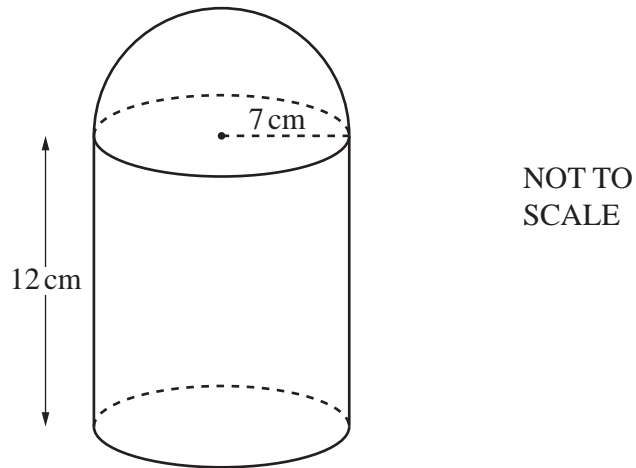
(i) Find  $gh(x)$  in its simplest form.

..... [2]

(ii) Find  $g^{-1}(x)$ .

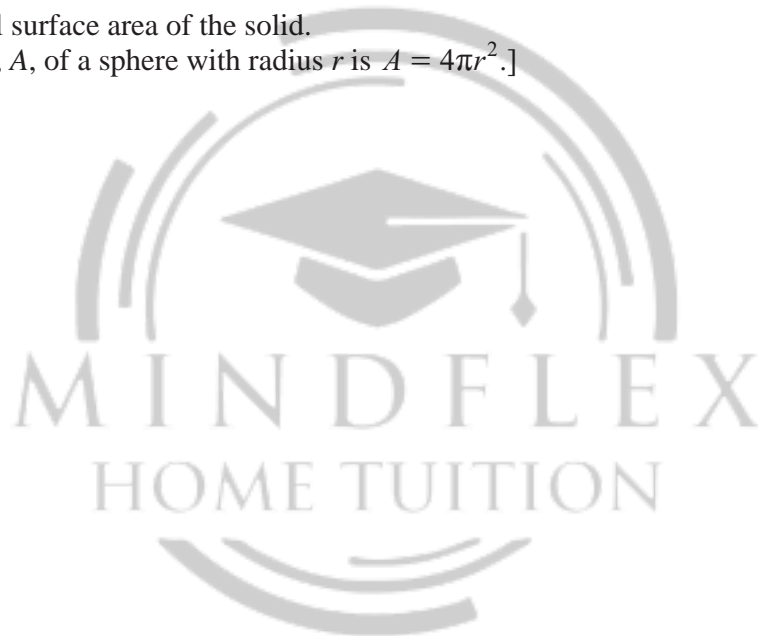
$g^{-1}(x) =$  ..... [2]

18



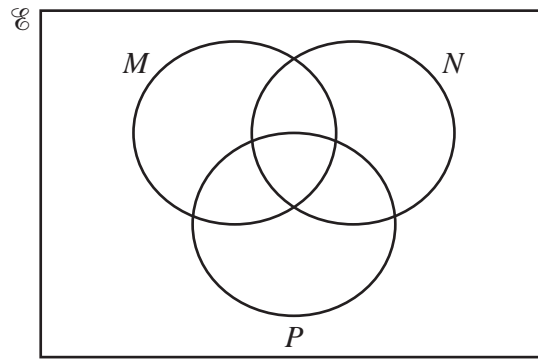
The diagram shows a solid made from a cylinder and a hemisphere, both of radius 7 cm. The cylinder has length 12 cm.

Work out the total surface area of the solid.  
[The surface area,  $A$ , of a sphere with radius  $r$  is  $A = 4\pi r^2$ .]



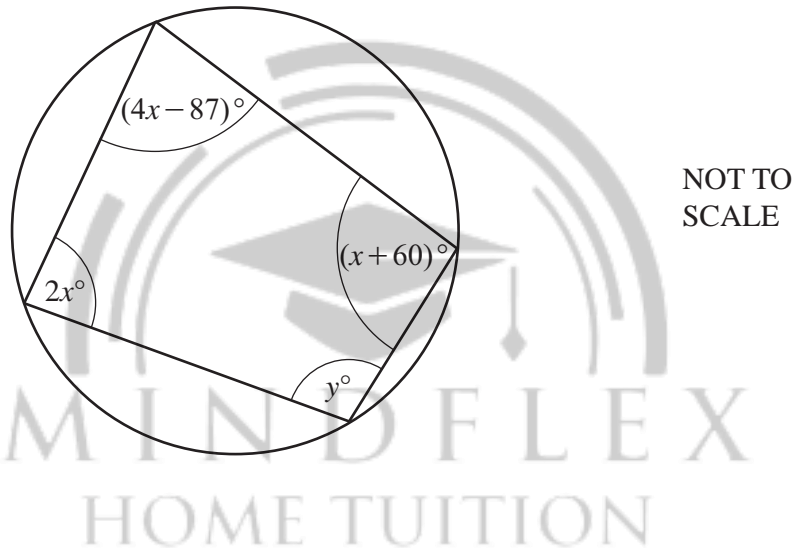
..... cm<sup>2</sup> [4]

19 In this Venn diagram, shade the region  $M'UNUP$ .



[1]

20

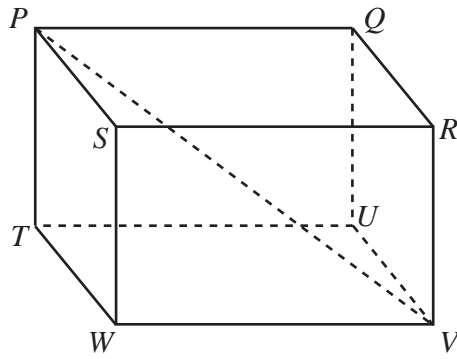


The diagram shows a cyclic quadrilateral.

Find the value of  $y$ .

$y = \dots\dots\dots$  [4]

21



NOT TO  
SCALE

The diagram shows a cuboid  $PQRSTUWV$ .

$PV = 17.2$  cm

The angle between the line  $PV$  and the base  $TUVW$  of the cuboid is  $43^\circ$ .

Calculate  $PT$ .



$PT = \dots\dots\dots$  cm [3]

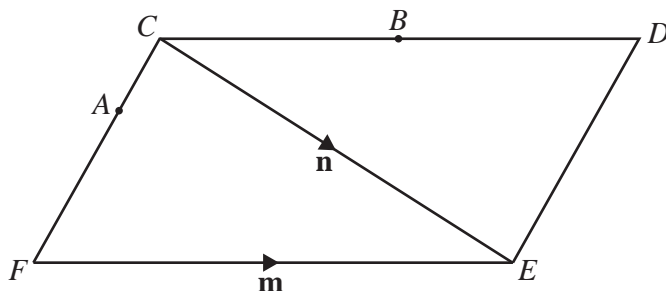
22 Simplify.

$$\frac{x^2 - 5x}{2x^2 - 50}$$

$\dots\dots\dots$  [4]

**Question 23 is printed on the next page.**

23 (a)



NOT TO  
SCALE

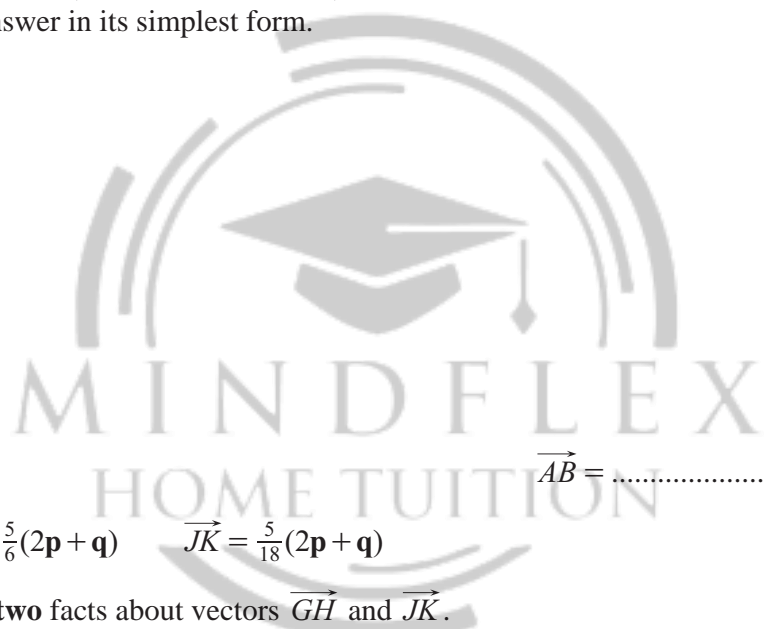
The diagram shows a parallelogram  $CDEF$ .

$\vec{FE} = \mathbf{m}$  and  $\vec{CE} = \mathbf{n}$ .

$B$  is the midpoint of  $CD$ .

$FA = 2AC$

Find an expression, in terms of  $\mathbf{m}$  and  $\mathbf{n}$ , for  $\vec{AB}$ .  
Give your answer in its simplest form.



$\vec{AB} = \dots\dots\dots$  [3]

(b)  $\vec{GH} = \frac{5}{6}(2\mathbf{p} + \mathbf{q})$       $\vec{JK} = \frac{5}{18}(2\mathbf{p} + \mathbf{q})$

Write down **two** facts about vectors  $\vec{GH}$  and  $\vec{JK}$ .

.....

..... [2]

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# Cambridge IGCSE™

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**MATHEMATICS**

**0580/21**

Paper 2 (Extended)

**October/November 2020**

MARK SCHEME

Maximum Mark: 70

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**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 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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This document consists of **6** printed pages.

### 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).

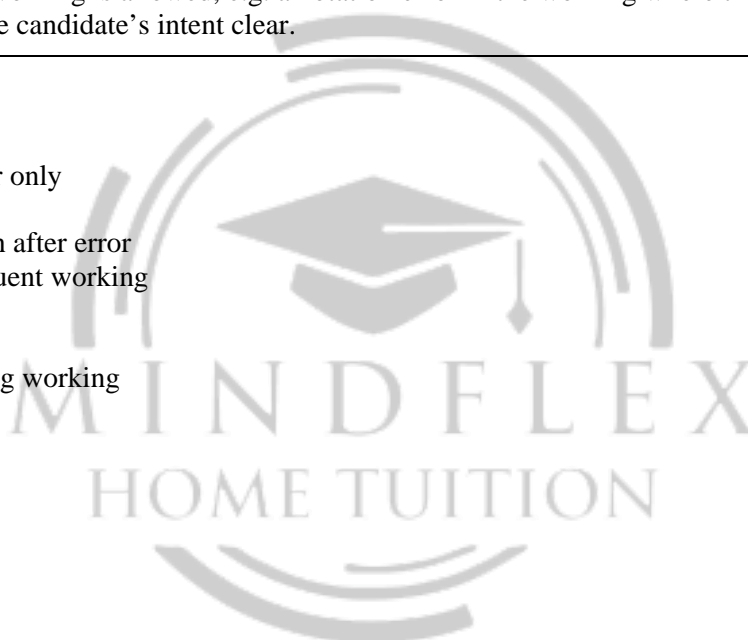
#### GENERIC MARKING PRINCIPLE 6:

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.

Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

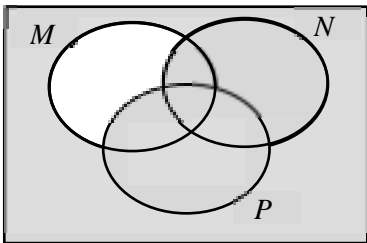
### Abbreviations

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



Question	Answer	Marks	Partial Marks
1	$-a + 8b$ final answer	2	<b>B1</b> for $-a$ or $[+]8b$ in final answer or for $-a + 8b$ spoilt
2	Correct triangle constructed with $AC = 5$ cm and $BC = 6.5$ cm and intersecting arcs	3	<b>B2</b> for correct triangle with no/incorrect arcs or <b>SC2</b> for accurate triangle with arcs but sides interchanged  or <b>B1</b> for 6.5 [cm] or 5 [cm] soi
3	1.75	3	<b>M2</b> for $(13.72 - 2.8 \times 2.65) \div 3.6$ oe or <b>M1</b> for $2.8 \times 2.65$
4(a)	4 points correctly plotted	2	<b>B1</b> for 2 or 3 points correctly plotted
4(b)	Negative	1	
4(c)	Correct ruled line of best fit	1	
4(d)	10 to 12	1	<b>FT</b> <i>their</i> straight line of best fit
5	$\frac{50 - 10}{4 \times 2}$	<b>M1</b>	Allow <b>M1</b> for 3 out of 4 values correctly rounded or for all correct but with any trailing zeros
	5	<b>A1</b>	dep on $\frac{50 - 10}{4 \times 2}$
6	$\frac{8}{3}$ and $\frac{11}{4}$ oe improper fractions	<b>M1</b>	
	$\frac{88}{12}$ oe improper fraction	<b>A1</b>	
	$7 \frac{1}{3}$ cao final answer	<b>A1</b>	dep on 1 <sup>st</sup> A1 If M0 scored <b>SC1</b> for $\frac{8}{3}$ or $\frac{11}{4}$ oe improper fraction
7	$[x =] \frac{2y+7}{5}$ oe or $[x =] \frac{2y}{5} + \frac{7}{5}$ oe final answer	2	<b>M1</b> for $2y + 7 = 5x$ oe or $\frac{2y}{5} = x - \frac{7}{5}$ oe
8(a)	0	1	
8(b)	$2^2 \times 3 \times 7$ or $2 \times 2 \times 3 \times 7$	2	<b>B1</b> for 2, 2, 3, 7
9(a)	$40 \times 4$	1	
9(b)	$\sqrt{2^2 + (-3)^2}$	1	

