



Cambridge Assessment
International Education

Cambridge IGCSE™

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS

0580/42

Paper 4 (Extended)

February/March 2021

2 hours 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

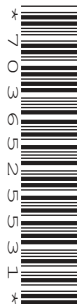
INSTRUCTIONS

- 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 π , 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. Any blank pages are indicated.



2

1

Painter \$35 per hour
--

Plumber Fixed charge \$40 plus \$26.50 per hour
--

Electrician \$48 per hour for the first 2 hours then \$32 per hour

These are the rates charged by a painter, a plumber and an electrician who do some work for Mr Sharma.

- (a) The painter works for 7 hours.

Calculate the amount Mr Sharma pays the painter.

\$ [1]

- (b) Mr Sharma pays the plumber \$252.

Calculate how many hours the plumber works.

..... hours [2]

- (c) Mr Sharma pays the electrician \$224.

Calculate how many hours the electrician works.

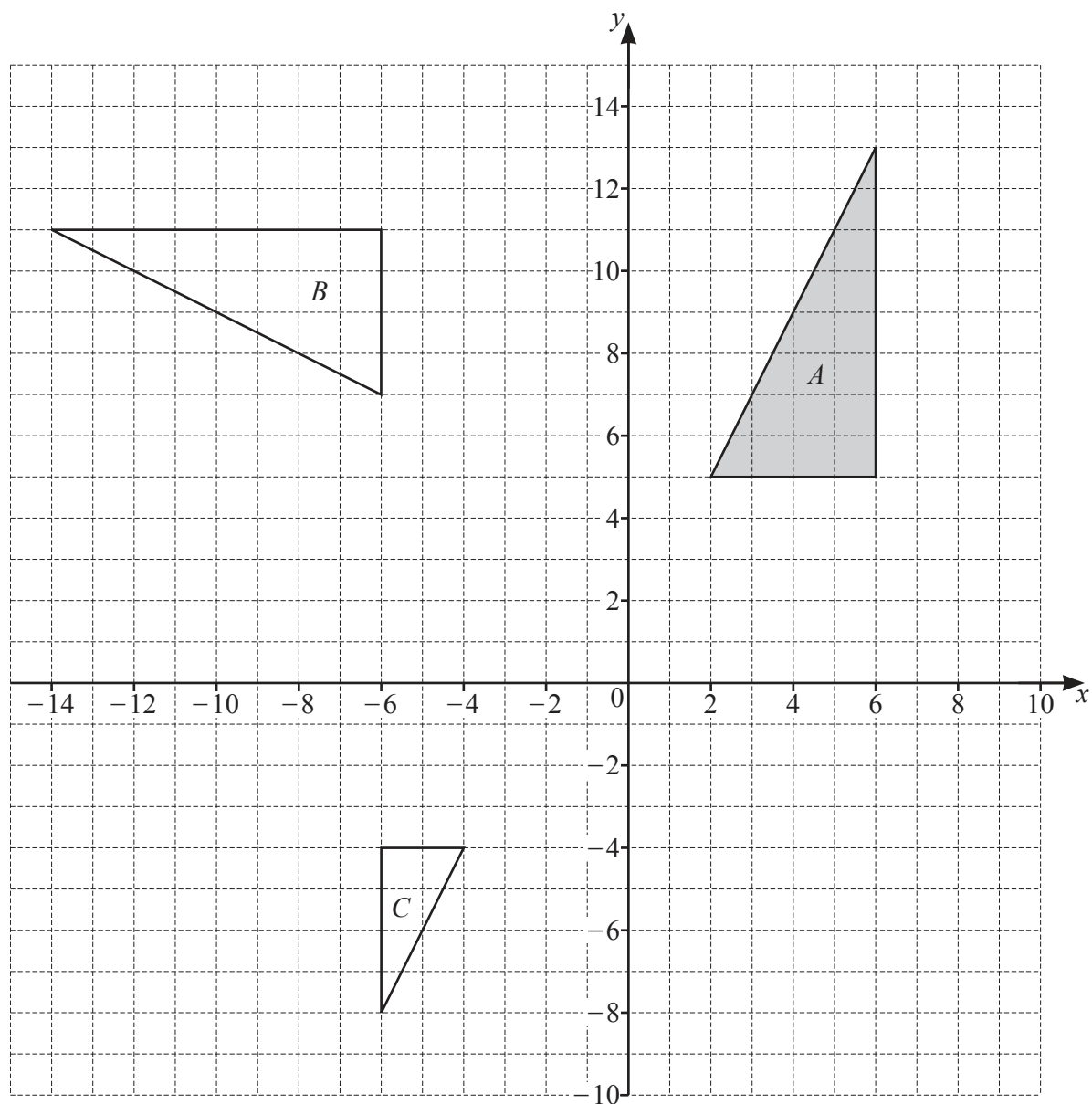
..... hours [2]