Question	Answer	Marks	Partial Marks
10	48 700 cao	3	<b>M1</b> for $45000 \times \left(1 + \frac{1.6}{100}\right)^5$ oe <b>A1</b> for 48 710 to 48 720 If A0 scored <b>B1</b> for <i>their</i> more accurate value correctly rounded to the nearest 100
11	[a =] -1 [b =] 5 [c =] 1 [d =] 4	2	<b>B1</b> for two or three correct or <b>SC1</b> for [a =] $x \geq -1$ [b =] $x \leq 5$ [c =] $y \geq 1$ [d =] $y \leq 4$
12	15	2	<b>M1</b> for $\frac{360}{180-156}$ or $\frac{180(n-2)}{n} = 156$ oe
13	17.77... - 1.77... oe	<b>M1</b>	<b>M1</b> for correct working shown
	$\frac{8}{45}$ cao	<b>A2</b>	<b>B1</b> for $\frac{16}{90}$ oe seen
14	2	2	<b>M1</b> for $y = \frac{5-4x}{8}$ oe or better
15(a)	0.3	1	
15(b)	360	3	<b>M2</b> for correct complete area statement e.g. $18 \times 60 + \frac{1}{2} \times 40 \times (18 + 6) - 12 \times 100$ or $\frac{1}{2} \times 6 \times (60 + 80) - \frac{1}{2} \times 6 \times 20$ or for answer 420 or <b>M1</b> for one area calculation
16	$(3x - 4)(2x + 5)$ final answer	2	<b>B1</b> for $(ax + b)(cx + d)$ where $ac = 6$ and $ad + bc = 7$ or $bd = -20$
17(a)	[a =] 7	2	<b>M1</b> for $3(-2)^2 + a = 19$ or better
17(b)(i)	$6x - 9$ or $3(2x - 3)$ final answer	2	<b>M1</b> for $2(3x - 8) + 7$ or better
17(b)(ii)	$\frac{x-7}{2}$ final answer	2	<b>M1</b> for a correct first step $x = 2y + 7$ or $y - 7 = 2x$ or $\frac{y}{2} = x + \frac{7}{2}$

Question	Answer	Marks	Partial Marks
18	990 or 989.58 to 989.73	4	<b>M1</b> for $4 \times \pi \times 7^2 [\div 2]$ <b>M1</b> for $\pi \times 7^2$ <b>M1</b> for $\pi \times 7 \times 2 \times 12$
19	$\xi$ 	1	
20	107	4	<b>B2</b> for $x = 40$ or <b>M1</b> for $2x + x + 60 = 180$ oe  <b>M1</b> for correctly substituting <i>their</i> $x$ into $4x - 87 + y = 180$ oe or $4x - 87 + x + 60 + y + 2x = 360$ oe
21	11.7 or 11.73...	3	<b>M2</b> for $\sin 43 = \frac{PT}{17.2}$ oe or <b>M1</b> for identifying angle $PVT$
22	$\frac{x}{2(x+5)}$ or $\frac{x}{2x+10}$ final answer	4	<b>B1</b> for $x(x-5)$ <b>B2</b> for $2(x-5)(x+5)$ or $(x-5)(2x+10)$ or $(2x-10)(x+5)$ or <b>B1</b> for $2(x^2-25)$ or $(x-5)(x+5)$
23(a)	$\frac{5}{6} \mathbf{m} - \frac{1}{3} \mathbf{n}$	3	<b>B2</b> for correct unsimplified answer in terms of $\mathbf{m}$ and $\mathbf{n}$ e.g. $\frac{1}{3} (\mathbf{m} - \mathbf{n}) + \frac{1}{2} \mathbf{m}$  or <b>M1</b> for a correct route or for $\overline{FC} = \mathbf{m} - \mathbf{n}$ or $\overline{CF} = \mathbf{n} - \mathbf{m}$ or better e.g. $\overline{AC} = \frac{1}{3} (\mathbf{m} - \mathbf{n})$
23(b)	$\overline{GH} = 3 \overline{JK}$ oe or $\overline{GH}$ has a greater magnitude  $\overline{GH}$ and $\overline{JK}$ are parallel	2	<b>B1</b> for each



# Cambridge IGCSE™

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**MATHEMATICS**

**0580/31**

Paper 3 (Core)

**October/November 2020**

**2 hours**

You must answer on the question paper.

You will need: Geometrical instruments

## INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use either your calculator value or 3.142.

## INFORMATION

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Blank pages are indicated.

1 Sean is the manager of a museum.

- (a) He buys a Chinese pot costing 1200 yuan.  
The exchange rate is  $\$1 = 6.4$  yuan.

Work out the cost of this pot in dollars.

\$ ..... [1]

- (b) Sean records the maximum and minimum temperatures, in  $^{\circ}\text{C}$ , at the museum.  
Some of the results for one week are shown in the table.

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Maximum temperature ( $^{\circ}\text{C}$ )	8	12	15	14	11	7	4
Minimum temperature ( $^{\circ}\text{C}$ )	-5	-2	-4	-1	3		

- (i) Find the difference between the maximum temperature and the minimum temperature on Wednesday.

.....  $^{\circ}\text{C}$  [1]

- (ii) The minimum temperature on Saturday was  $2^{\circ}\text{C}$  higher than the minimum temperature on Monday.

Find the minimum temperature on Saturday.

.....  $^{\circ}\text{C}$  [1]

- (iii) In this week the range of temperatures was  $23^{\circ}\text{C}$ .

Find the minimum temperature on Sunday.

.....  $^{\circ}\text{C}$  [1]



(c) These are the opening times for the museum.

Monday to Friday	0900 to 1700
Saturday and Sunday	1000 to 1600

During opening hours the museum has 4 security guards working.  
Each guard works a maximum of 30 hours each week.

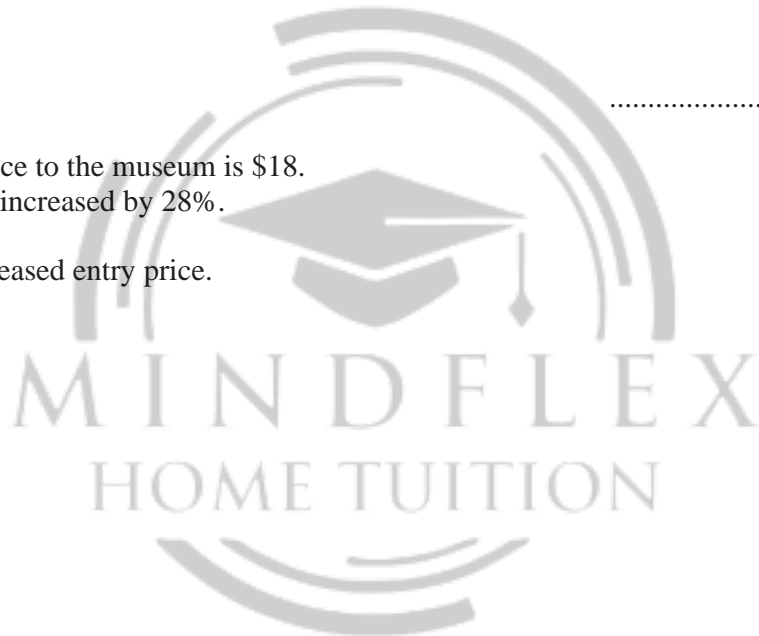
Work out the smallest number of guards needed each week.

..... [4]

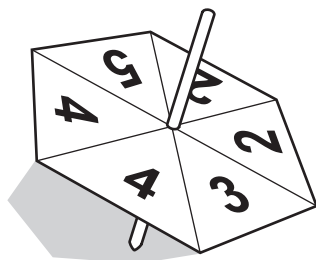
(d) The entry price to the museum is \$18.  
This price is increased by 28%.

Find the increased entry price.

\$ ..... [2]



- 2 (a) Jian has a fair spinner in the shape of a regular hexagon. The spinner is numbered 2, 2, 3, 4, 4, 5.



Jian spins the spinner.

Find the probability that the spinner lands on

- (i) an even number,

..... [1]

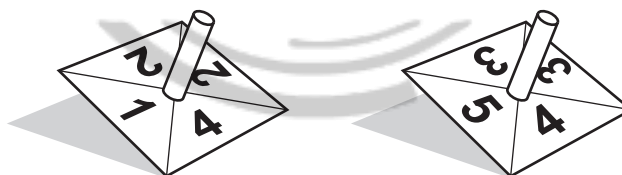
- (ii) a number less than 6,

..... [1]

- (iii) the number 1.

..... [1]

- (b) Mei has two fair square spinners, A and B. Spinner A is numbered 1, 2, 2, 4 and spinner B is numbered 3, 3, 4, 5.



Spinner A

Spinner B

She spins both spinners and adds the two numbers.

- (i) Complete the table to show all the possible outcomes.

A \ B	3	3	4	5
1	4	4		
2	5	5	6	7
2	5	5	6	7
4	7	7		

[2]

(ii) Use the table to write down the probability that the total is

(a) 5,

..... [1]

(b) more than 5.

..... [1]

(c) Ning has a spinner numbered 1 to 6.  
She spins it 50 times and her results are shown in the table.

Number on spinner	Frequency
1	15
2	12
3	9
4	5
5	2
6	7

(i) Write down the mode.



..... [1]

(ii) Find the median.

..... [1]

(iii) Work out the mean.

..... [3]

3 (a)

8 15 18 33 39 41 51 57 60 81

From this list, write down

(i) a factor of 54,

..... [1]

(ii) a multiple of 19,

..... [1]

(iii) a prime number.

..... [1]

(b) Write down the reciprocal of 64.

..... [1]

(c) (i) Write  $4.81 \times 10^{-3}$  as an ordinary number.



..... [1]

(ii) Write 75 000 in standard form.

..... [1]

(iii) Calculate  $\frac{6.3 \times 10^2}{7 \times 10^{-3}}$ .

Write your answer in standard form.

..... [2]

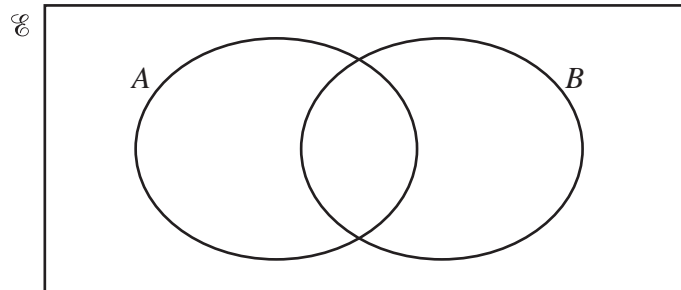
(d) (i)

$$\mathcal{C} = \{2, 4, 8, 16, 32, 64\}$$

$$A = \{\text{square numbers}\}$$

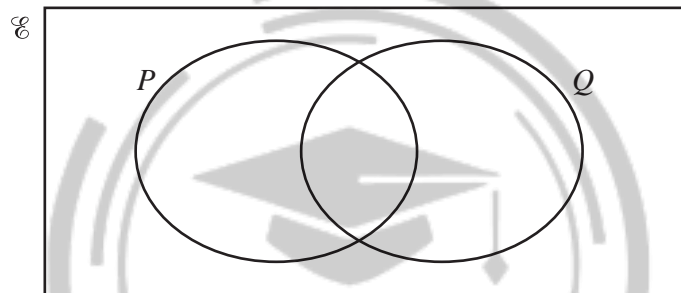
$$B = \{\text{cube numbers}\}$$

Use this information to complete the Venn diagram.

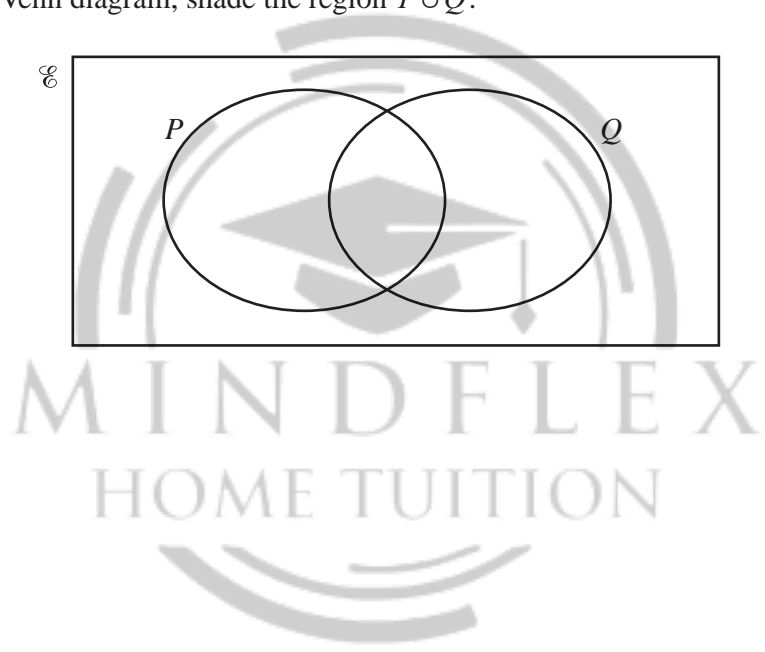


[2]

(ii) On this Venn diagram, shade the region  $P \cup Q$ .



[1]



4 (a) Simplify.

$$6a - 3b + 2a - 4b$$

..... [2]

(b) Expand.

$$5(x - 3)$$

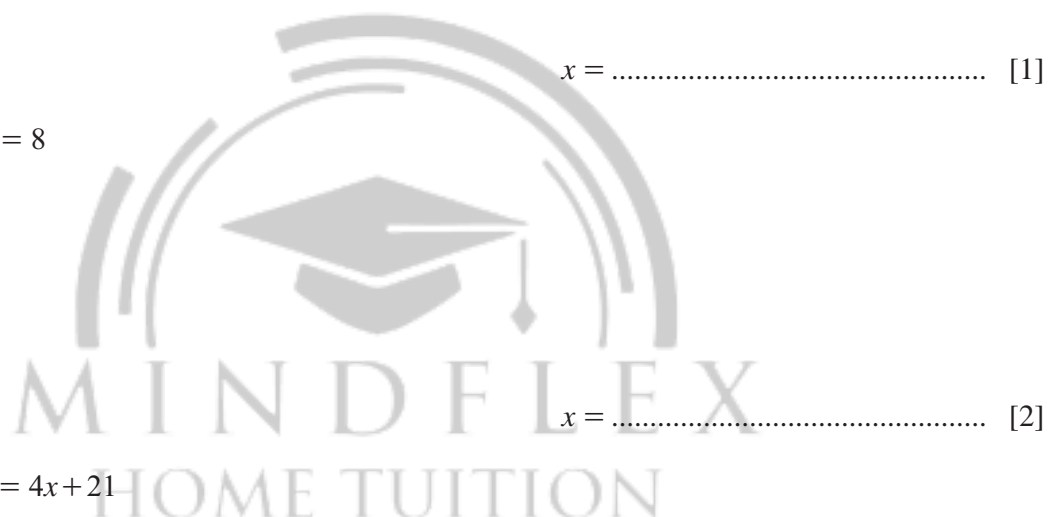
..... [1]

(c) Solve these equations.