- (d) Write down the ratio of the amount Mr Sharma pays to the painter, the plumber and the electrician.
Give your answer in its lowest terms.

painter : plumber : electrician = : : [2]

3

2



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

(i) triangle A onto triangle B ,

..... [3]

(ii) triangle A onto triangle C .

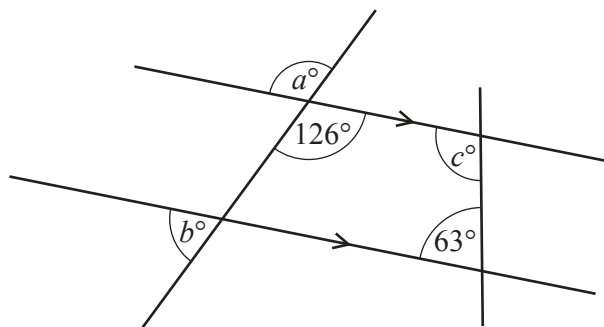
..... [3]

(b) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} -5 \\ -10 \end{pmatrix}$. [2]

(c) Draw the image of triangle A after a reflection in the line $y = 4$. [2]

4

3 (a)

NOT TO
SCALE

The diagram shows two straight lines intersecting two parallel lines.

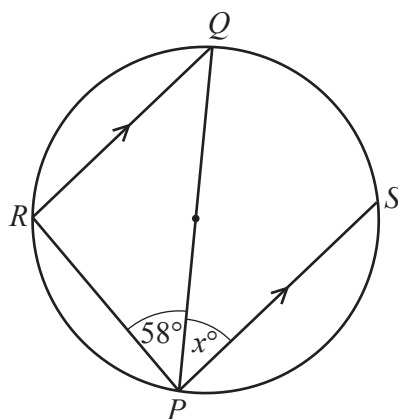
Find the values of a , b and c .

$a =$

$b =$

$c =$ [3]

(b)

NOT TO
SCALE

Points R and S lie on a circle with diameter PQ .

RQ is parallel to PS .

Angle $RPQ = 58^\circ$.

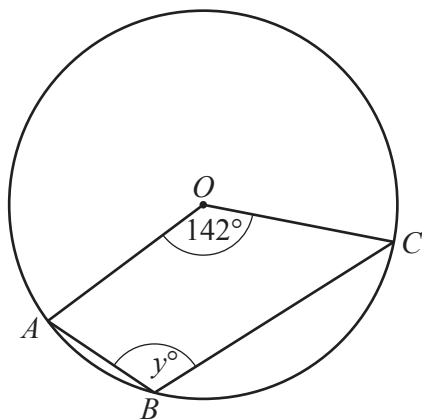
Find the value of x , giving a geometrical reason for each stage of your working.

.....

$x =$ [3]

5

(c)

NOT TO
SCALE

Points A , B and C lie on a circle, centre O .
Angle $AOC = 142^\circ$.

Find the value of y .

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

6

- 4 (a) A shop gives each of 1000 people a voucher.
28 people use their voucher.
The shop now gives each of 16 500 people a voucher.

Calculate how many of these 16 500 people are expected to use their voucher.

..... [1]

- (b) In a class activity, all the 15 students wear hats.
7 students wear red hats, 6 students wear green hats and 2 students wear white hats.

- (i) One of these students is picked at random.

Find the probability that this student wears a red hat.

..... [1]

- (ii) Two of the 15 students are picked at random.

Show that the probability that these two students wear hats of the same colour is $\frac{37}{105}$.

[3]

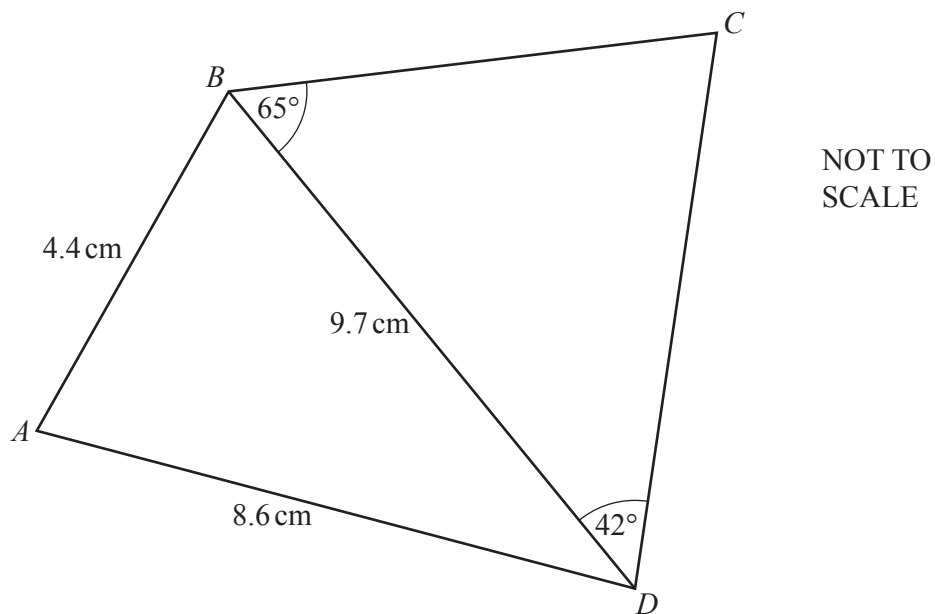
- (iii) Three of the 15 students are picked at random.

Find the probability that at least two of these three students wear red hats.

..... [4]

7

5



(a) Calculate angle ADB .

Angle $ADB = \dots\dots\dots$ [3]