(i)  $\frac{x}{3} = 18$

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

(ii)  $5x + 18 = 8$



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

(iii)  $12x - 3 = 4x + 21$

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

(d)  $6^{10} \times 6^x = 6^2$

Find the value of  $x$ .

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

- (e) The Fraser family and the Singh family go to the cinema.  
The Fraser family buys 6 adult tickets and 2 child tickets for \$124.  
The Singh family buys 3 adult tickets and 5 child tickets for \$100.

Find the price of an adult ticket and the price of a child ticket.



Adult ticket \$ .....

Child ticket \$ ..... [5]

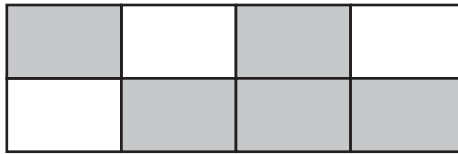
5 (a) Write one hundred and twenty thousand and twenty in figures.

..... [1]

(b) Find the value of  $\sqrt{3481}$ .

..... [1]

(c)



(i) Write down the fraction of the rectangle that is shaded.

..... [1]

(ii) Find the percentage of the rectangle that is **not** shaded.

..... % [1]

(d) Write these numbers in order, starting with the smallest.

27%       $\frac{5}{17}$       0.268       $\frac{7}{29}$

..... < ..... < ..... < ..... [2]  
*smallest*

(e) Write 0.3728 correct to 1 decimal place.

..... [1]



(f) Write down the value of  $19^0$ .

..... [1]

(g) The height,  $h$  metres, of a tower is 128 m, correct to the nearest metre.

Complete the statement about the value of  $h$ .

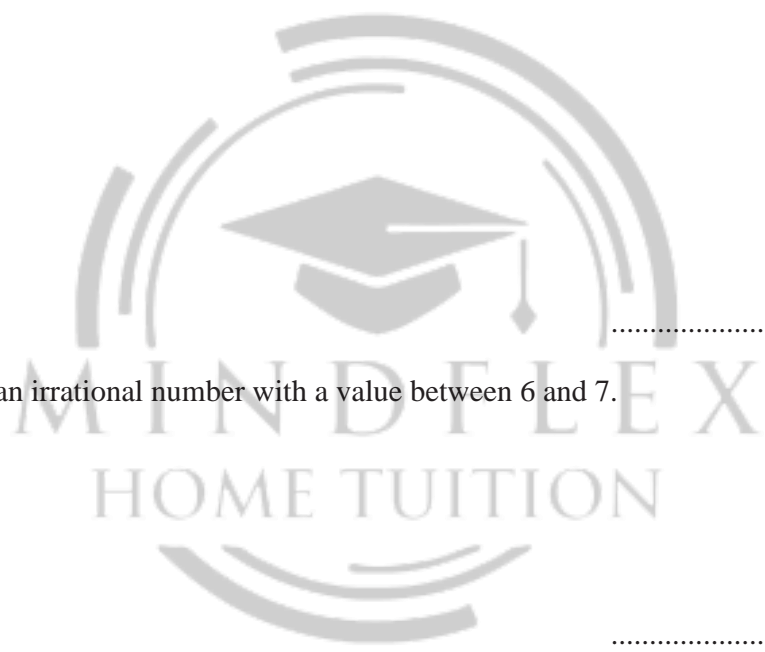
.....  $\leq h <$  ..... [2]

(h) Find the highest common factor (HCF) of 126 and 180.

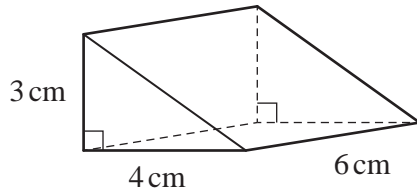
..... [2]

(i) Write down an irrational number with a value between 6 and 7.

..... [1]



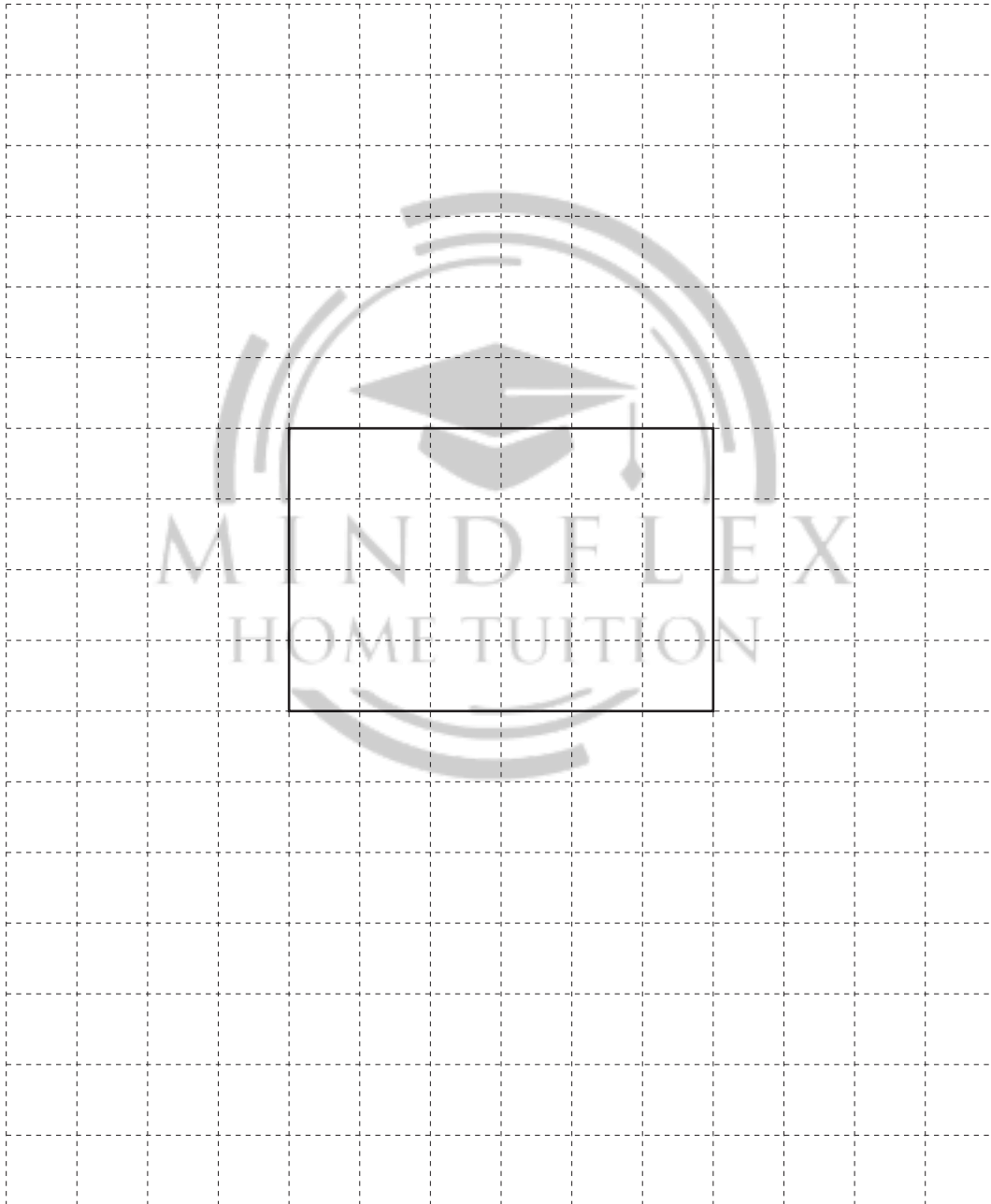
6



NOT TO  
SCALE

The diagram shows a right-angled triangular prism.

- (a) On the  $1\text{ cm}^2$  grid, complete the net of the prism.  
One face has been drawn for you.



[3]

(b) Work out the surface area of the prism.

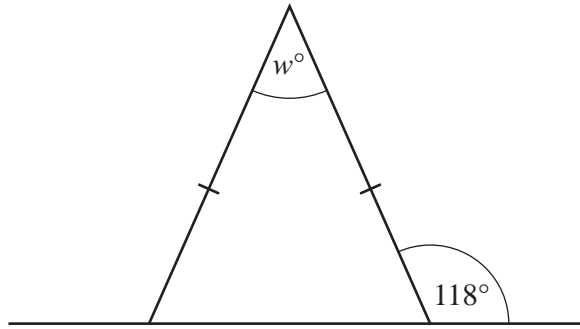
.....  $\text{cm}^2$  [3]

(c) Work out the volume of the prism.



.....  $\text{cm}^3$  [2]

7 (a)



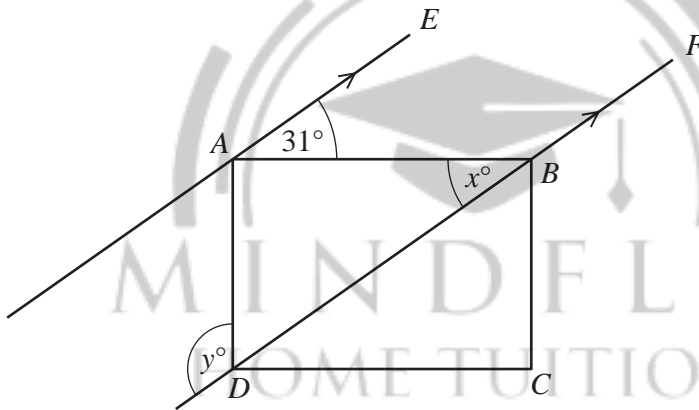
NOT TO  
SCALE

The diagram shows an isosceles triangle and a straight line.

Work out the value of  $w$ .

$w = \dots\dots\dots$  [2]

(b)



NOT TO  
SCALE

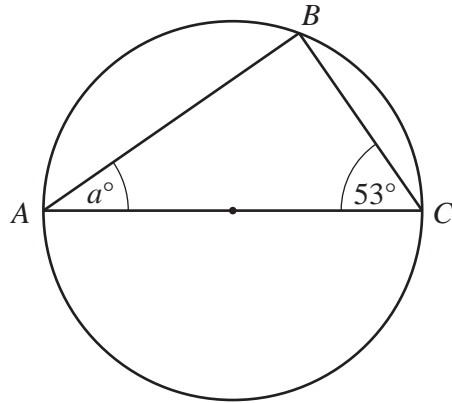
$ABCD$  is a rectangle.  
 $AE$  is parallel to  $DBF$ .

Find the value of  $x$  and the value of  $y$ .

$x = \dots\dots\dots$

$y = \dots\dots\dots$  [2]

(c)



NOT TO  
SCALE

$A$ ,  $B$  and  $C$  are points on a circle.  
 $AC$  is a diameter of the circle.

Find the value of  $a$ .

$a = \dots\dots\dots$  [2]

(d)

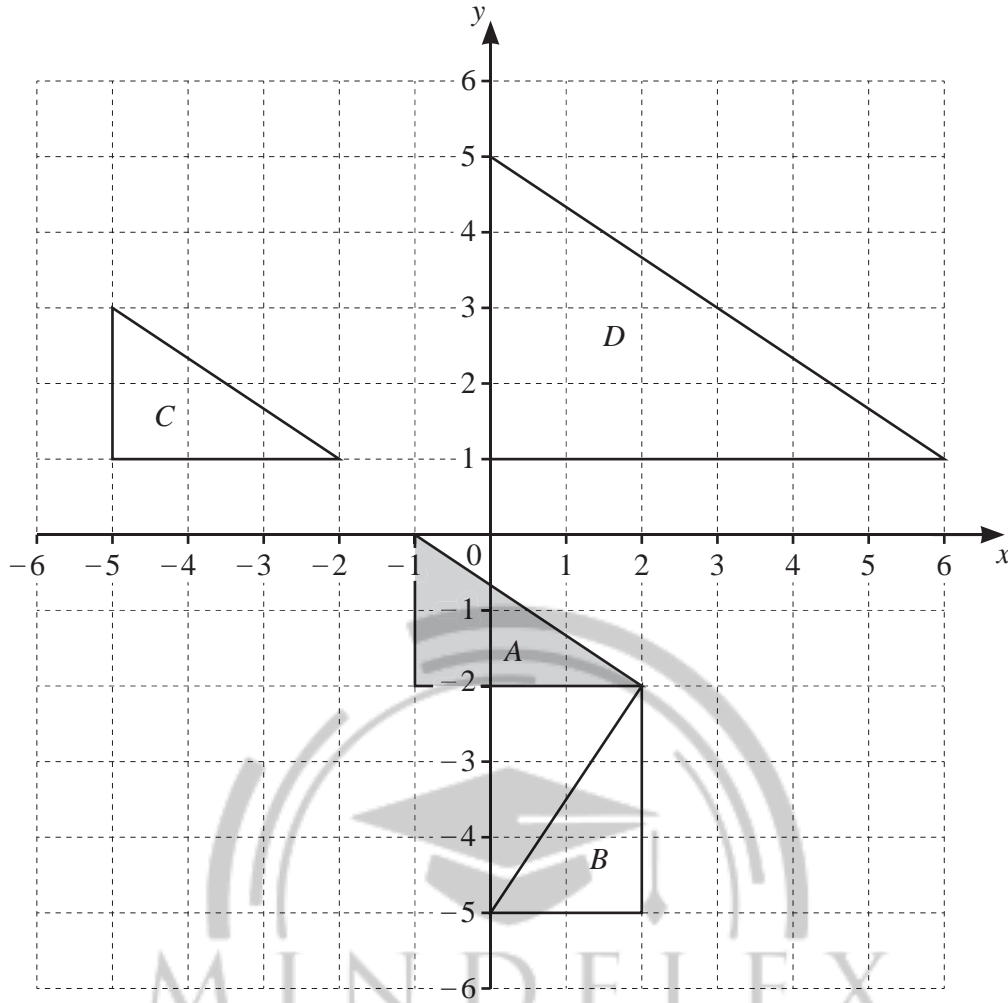


NOT TO  
SCALE

Two regular octagons and a square meet at point  $P$ .

Show, by calculation, that the three interior angles at  $P$  add up to  $360^\circ$ .