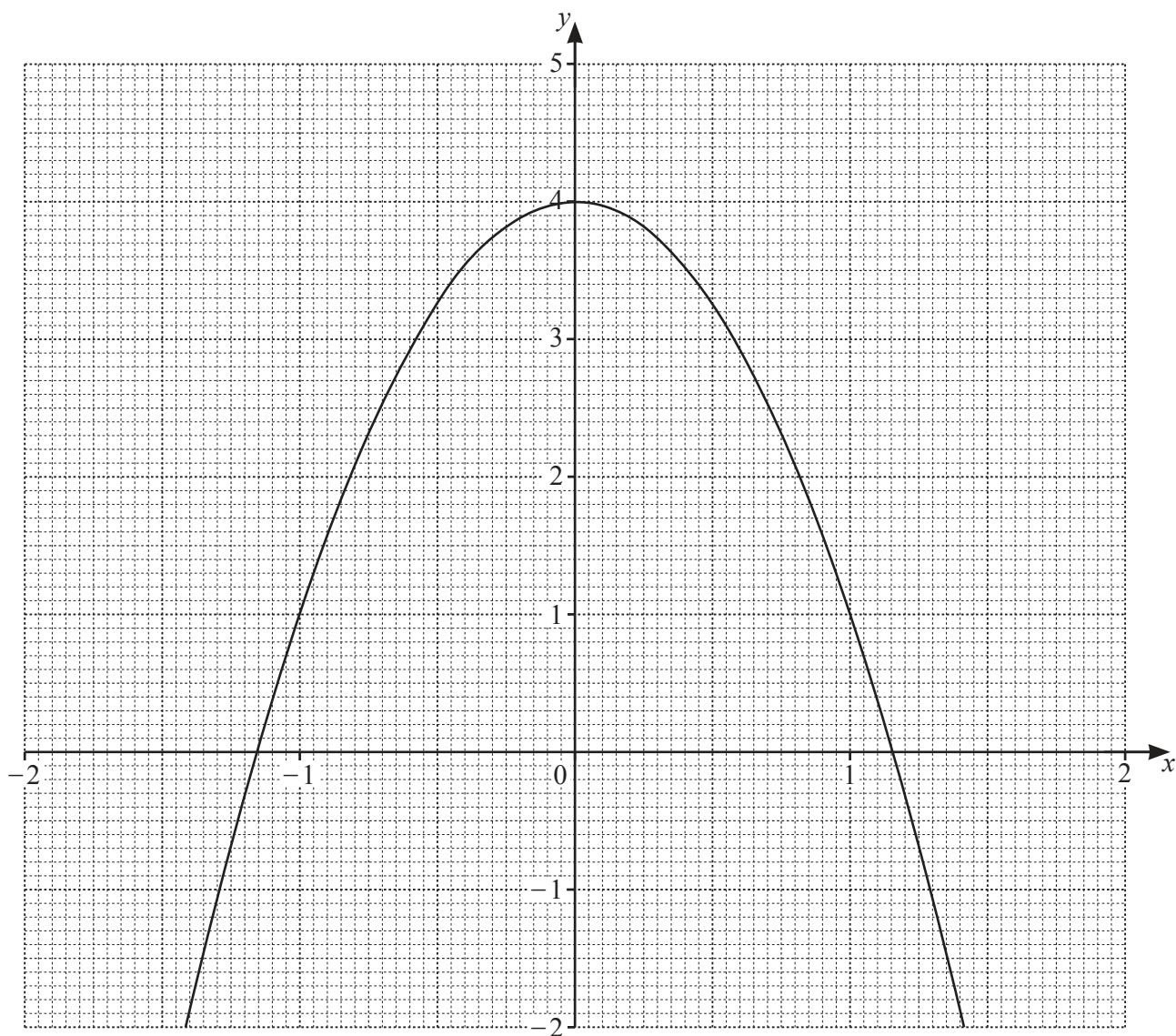
(b) Calculate DC .

$DC = \dots\dots\dots\text{ cm}$ [4]

(c) Calculate the shortest distance from C to BD .

$\dots\dots\dots\text{ cm}$ [3]

6



- (a) The grid shows the graph of $y = a + bx^2$.

The graph passes through the points with coordinates (0, 4) and (1, 1).

- (i) Find the value of a and the value of b .

$a =$

$b =$ [2]

9

- (ii) Write down the equation of the tangent to the graph at
- $(0, 4)$
- .

..... [1]

- (iii) The equation of the tangent to the graph at
- $x = -1$
- is
- $y = 6x + 7$
- .

Find the equation of the tangent to the graph at $x = 1$.

..... [2]

- (b) The table shows some values for
- $y = 1 + \frac{5}{3-x}$
- for
- $-2 \leq x \leq 1.5$
- .

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5
y	2	2.11		2.43		3		4.33

- (i) Complete the table.

[3]

- (ii) On the grid, draw the graph of
- $y = 1 + \frac{5}{3-x}$
- for
- $-2 \leq x \leq 1.5$
- .

[4]

- (c) (i) Write down the values of
- x
- where the two graphs intersect.

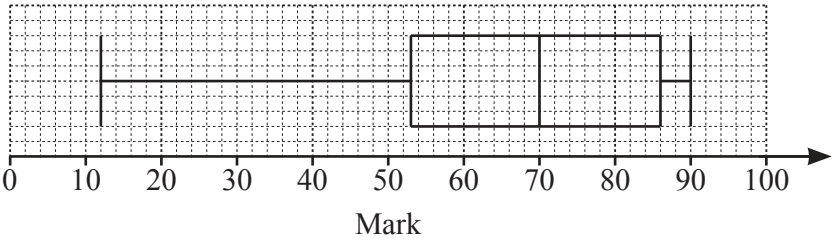
 $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

- (ii) The answers to
- part(c)(i)**
- are two solutions of a cubic equation in terms of
- x
- .