[3]



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

(i) triangle A onto triangle B,

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

(ii) triangle A onto triangle C,

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

(iii) triangle A onto triangle D.

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

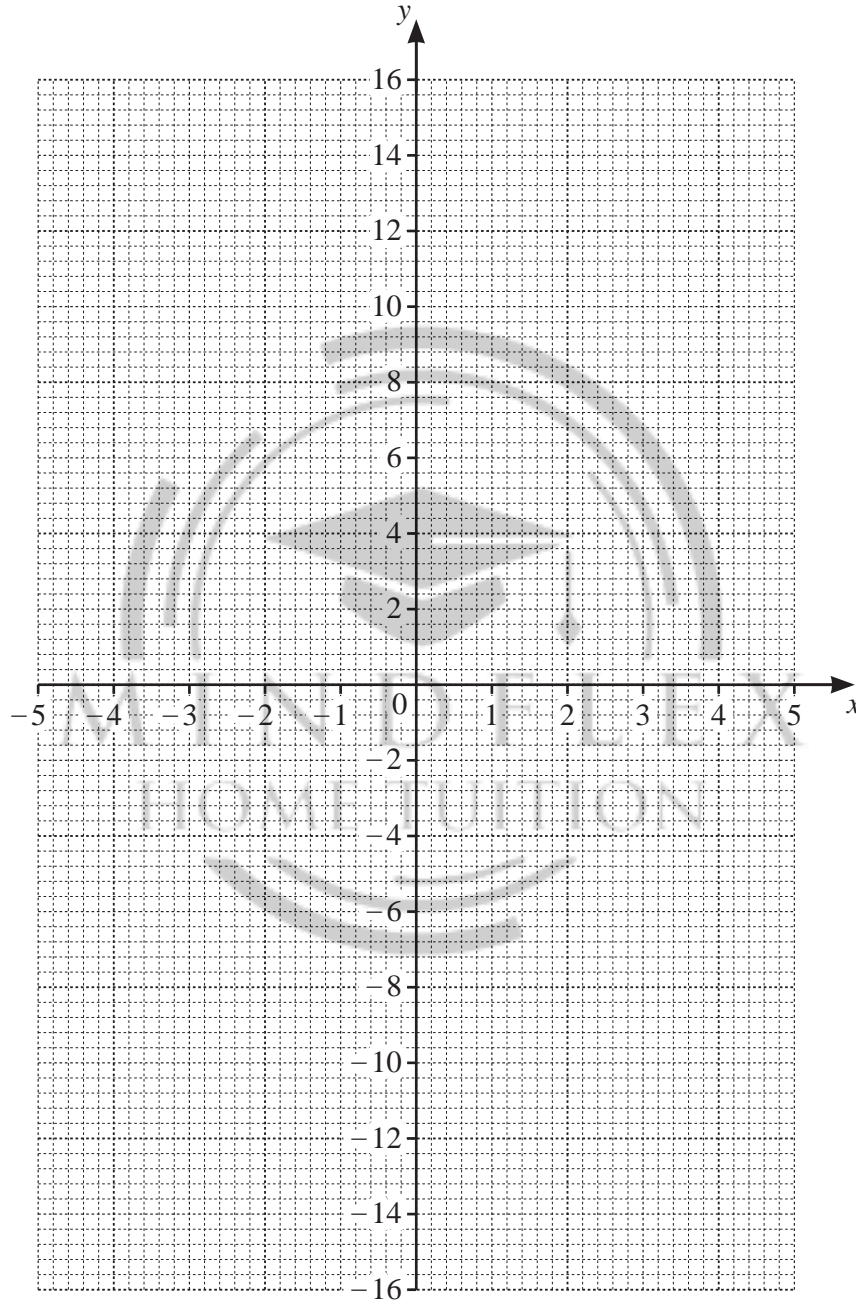
(b) On the grid, draw the image of triangle A after a reflection in the line  $x = -2$ . [2]

9 (a) Complete the table of values for  $y = \frac{15}{x}$ .

x	-5	-3	-2	-1		1	2	3	5
y				-15		15			

[3]

(b) On the grid, draw the graph of  $y = \frac{15}{x}$  for  $-5 \leq x \leq -1$  and  $1 \leq x \leq 5$ .



[4]

(c) On the grid, draw the line  $y = 6$ .

[1]

(d) Use your graph to solve  $\frac{15}{x} = 6$ .

$x = \dots\dots\dots$  [1]

10 (a) These are the first four terms of a sequence.

8    15    22    29

(i) Write down the next term.

..... [1]

(ii) Write down the term to term rule for continuing this sequence.

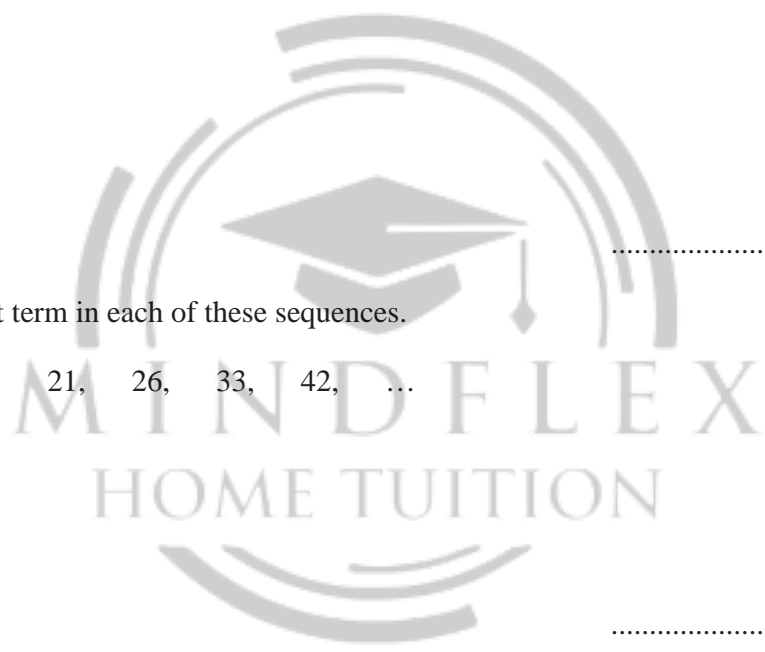
..... [1]

(iii) Find an expression for the  $n$ th term.

..... [2]

(b) Find the next term in each of these sequences.

(i) 18, 21, 26, 33, 42, ...



..... [1]

(ii) 18, 20, 24, 32, 48, ...

..... [1]



(c) Find the first three terms of the sequence with  $n$ th term  $n^2 + 5n$ .

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



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# Cambridge IGCSE™

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**MATHEMATICS**

**0580/31**

Paper 3 (Core)

**October/November 2020**

MARK SCHEME

Maximum Mark: 104

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**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 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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This document consists of **7** printed pages.

### 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.

Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

### Abbreviations

cao – correct answer only

dep – dependent

FT – follow through after error

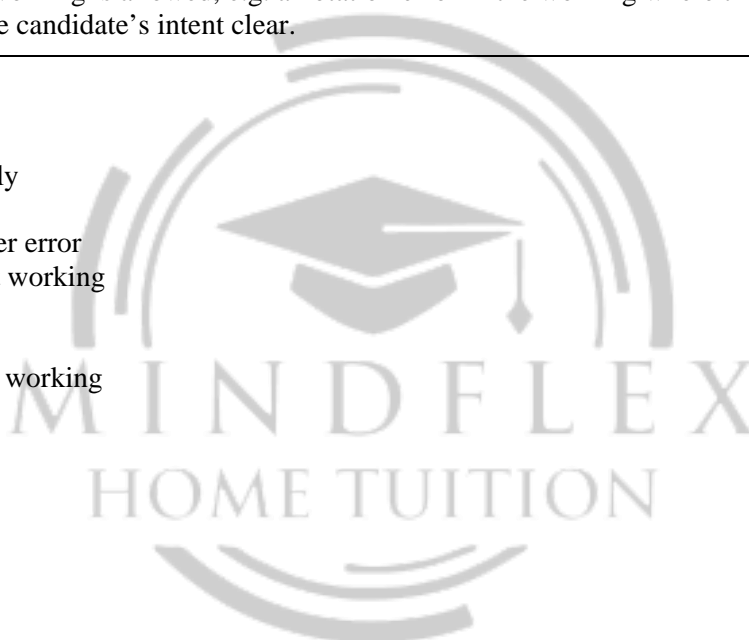
isw – ignore subsequent working

oe – or equivalent

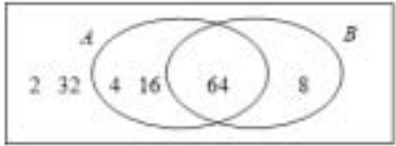

SC – Special Case

nfw – not from wrong working

soi – seen or implied



Question	Answer	Marks	Partial Marks
1(a)	187.5[0]	1	
1(b)(i)	19	1	
1(b)(ii)	-3	1	
1(b)(iii)	-8	1	
1(c)	7 nfw	4	<b>M1</b> for $8 \times 5 + 6 \times 2$ oe and <b>M2</b> for <i>their</i> $52 \times 4 \div 30$ oe or <b>M1</b> for <i>their</i> $52 \times 4$ oe or <i>their</i> $52 \div 30$ oe
1(d)	23.04	2	<b>M1</b> for $18 \times (1 + \frac{28}{100})$ oe or <b>B1</b> for 5.04
2(a)(i)	$\frac{2}{3}$ oe	1	
2(a)(ii)	1	1	
2(a)(iii)	0	1	
2(b)(i)	$\begin{matrix} 5 & 6 \\ 8 & 9 \end{matrix}$ in the correct places	2	<b>B1</b> for 2 or 3 correct, in correct places
2(b)(ii)(a)	$\frac{5}{16}$ oe	1	<b>FT</b> <i>their</i> table
2(b)(ii)(b)	$\frac{9}{16}$ oe	1	<b>FT</b> <i>their</i> table
2(c)(i)	1	1	
2(c)(ii)	2	1	
2(c)(iii)	2.76	3	<b>M1</b> for $1 \times 15 + 2 \times 12 + 3 \times 9 + 4 \times 5 + 5 \times 2 + 6 \times 7$ oe  <b>M1dep</b> for <i>their</i> $138 \div 50$
3(a)(i)	18	1	
3(a)(ii)	57	1	
3(a)(iii)	41	1	
3(b)	$\frac{1}{64}$	1	

Question	Answer	Marks	Partial Marks
3(c)(i)	[0].00481 cao	1	
3(c)(ii)	$7.5 \times 10^4$	1	
3(c)(iii)	$9 \times 10^4$	2	<b>B1</b> for figs 9
3(d)(i)		2	<b>B1</b> for 4 or 5 numbers in the correct place
3(d)(ii)		1	
4(a)	$8a - 7b$	2	<b>B1</b> for $8a$ or $-7b$ in final answer or for $8a - 7b$ seen then spoilt
4(b)	$5x - 15$	1	
4(c)(i)	54	1	
4(c)(ii)	-2	2	<b>M1</b> for $5x = 8 - 18$ or $x + \frac{18}{5} = \frac{8}{5}$ or better oe
4(c)(iii)	3	2	<b>M1</b> for $12x - 4x = 21 + 3$ or better oe
4(d)	-8 cao	1	
4(e)	17.5[0] 9.5[0]	5	<b>B1</b> for $6a + 2c = 124$ <b>B1</b> for $3a + 5c = 100$ oe  <b>M1FT</b> for a correct method to eliminate one variable  <b>A1</b> for 17.5[0] <b>A1</b> for 9.5[0]  If 0 scored after <b>B0</b> , <b>B1</b> or <b>B2</b> , <b>SC1</b> for two values that satisfy one of the/ <i>their</i> original equations or family
5(a)	120020	1	
5(b)	59	1	
5(c)(i)	$\frac{5}{8}$	1	

Question	Answer	Marks	Partial Marks
5(c)(ii)	37.5	1	
5(d)	$\frac{7}{29}$ 0.268 27% $\frac{5}{17}$	2	<b>B1</b> for 3 in the correct order or <b>M1</b> for .27 .29... [.268] .24...
5(e)	0.4	1	
5(f)	1	1	
5(g)	127.5 128.5	2	<b>B1</b> for each or <b>SC1</b> for both correct but reversed
5(h)	18	2	<b>B1</b> for an answer of 2 or 3 or 6 or 9 or $2 \times 3 \times 3$ or $2 \times 3^2$ as final answer  or for [126 =] $2 \times 3 \times 3 \times 7$ or $2 \times 3^2 \times 7$ and [180 =] $2 \times 2 \times 3 \times 3 \times 5$ or $2^2 \times 3^2 \times 5$  or for complete correct list of factors for 126 and 180
5(i)	Any irrational number between 6 and 7	1	
6(a)	Correct net	3	<b>B2</b> for 2 or 3 correct faces in the correct place or <b>B1</b> for 1 correct face in the correct place
6(b)	84	3	<b>M2</b> for $5 \times 6 + 6 \times 4 + 6 \times 3$ oe or better or $6 \times (5 + 4 + 3)$ oe or better or $2(\frac{1}{2} \times 3 \times 4)$ oe or better  or <b>M1</b> for one correct area
6(c)	36	2	<b>M1</b> for $\frac{1}{2} \times 3 \times 4 \times 6$ oe
7(a)	56	2	<b>M1</b> for $180 - 118$ oe or $180 - 2 \times \text{their } 62$ oe
7(b)	[x =] 31 [y =] 121	2	<b>B1</b> for each or <b>M1</b> for $\text{their } y = 90 + \text{their } x$
7(c)	37	2	<b>B1</b> for the angle $ABC$ marked as 90 or <b>M1</b> for $180 - (90 + 53)$ oe
7(d)	$180 - \frac{360}{8}$ or $(8 - 2) \times 180 \div 8$	<b>M2</b>	<b>M1</b> for $\frac{360}{8}$ or $(8 - 2) \times 180$
	$135 + 135 + 90$ [= 360]	<b>A1</b>	



Question	Answer	Marks	Partial Marks
8(a)(i)	Rotation [centre] (2, -2) 90° [anticlockwise] oe	3	<b>B1</b> for each
8(a)(ii)	Translation $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$	2	<b>B1</b> for each
8(a)(iii)	Enlargement [centre] (-2, -5) [sf] 2	3	<b>B1</b> for each
8(b)	Correct reflection of triangle points at (-3, 0) (-3, -2) (-6, -2)	2	<b>B1</b> for correct reflection in lines $x = k$ or $y = -2$
9(a)	-3 -5 -7.5 7.5 5 3	3	<b>B2</b> for 4 or 5 correct or <b>B1</b> for 2 or 3 correct
9(b)	Correct curve	4	<b>B3FT</b> for 7 or 8 points plotted correctly or <b>B2FT</b> for 5 or 6 points plotted correctly or <b>B1FT</b> for 3 or 4 points plotted correctly
9(c)	Correct ruled line	1	
9(d)	2.5 or 2.4 to 2.6	1	<b>FT</b> <i>their</i> line ( $y = k$ ) and <i>their</i> curve
10(a)(i)	36	1	
10(a)(ii)	add 7 oe	1	
10(a)(iii)	$7n + 1$ oe final answer	2	<b>B1</b> for $7n + j$ or $kn + 1$ ( $k \neq 0$ ) as final answer, or for $7n + 1$ seen then spoilt
10(b)(i)	53	1	
10(b)(ii)	80	1	
10(c)	6 14 24	2	<b>B1</b> for 2 correct terms in the correct place If 0 scored, <b>SC1</b> for 0 6 14



# Cambridge IGCSE™

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NUMBER

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**MATHEMATICS**

**0580/41**

Paper 4 (Extended)

**October/November 2020**

**2 hours 30 minutes**

You must answer on the question paper.

You will need: Geometrical instruments

## INSTRUCTIONS

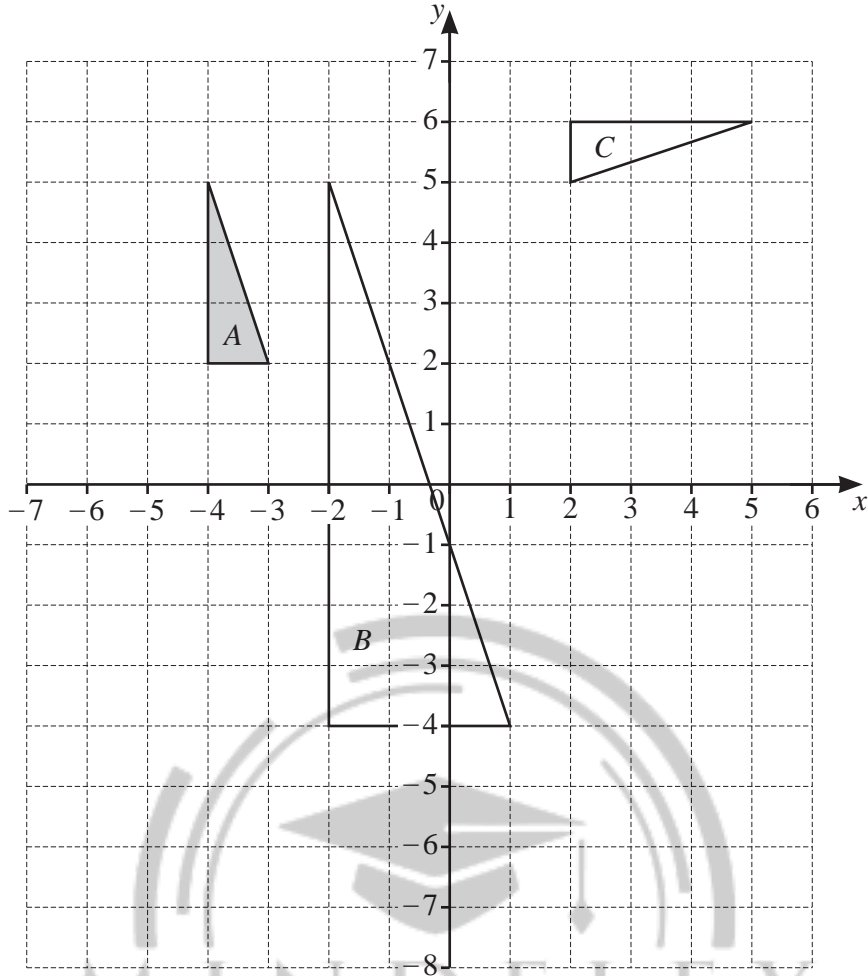
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use either your calculator value or 3.142.

## INFORMATION

- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Blank pages are indicated.

1



(a) Draw the image of shape A after a translation by the vector  $\begin{pmatrix} 8 \\ -6 \end{pmatrix}$ . [2]

(b) Draw the image of shape A after a reflection in the line  $y = -1$ . [2]

(c) Describe fully the **single** transformation that maps shape A onto shape B.

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

(d) Describe fully the **single** transformation that maps shape A onto shape C.

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

- 2 (a) A plane has 14 First Class seats, 70 Premium seats and 168 Economy seats.

Find the ratio First Class seats : Premium seats : Economy seats.  
Give your answer in its simplest form.

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

- (b) (i) For a morning flight, the costs of tickets are in the ratio

$$\text{First Class : Premium : Economy} = 14 : 6 : 5.$$

The cost of a Premium ticket is \$114.

Calculate the cost of a First Class ticket and the cost of an Economy ticket.

First Class \$ .....

Economy \$ ..... [3]

- (ii) For an afternoon flight, the cost of a Premium ticket is reduced from \$114 to \$96.90 .

Calculate the percentage reduction in the cost of a ticket.

..... % [2]

- (c) When the local time in Athens is 0900, the local time in Berlin is 0800.

A plane leaves Athens at 1315.

It arrives in Berlin at 1505 local time.

- (i) Find the flight time from Athens to Berlin.

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

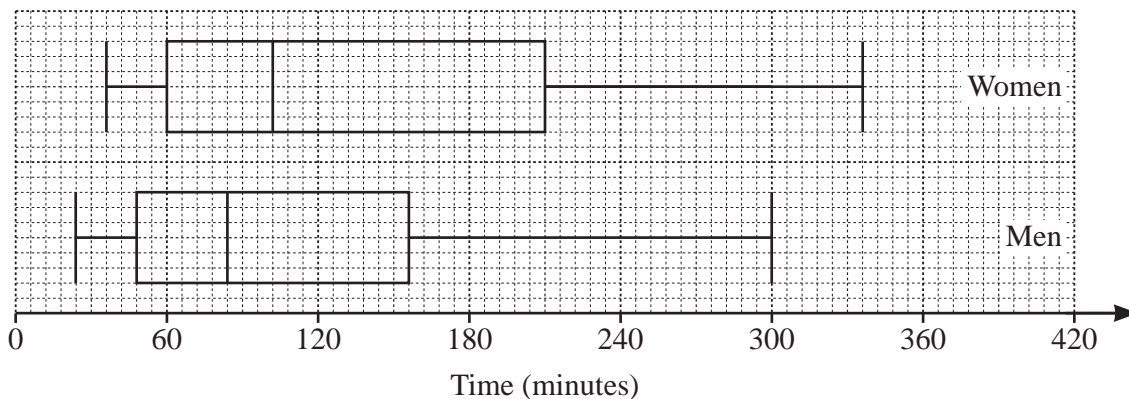
- (ii) The distance the plane flies from Athens to Berlin is 1802 km.

Calculate the average speed of the plane.

Give your answer in kilometres per hour.

..... km/h [2]

3 (a)



The box-and-whisker plots show the times spent exercising in one week by a group of women and a group of men.

Below are two statements comparing these times.

For each one, write down whether you agree or disagree, giving a reason for your answer.

Statement	Agree or disagree	Reason
On average, the women spent less time exercising than the men.		
The times for the women show less variation than the times for the men.		

[2]

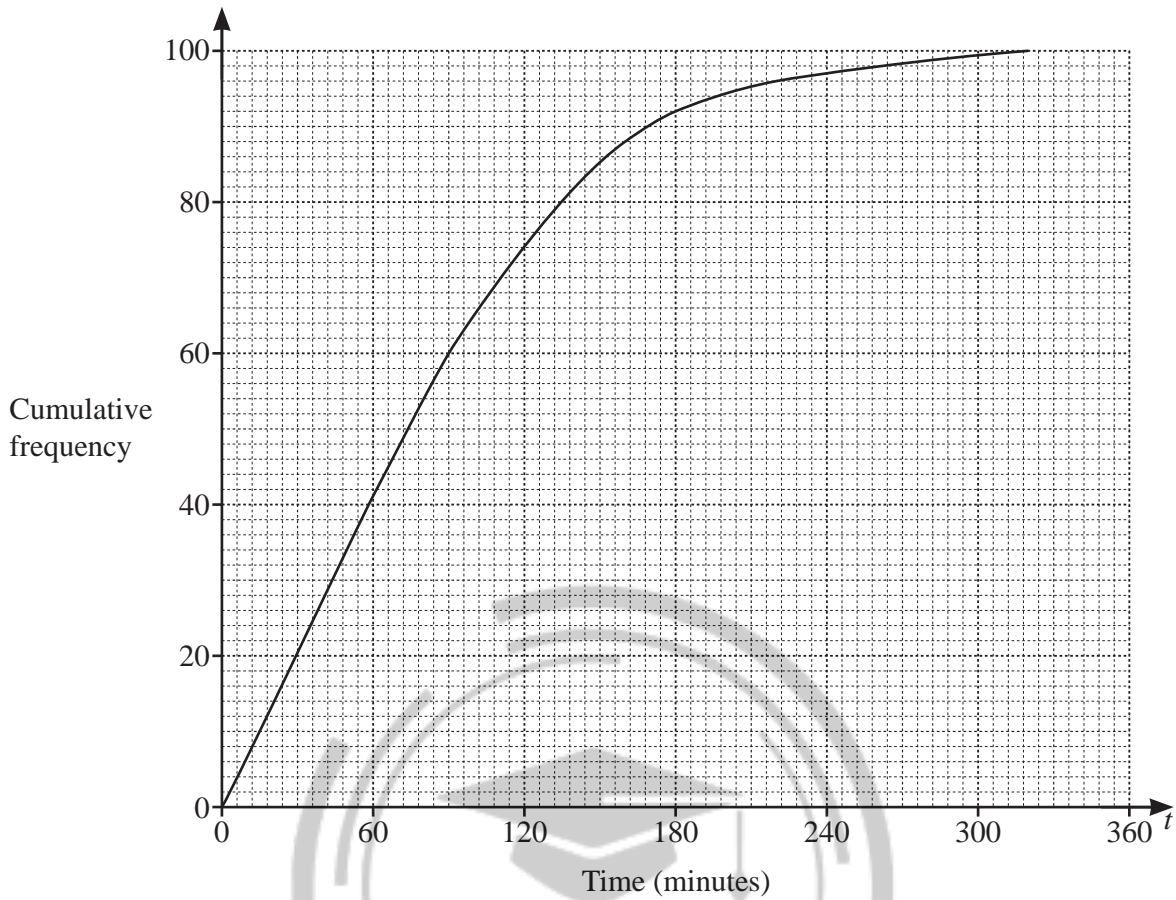
(b) The frequency table shows the times,  $t$  minutes, each of 100 children spent exercising in one week.

Time ( $t$ minutes)	$0 < t \leq 60$	$60 < t \leq 100$	$100 < t \leq 160$	$160 < t \leq 220$	$220 < t \leq 320$
Frequency	41	24	23	8	4

(i) Calculate an estimate of the mean time.

..... min [4]

(ii) The information in the frequency table is shown in this cumulative frequency diagram.



Use the cumulative frequency diagram to find an estimate of

(a) the 60th percentile,

..... min [1]

(b) the number of children who spent more than 3 hours exercising.

..... [2]

(iii) A histogram is drawn to show the information in the frequency table.  
The height of the bar for the interval  $60 < t \leq 100$  is 10.8 cm.

Calculate the height of the bar for the interval  $160 < t \leq 220$ .

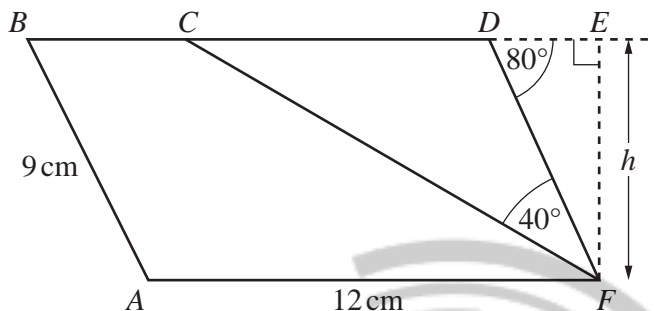
..... cm [2]

- 4 (a) A rectangle measures 8.5 cm by 10.7 cm, both correct to 1 decimal place.

Calculate the upper bound of the perimeter of the rectangle.

..... cm [3]

(b)



NOT TO SCALE

*ABDF* is a parallelogram and *BCDE* is a straight line.  
*AF* = 12 cm, *AB* = 9 cm, angle *CFD* =  $40^\circ$  and angle *FDE* =  $80^\circ$ .

- (i) Calculate the height, *h*, of the parallelogram.

MIND FLEX  
HOME TUITION

*h* = ..... cm [2]

- (ii) Explain why triangle *CDF* is isosceles.

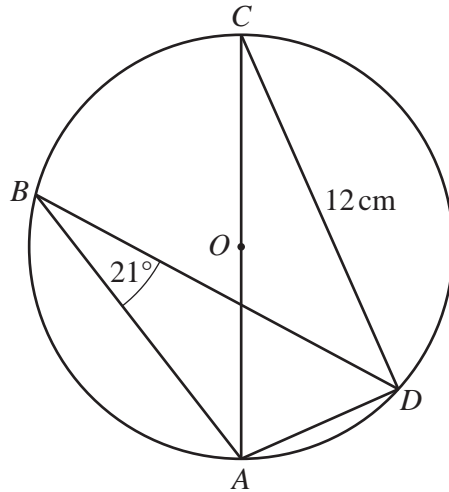
.....

..... [2]

- (iii) Calculate the area of the **trapezium** *ABCF*.