Find this equation in the form $ax^3 + bx^2 + cx + d = 0$, where a , b , c and d are integers.

..... [4]

7 (a) The box-and-whisker plot shows information about the marks scored by some students in a test.



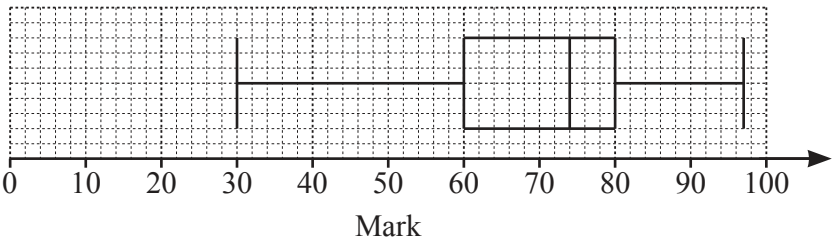
(i) Write down the median mark. [1]

(ii) Work out the range. [1]

(iii) Jais scored a mark in the test that was higher than the marks scored by 75% of the students.

Write down a possible mark for Jais. [1]

(iv) This box-and-whisker plot shows information about the marks scored by the same students in a second test.



Make one comparison between the distributions of marks in the two tests.

..... [1]

(b) The table shows information about the height, h cm, of each of 50 plants.

Height (h cm)	$0 < h \leq 20$	$20 < h \leq 30$	$30 < h \leq 34$	$34 < h \leq 40$	$40 < h \leq 60$
Frequency	4	9	20	15	2

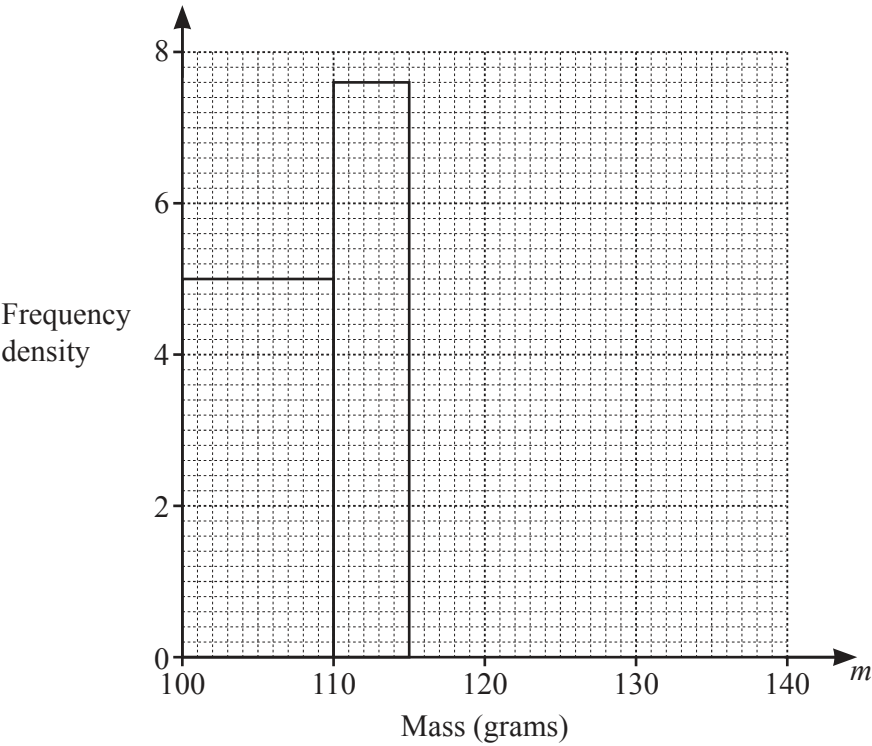
Calculate an estimate of the mean.

..... cm [4]

- (c) Some apples are weighed and the mass, m grams, of each apple is recorded.
The table shows the results.