..... cm<sup>2</sup> [3]

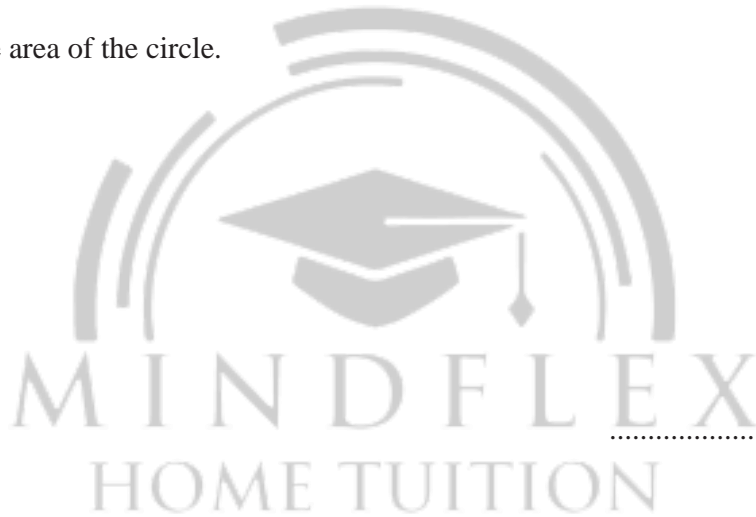
(c)



NOT TO  
SCALE

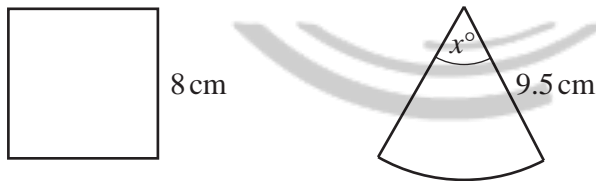
$A, B, C$  and  $D$  are points on the circle, centre  $O$ .  
Angle  $ABD = 21^\circ$  and  $CD = 12$  cm.

Calculate the area of the circle.



..... cm<sup>2</sup> [5]

(d)



NOT TO  
SCALE

The diagram shows a square with side length 8 cm and a sector of a circle with radius 9.5 cm and sector angle  $x^\circ$ .

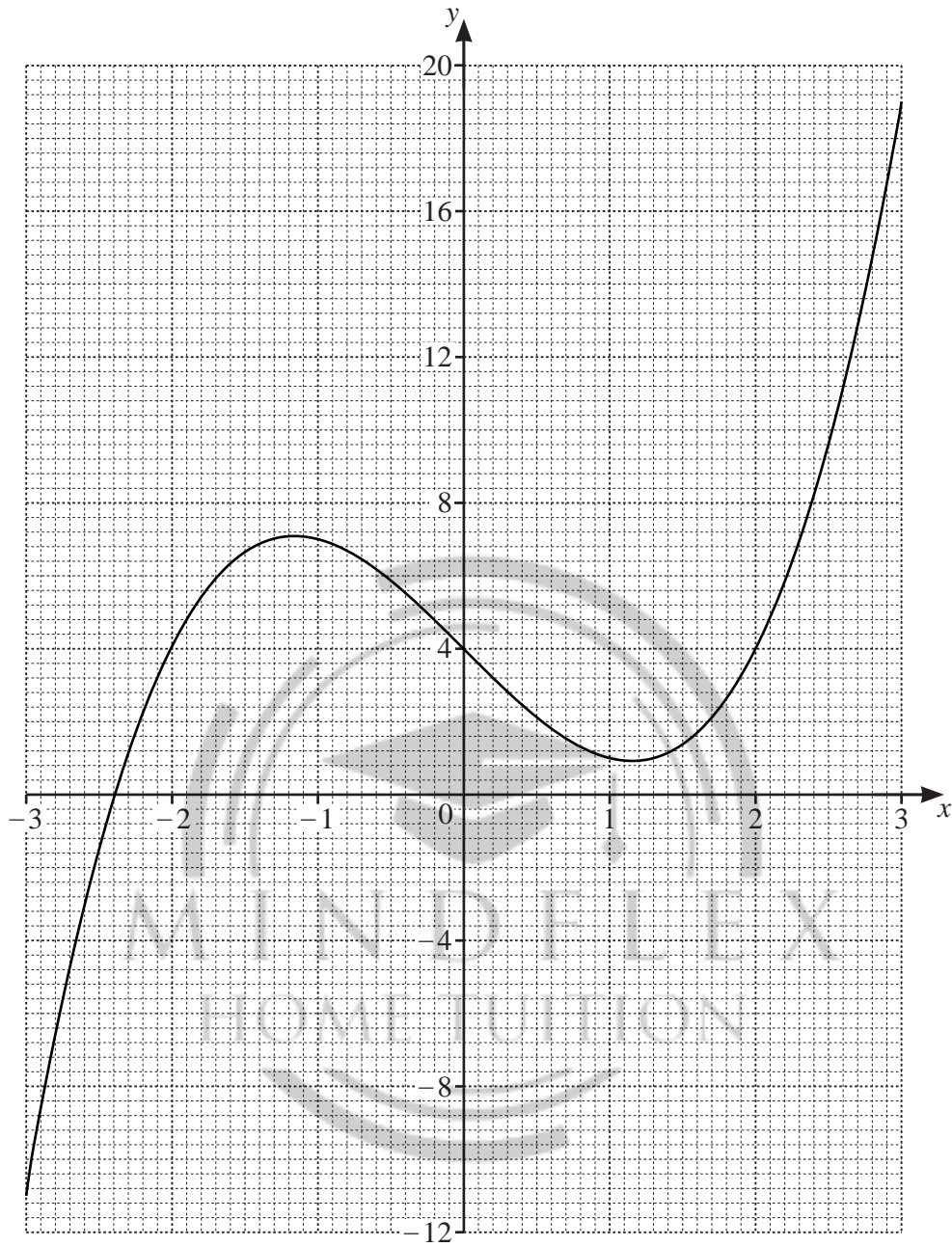
The perimeter of the square is equal to the perimeter of the sector.

Calculate the value of  $x$ .

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



- 5 (a) The diagram shows the graph of  $y = f(x)$  for  $-3 \leq x \leq 3$ .



- (i) Solve  $f(x) = 14$ .

$x = \dots\dots\dots$  [1]

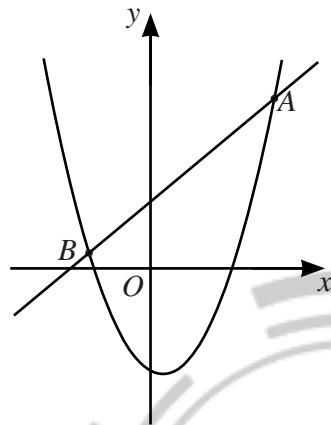
- (ii) By drawing a suitable tangent, find an estimate of the gradient of the graph at the point  $(-2, 4)$ .

$\dots\dots\dots$  [3]

(iii) By drawing a suitable straight line on the grid, solve  $f(x) = 2x - 2$  for  $-3 \leq x \leq 3$ .

$x = \dots\dots\dots$  [3]

(b)



NOT TO  
SCALE

The diagram shows a curve with equation  $y = 2x^2 - 2x - 7$ .  
The straight line with equation  $y = 3x + 5$  intersects the curve at the points A and B.

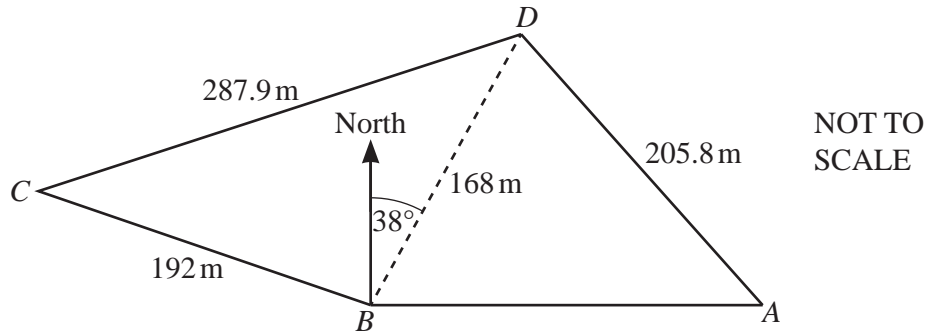
Find the coordinates of the points A and B.



A (..... , .....)

B (..... , .....) [5]

6



The diagram shows a field,  $ABCD$ , on horizontal ground.  
 $BC = 192$  m,  $CD = 287.9$  m,  $BD = 168$  m and  $AD = 205.8$  m.

(a) (i) Calculate angle  $CBD$  and show that it rounds to  $106.0^\circ$ , correct to 1 decimal place.

(ii) The bearing of  $D$  from  $B$  is  $038^\circ$ .

Find the bearing of  $C$  from  $B$ .

[4]

(iii)  $A$  is **due east** of  $B$ .

Calculate the bearing of  $D$  from  $A$ .

..... [1]

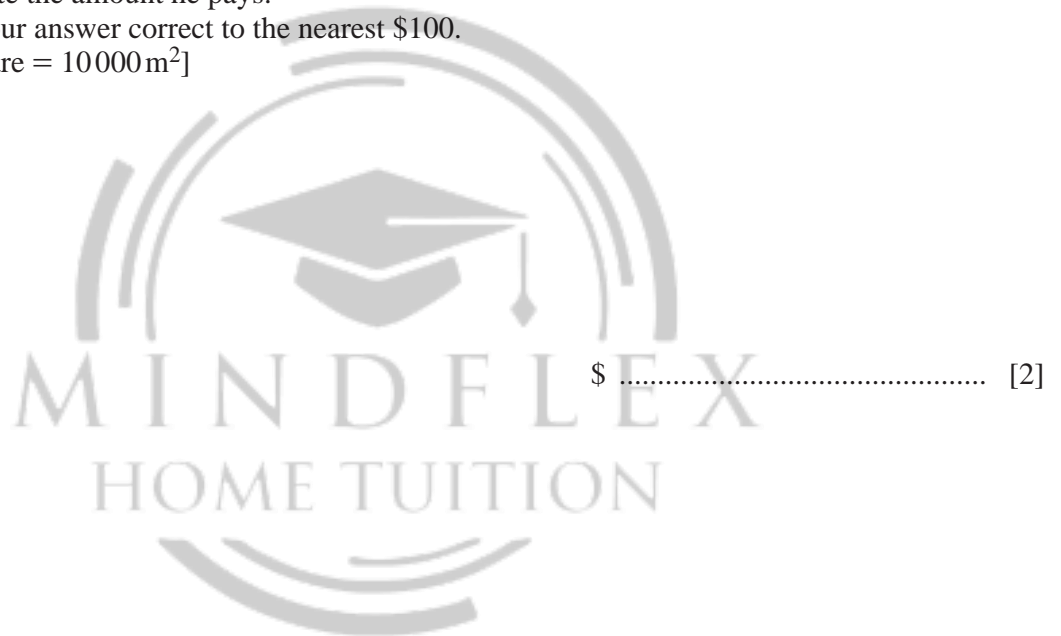
..... [5]

(b) (i) Calculate the area of triangle  $BCD$ .

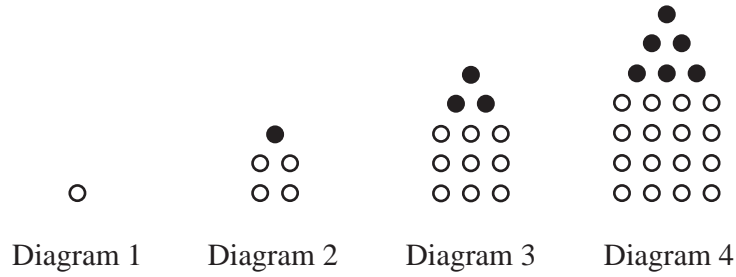
.....  $m^2$  [2]

(ii) Tomas buys the triangular part of the field,  $BCD$ .  
The cost is \$35 750 per hectare.

Calculate the amount he pays.  
Give your answer correct to the nearest \$100.  
[1 hectare = 10 000  $m^2$ ]



7



These are the first four diagrams of a sequence.  
The diagrams are made from white dots and black dots.

(a) Complete the table for Diagram 5 and Diagram 6.

Diagram	1	2	3	4	5	6
Number of white dots	1	4	9	16		
Number of black dots	0	1	3	6		
Total number of dots	1	5	12	22		

[2]

(b) Write an expression, in terms of  $n$ , for the number of white dots in Diagram  $n$ .

..... [1]

(c) The expression for the total number of dots in Diagram  $n$  is  $\frac{1}{2}(3n^2 - n)$ .

(i) Find the total number of dots in Diagram 8.

..... [1]

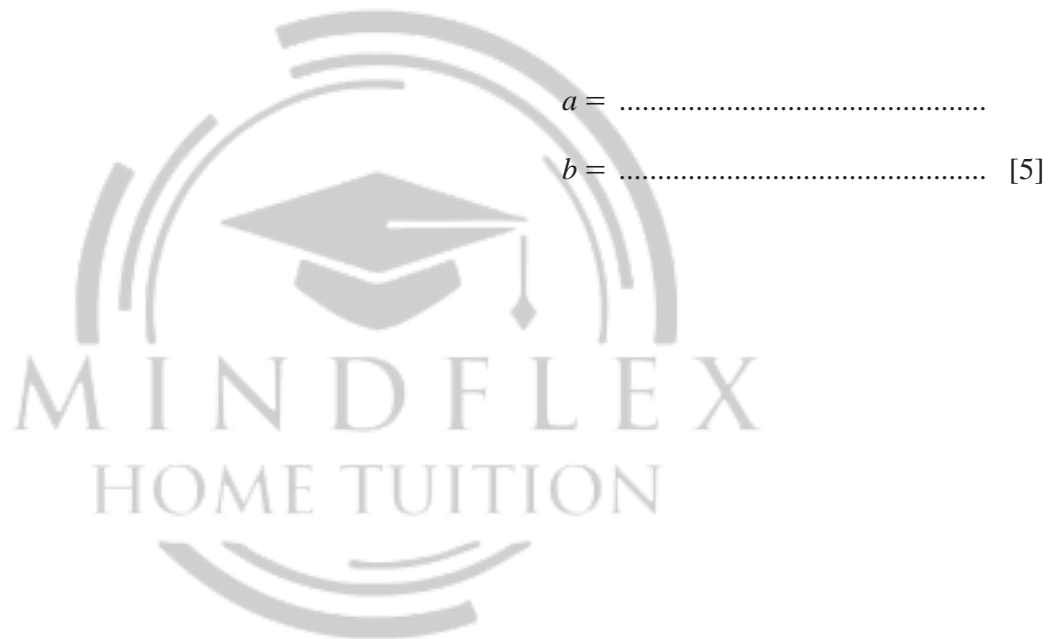
(ii) Find an expression for the number of black dots in Diagram  $n$ .  
Give your answer in its simplest form.

..... [2]

(d)  $T$  is the total number of dots used to make **all** of the first  $n$  diagrams.

$$T = an^3 + bn^2$$

Find the value of  $a$  and the value of  $b$ .  
You must show all your working.



8 (a) Factorise completely.

$$3a^2b - ab^2$$

..... [2]

(b) Solve the inequality.

$$3x + 12 < 5x - 3$$

..... [2]

(c) Simplify.

$$(3x^2y^4)^3$$

..... [2]

(d) Solve.

$$\frac{2}{x} = \frac{6}{2-x}$$

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

(e) Expand and simplify.

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

..... [3]

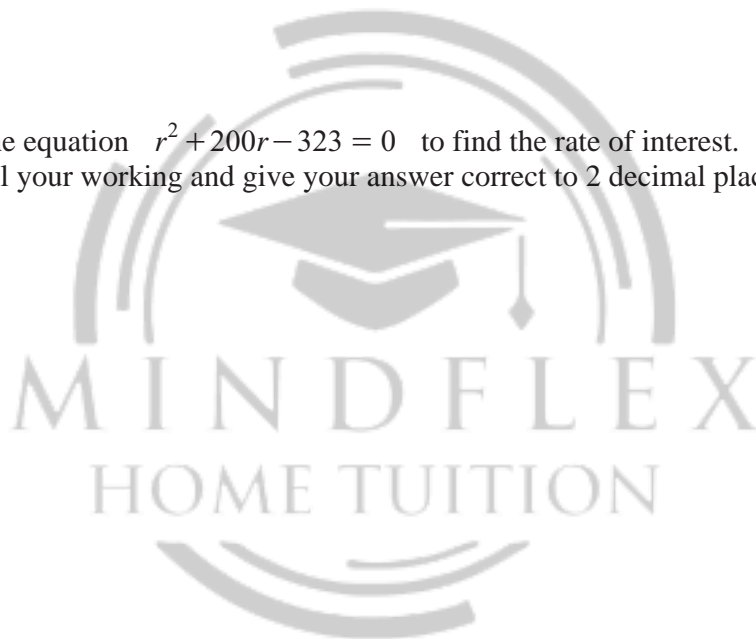


(f) Alan invests \$200 at a rate of  $r\%$  per year compound interest.  
After 2 years the value of his investment is \$206.46 .

(i) Show that  $r^2 + 200r - 323 = 0$ .

[3]

(ii) Solve the equation  $r^2 + 200r - 323 = 0$  to find the rate of interest.  
Show all your working and give your answer correct to 2 decimal places.

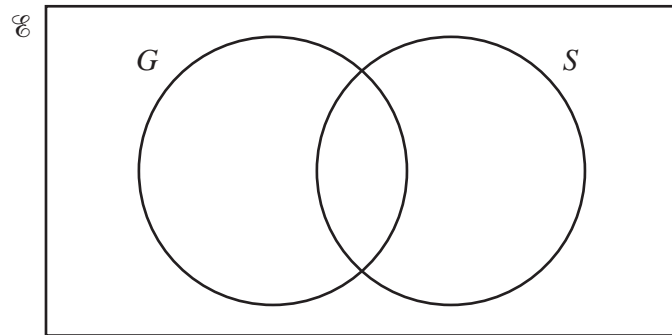


$r = \dots\dots\dots$  [3]



9 (a) There are 32 students in a class.

5 do not study any languages.  
15 study German ( $G$ ).  
18 study Spanish ( $S$ ).



(i) Complete the Venn diagram to show this information. [2]

(ii) A student is chosen at random.

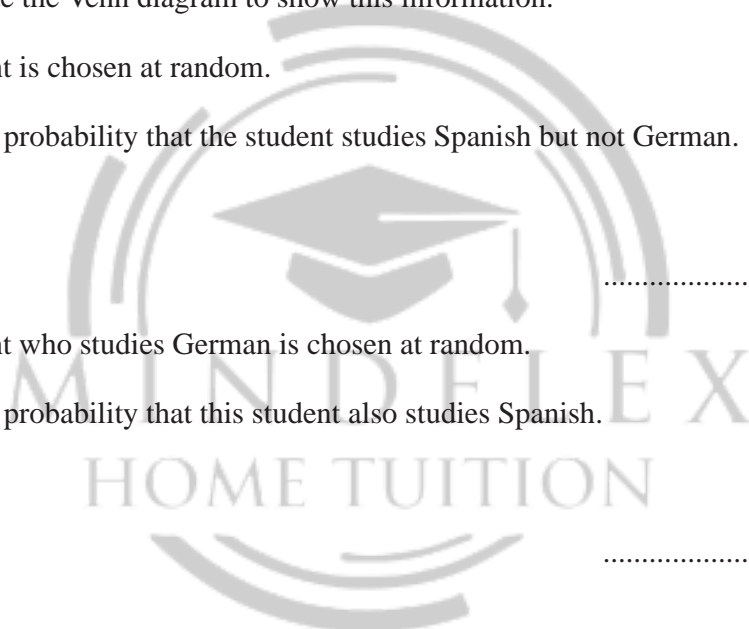
Find the probability that the student studies Spanish but not German.

..... [1]

(iii) A student who studies German is chosen at random.

Find the probability that this student also studies Spanish.

..... [1]



- (b) A bag contains 54 red marbles and some blue marbles.  
36% of the marbles in the bag are red.

Find the number of blue marbles in the bag.

..... [2]

- (c) Another bag contains 15 red beads and 10 yellow beads.  
Ariana picks a bead at random, records its colour and replaces it in the bag.  
She then picks another bead at random.

- (i) Find the probability that she picks two red beads.

..... [2]

- (ii) Find the probability that she does not pick two red beads.

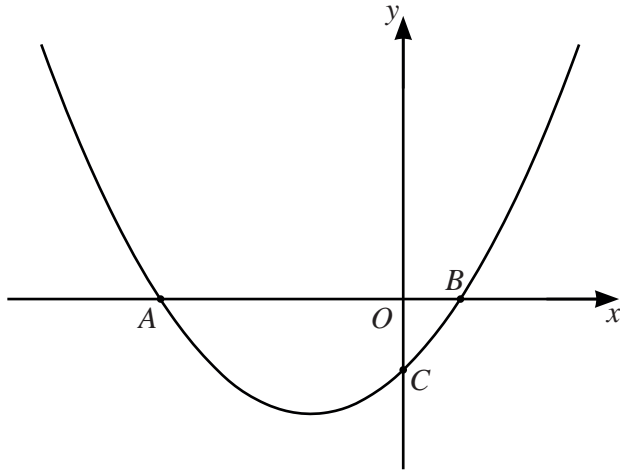
..... [1]

- (d) A box contains 15 red pencils, 8 yellow pencils and 2 green pencils.  
Two pencils are picked at random without replacement.

Find the probability that at least one pencil is red.

..... [3]

10 (a)



NOT TO  
SCALE

The diagram shows a sketch of the curve  $y = x^2 + 3x - 4$ .

(i) Find the coordinates of the points A, B and C.

A (....., .....) [4]

B (....., .....) [4]

C (....., .....) [4]

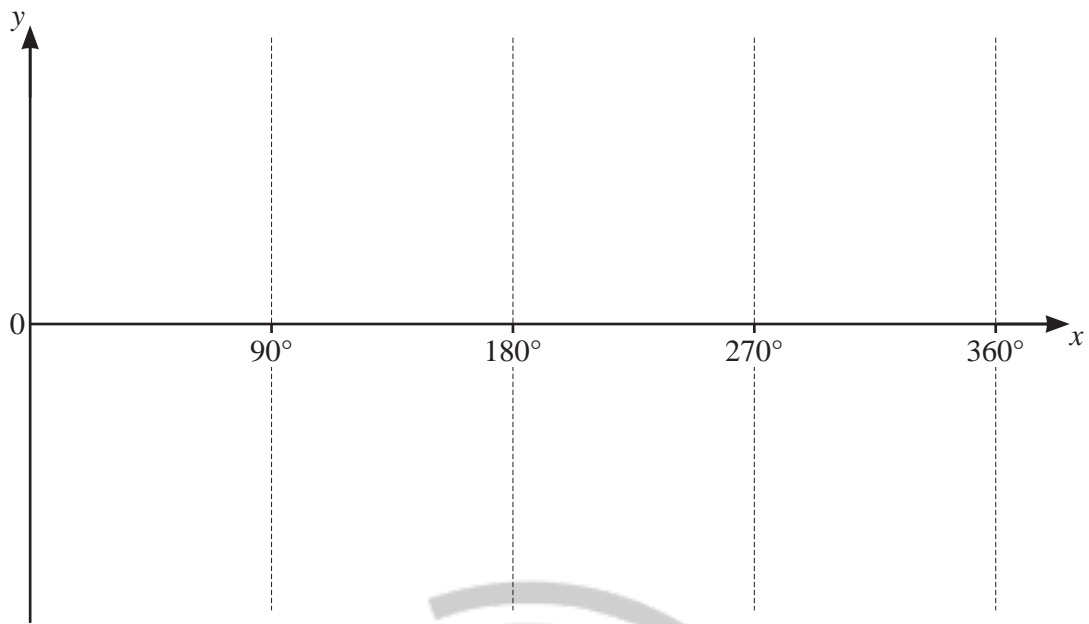
(ii) Differentiate  $x^2 + 3x - 4$ .

..... [2]

(iii) Find the equation of the tangent to the curve at the point (2, 6).

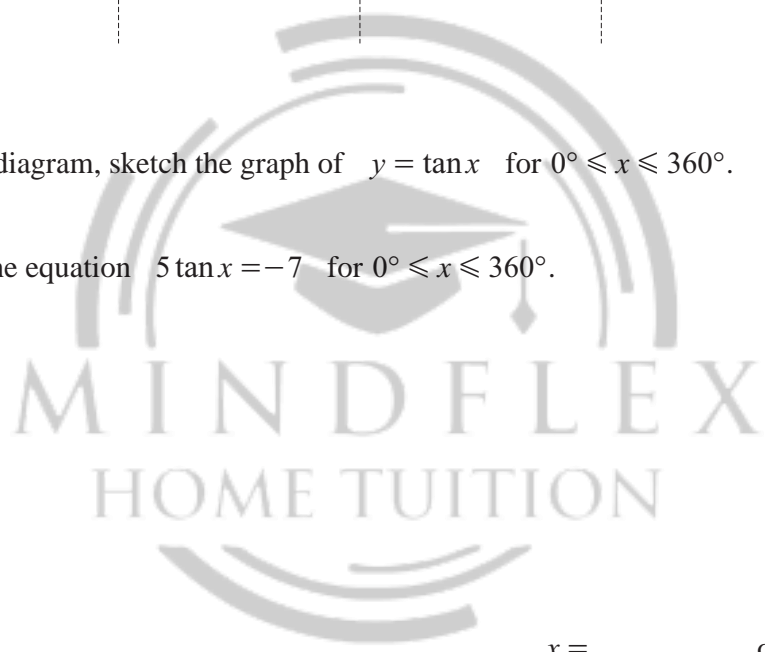
..... [3]

(b)



(i) On the diagram, sketch the graph of  $y = \tan x$  for  $0^\circ \leq x \leq 360^\circ$ . [2]

(ii) Solve the equation  $5 \tan x = -7$  for  $0^\circ \leq x \leq 360^\circ$ .



$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

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# Cambridge IGCSE™

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**MATHEMATICS**

**0580/41**

Paper 4 (Extended)

**October/November 2020**

MARK SCHEME

Maximum Mark: 130

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**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 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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This document consists of **11** printed pages.

### 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.

Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

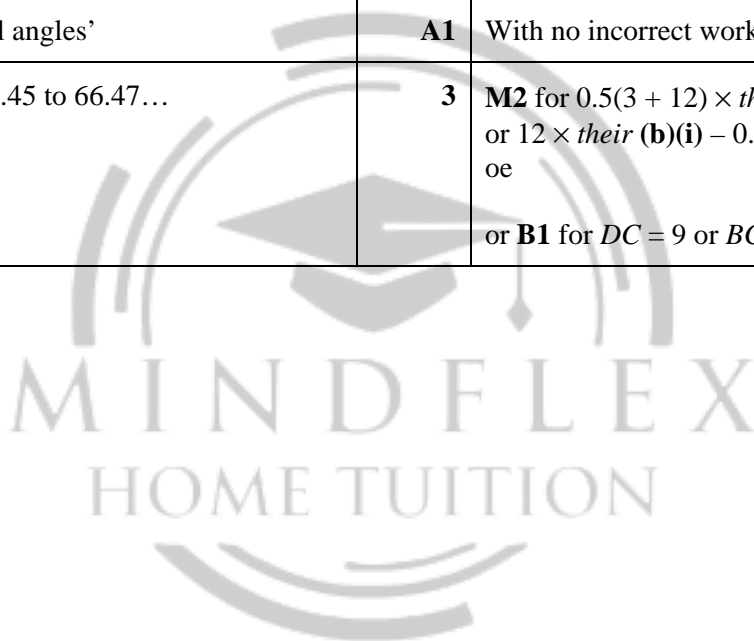
### Abbreviations

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(a)	Image at (4, -1) (4, -4) (5, -4)	2	<b>B1</b> for translation by $\begin{pmatrix} 8 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -6 \end{pmatrix}$ or for correct vertices not joined
1(b)	Image at (-4, -4) (-4, -7) (-3, -4)	2	<b>B1</b> for reflection in $x = -1$ or $y = k$ or for correct vertices not joined
1(c)	Enlargement 3 (-5, 5)	3	<b>B1</b> for each
1(d)	Rotation 90° clockwise oe (1, 1)	3	<b>B1</b> for each
2(a)	1 : 5 : 12	2	<b>M1</b> for 2 : 10 : 24 or 7 : 35 : 84 or $\frac{1}{18} : \frac{5}{18} : \frac{12}{18}$
2(b)(i)	266 and 95	3	<b>B2</b> for 266 or 95 or 266 and 95 reversed or <b>M1</b> for $\frac{114}{6}$
2(b)(ii)	15	2	<b>M1</b> for $\frac{114 - 96.9}{114} [\times 100]$ oe or $\frac{96.9}{114} \times 100$
2(c)(i)	2h 50min	1	
2(c)(ii)	636	2	<b>M1</b> for $1802 \div \text{their } 2\text{h } 50\text{min}$
3(a)	Disagree: the median for the women is greater (than the median for the men) oe  Disagree: the men have a smaller [interquartile] range of times oe	2	<b>B1</b> for each correct statement oe
3(b)(i)	87.4 nfw	4	<b>M1</b> for mid-points <b>soi</b> (30, 80, 130, 190, 270) <b>M1</b> for use of $\Sigma fm$ with $m$ in correct interval including both boundaries  <b>M1</b> (dep on 2 <sup>nd</sup> M1) for $\Sigma fm \div (41 + 24 + 23 + 8 + 4)$
3(b)(ii)(a)	90	1	
3(b)(ii)(b)	8	2	<b>B1</b> for 92 seen

Question	Answer	Marks	Partial Marks
3(b)(iii)	2.4	2	<b>M1</b> for $\frac{24}{40}$ or $\frac{8}{60}$ Or <b>B1</b> for [multiplier] 18 or $\frac{1}{18}$
4(a)	38.6	3	<b>M2</b> for $[2 \times] (8.5 + 0.05 + 10.7 + 0.05)$ or <b>M1</b> for $8.5 + 0.05$ or $10.7 + 0.05$
4(b)(i)	8.86 or 8.863...	2	<b>M1</b> for $\frac{h}{9} = \sin 80$ or better oe
4(b)(ii)	$\angle CDF = 100$ leading to $\angle DCF = 40$ Or $\angle EDF = 80$ leading to $\angle DCF = 40$	<b>M1</b>	Implied by $180 - (100 + 40) = 40$ or $80 - 40$
	'two equal angles'	<b>A1</b>	With no incorrect work seen
4(b)(iii)	66.5 or 66.45 to 66.47...	3	<b>M2</b> for $0.5(3 + 12) \times \text{their (b)(i)}$ or $12 \times \text{their (b)(i)} - 0.5 \times 9 \times 9 \times \sin 100$ oe or <b>B1</b> for $DC = 9$ or $BC = 3$

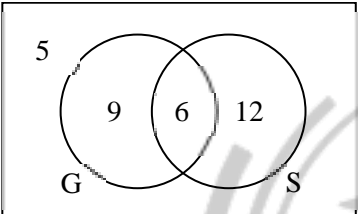


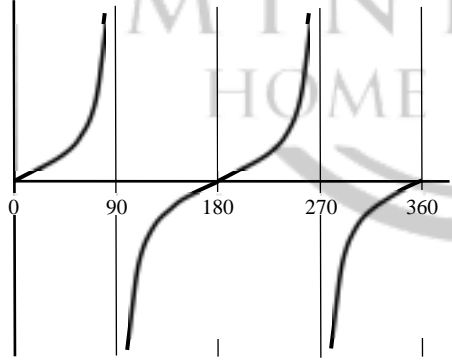
Question	Answer	Marks	Partial Marks
4(c)	130 nfw or 129.6 to 129.8	5	<p><b>B1</b> for <math>\angle ACD = 21^\circ</math> or <math>\angle CAD = 69^\circ</math></p> <p><b>Method 1</b></p> <p><b>M2</b> for <math>\cos 21 = \frac{12}{AC}</math> oe or <b>M1</b> for <math>\angle ADC = 90</math> soi</p> <p><b>M1</b> for <math>\pi(\text{their } AC/2)^2</math></p> <p>OR</p> <p><b>Method 2</b></p> <p><b>M2</b> for <math>\frac{12}{\sin 138} = \frac{r}{\sin 21}</math> oe or <b>M1</b> for <math>\angle COD = 138</math> soi</p> <p><b>M1</b> for <math>\pi(\text{their } r)^2</math></p> <p>OR</p> <p><b>Method 3</b></p> <p><b>M2</b> for <math>\cos 21 = \frac{6}{OC}</math> oe or <b>M1</b> for <math>\angle CXO = 90</math> soi where X is the point where the perpendicular from O meets the chord CD</p> <p><b>M1</b> for <math>\pi(\text{their } OC)^2</math></p>
4(d)	78.4 or 78.37 to 78.41	3	<p><b>M2</b> for <math>\frac{x}{360} \times 2 \times \pi \times 9.5 + 2 \times 9.5 = 4 \times 8</math> oe</p> <p>or <b>M1</b> for <math>\frac{x}{360} \times 2 \times \pi \times 9.5</math></p> <p>After <b>M0, SC1</b> for <math>9.5x + 19 = 32</math> oe</p>
5(a)(i)	2.7 to 2.8	1	

Question	Answer	Marks	Partial Marks
5(a)(ii)	tangent ruled at $x = -2$	<b>B1</b>	
	6 to 10	<b>2</b>	<p><b>dep on B1</b> or a close attempt at tangent at <math>x = -2</math></p> <p>or <b>M1</b> for rise/run for <i>their</i> tangent, or close attempt, at any point</p> <p>Must see correct or implied calculation from a drawn tangent</p> <p>After <b>M0</b>, <b>SC1</b> for gradient of tangent (or close attempt) in range embedded in <math>y = mx + c</math></p>
5(a)(iii)	$y = 2x - 2$ ruled and $x = -2.9$ to $-2.8$ cao	<b>3</b>	<p><b>B2</b> for correct ruled line</p> <p>or <b>B1</b> for short line or for freehand line or broken line or ruled line with gradient 2 or with y-intercept at <math>-2</math> (but not <math>y = -2</math>)</p>
5(b)	A (4, 17) B (-1.5, 0.5)	<b>5</b>	<p><b>B4</b> for <math>(-1.5, 0.5)</math> and <math>(4, 17)</math>, or for <math>x = 4</math> and <math>x = -1.5</math></p> <p>OR</p> <p><b>B3</b> for A(4, 17) or B(-1.5, 0.5)</p> <p>OR</p> <p><b>M1</b> for <math>2x^2 - 2x - 7 = 3x + 5</math> oe</p> <p>AND either</p> <p><b>M2</b> for <math>(2x + 3)(x - 4)</math> or <b>M1</b> for <math>2x(x - 4) + 3(x - 4)</math> or <math>x(2x + 3) - 4(2x + 3)</math> or <math>(2x + c)(x + d)</math> where <math>cd = -12</math> or <math>c + 2d = -5</math> [<math>c</math> and <math>d</math> are integers]</p> <p>OR</p> <p><b>M2</b> for</p> $\frac{-\text{their } b \pm \sqrt{(\text{their } b)^2 - 4(\text{their } a)(\text{their } c)}}{2(\text{their } a)}$ <p>or <b>M1</b> for <math>\sqrt{(\text{their } b)^2 - 4(\text{their } a)(\text{their } c)}</math> or for <math>p = -\text{their } b</math>, <math>r = 2(\text{their } a)</math> if in the form <math>\frac{p + \sqrt{q}}{r}</math> or <math>\frac{p - \sqrt{q}}{r}</math></p>

Question	Answer	Marks	Partial Marks
6(a)(i)	106.01 to 106.02	4	<b>M2</b> for $[\cos[\angle CBD] =] \frac{192^2 + 168^2 - 287.9^2}{2 \times 192 \times 168}$ oe or <b>M1</b> for the implicit form <b>A1</b> for $-0.276$ to $-0.275$
6(a)(ii)	292.0 or 291.98 to 291.99	1	
6(a)(iii)	310.0 or 310.03 to 310.04	5	<b>M2</b> for $[\sin A =] \frac{168 \times \sin(90 - 38)}{205.8}$ or <b>M1</b> for $\frac{\sin A}{168} = \frac{\sin(90 - 38)}{205.8}$  <b>A1</b> for $[A =] 40.0$ or $40.03$ to $40.04$  <b>M1 dep</b> for $270 + \text{their angle } DAB$ oe
6(b)(i)	15 500 or 15 501 to 15 503. ...	2	<b>M1</b> for $0.5 \times 192 \times 168 \times \sin(106)$ oe
6(b)(ii)	55 400	2	<b>FT</b> $3.575 \times \text{their (b)(i)}$ oe rounded to nearest 100  <b>M1</b> for figs $35\ 75 \times \text{figs their (b)(i)}$ or figs 554 or figs 5541 to figs 5543
7(a)	25 36 10 15 35 51	2	<b>B1</b> for 3, 4 or 5 correct
7(b)	$n^2$	1	
7(c)(i)	92	1	
7(c)(ii)	$\frac{1}{2}(n^2 - n)$ oe	2	<b>M1</b> for $\frac{1}{2}(3n^2 - n) - n^2$ oe  or for final quadratic answer with $\frac{1}{2}n^2$ oe  or $-\frac{1}{2}n^2$ oe but not both

Question	Answer	Marks	Partial Marks
7(d)	$a = \frac{1}{2}, b = \frac{1}{2}$	5	<b>B2</b> for 2 correct equations eg $a + b = 1, 8a + 4b = 6$ or <b>B1</b> for 1 correct equation  <b>B2</b> for one correct value or <b>M1</b> (dep on at least B1) for correctly eliminating one variable from two linear equations in a and b  OR  <b>B2</b> for $a = \frac{1}{2}$ or <b>B1</b> for $6a = 3$ or for 3 <sup>rd</sup> difference = 3  <b>B2</b> for $b = \frac{1}{2}$ or <b>M1</b> for substituting <i>their</i> a into a correct equation of first differences
8(a)	$ab(3a - b)$ final answer	2	<b>B1</b> for $a(3ab - b^2)$ or $b(3a^2 - ab)$ or $ab(3a - b)$ seen
8(b)	$x > 7.5$ final answer	2	<b>B1</b> for $12+3 < 5x - 3x$ oe
8(c)	$27x^6y^{12}$	2	<b>B1</b> for two of 27, $x^6$ and $y^{12}$ correct
8(d)	0.5 or $\frac{1}{2}$	3	<b>M2</b> for $4 = 6x + 2x$ or better or <b>M1</b> for $2(2 - x) = 6x$ oe
8(e)	$2x^3 + 5x^2 - 23x + 10$ final answer	3	<b>B2</b> for correct expansion of three brackets unsimplified  <b>B1</b> for correct expansion of two brackets with at least 3 terms correct
8(f)(i)	$200\left(1 + \frac{r}{100}\right)^2 = 206.46$ oe	<b>M1</b>	
	$1 + \frac{2r}{100} + \frac{r^2}{100^2}$ oe	<b>M1</b>	
	$r^2 + 200r - 323 = 0$	<b>A1</b>	Correct solution reached with no errors or omissions seen  If 0 scored, <b>SC1</b> for $200(n)^2 = 206.46$

Question	Answer	Marks	Partial Marks
8(f)(ii)	$\frac{-200 + \sqrt{200^2 - 4(1)(-323)}}{2 \times 1}$	<b>B2</b>	<b>B1</b> for $\sqrt{200^2 - 4(1)(-323)}$ or $(r + 100)^2$ <b>B1</b> for $\frac{-200 + \sqrt{q}}{2 \times 1}$ or $r = \sqrt{323 + 100^2} - 100$ OR <b>B2</b> for $100 \left( \sqrt{\frac{206.46}{200}} - 1 \right)$ or <b>B1</b> for $\sqrt{\frac{206.46}{200}}$
	1.60 cao final answer	<b>B1</b>	
9(a)(i)		<b>2</b>	<b>B1</b> for two correct values Or <b>B1</b> 5 outside and total in G = 15 and total in S = 18
9(a)(ii)	$\frac{3}{8}$ oe	<b>1</b>	<b>FT</b> $\frac{\text{their } 12}{32}$
9(a)(iii)	$\frac{2}{5}$ oe	<b>1</b>	<b>FT</b> $\frac{\text{their } 6}{15}$
9(b)	96	<b>2</b>	<b>M1</b> for $\frac{36}{64} = \frac{54}{x}$ oe or $36 = \frac{54}{(54+b)} \times 100$ oe If 0 scored <b>SC1</b> for answer 150
9(c)(i)	$\frac{9}{25}$ oe	<b>2</b>	<b>M1</b> for $\frac{15}{25} \times \frac{15}{25}$ oe
9(c)(ii)	$\frac{16}{25}$ oe	<b>1</b>	<b>FT</b> 1 – their (c)(i)
9(d)	$\frac{17}{20}$ oe	<b>3</b>	<b>M2</b> for $1 - \frac{10}{25} \times \frac{9}{24}$ oe or for $\frac{15}{25} \times \frac{14}{24} + \frac{15}{25} \times \frac{8}{24} + \frac{15}{25} \times \frac{2}{24} + \frac{8}{25} \times \frac{15}{24}$ $+ \frac{2}{25} \times \frac{15}{24}$ oe or <b>M1</b> for one correct relevant product

Question	Answer	Marks	Partial Marks
10(a)(i)	A(-4, 0) B(1, 0) C(0, -4)	4	<b>B3</b> for A and B correct Or <b>B2</b> for B (-4, 0) and A (1, 0)  Or <b>B1</b> for $(x + 4)(x - 1)$ or for $\frac{-3 \pm \sqrt{3^2 - 4 \times 1 \times -4}}{2}$ oe and <b>B1</b> for A or B correct  <b>B1</b> for C(0, -4) OR  <b>SC2</b> for -4, 1 and -4 in correct positions on the graph
10(a)(ii)	$2x + 3$ [ ± 0 ] final answer	2	<b>B1</b> for answer $2x + c$ or for $ax + 3, a \neq 0$ or for correct answer seen
10(a)(iii)	$y = 7x - 8$ oe	3	<b>B2</b> for answer $7x - 8$  OR  <b>M1</b> for [gradient =] $2(2) + 3$ FT <i>their</i> part (a)(ii) of the form $ax + b$ <b>M1dep</b> for substitution of (2, 6) into $y = \text{their } mx + c$ oe
10(b)(i)	Correct sketch 	2	<b>B1</b> for one correct section out of 4 OR <b>B1</b> for two properties correct from <ul style="list-style-type: none"> <li>• Crosses x-axis at (0, 0) (180, 0) and (360, 0) only</li> <li>• Correct curvature in each section of 90°</li> <li>• Asymptotes at <math>x = 90</math> and <math>x = 270</math></li> </ul>
10(b)(ii)	125.5 or 125.53 to 125.54 and 305.5 or 305.53 to 305.54	3	<b>B2</b> for one correct angle or <b>B1</b> for -54.5 or -54.46... or for 2 angles with a difference of 180.