Mass (m grams)	$100 < m \leq 110$	$110 < m \leq 115$	$115 < m \leq 125$	$125 < m \leq 140$
Frequency	50	x	44	51

The histogram shows some of the information from the table.



- (i) Work out the value of x .

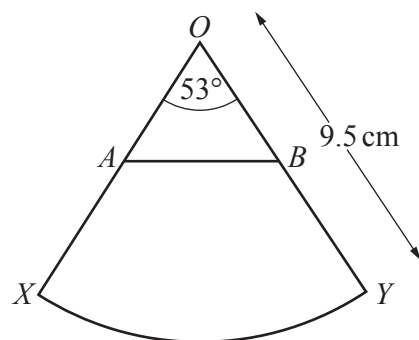
$x = \dots\dots\dots$ [1]

- (ii) Complete the histogram.

[2]

12

8 (a)

NOT TO
SCALE

The diagram shows a sector OXY of a circle with centre O and radius 9.5 cm .
The sector angle is 53° .

A lies on OX , B lies on OY and $OA = OB$.

- (i) Show that the area of the sector is 41.7 cm^2 , correct to 1 decimal place.

[2]

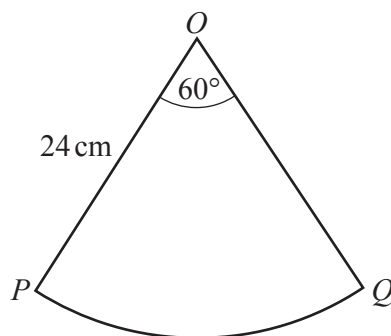
- (ii) The area of triangle OAB is $\frac{1}{3}$ of the area of sector OXY .

Calculate OA .

$OA = \dots\dots\dots\text{ cm}$ [4]

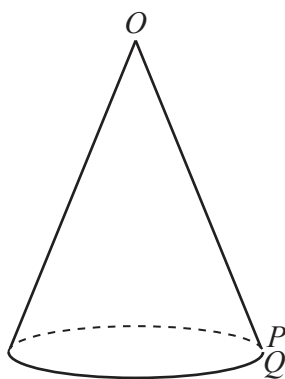
13

(b)

NOT TO
SCALE

The diagram shows a sector OPQ of a circle with centre O and radius 24 cm. The sector angle is 60° .

A cone is made from this sector by joining OP to OQ .

NOT TO
SCALE

Calculate the volume of the cone.

[The volume, V , of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

..... cm^3 [6]

14

9 (a) Factorise.

(i) $5am + 10ap - bm - 2bp$

..... [2]

(ii) $15(k+g)^2 - 20(k+g)$

..... [2]

(iii) $4x^2 - y^4$

..... [2]

15

(b) Expand and simplify.

$$(x-3)(x+1)(3x-4)$$

..... [3]

(c) $(x+a)^2 = x^2 + 22x + b$

Find the value of a and the value of b .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots [2]$$

16

- 10 (a)** A box is a cuboid with length 45 cm, width 30 cm and height 42 cm.
The box is completely filled with 90.72 kg of sand.

Calculate the density of this sand in kg/m^3 .
[Density = mass $\div$ volume]

..... kg/m^3 [3]

- (b)** A bag contains 15000cm^3 of sand.
Some of this sand is used to completely fill a hole in the shape of a cylinder.
The hole is 30 cm deep and has radius 10 cm.

Calculate the percentage of the sand from the bag that is used.

..... % [3]

- (c)** Sand costs \$98.90 per tonne.
This cost includes a tax of 15%.

Calculate the amount of tax paid per tonne of sand.

\$ [3]

- (d)** Raj buys some sand for 3540 rupees.

Calculate the cost in dollars when the exchange rate is \$1 = 70.8 rupees.

\$ [2]

17

11 Gaya spends \$48 to buy books that cost \$ x each.

(a) Write down an expression, in terms of x , for the number of books Gaya buys.

..... [1]

(b) Myra spends \$60 to buy books that cost \$ $(x + 2)$ each.
Gaya buys 4 more books than Myra.

Show that $x^2 + 5x - 24 = 0$.

[4]

(c) Solve by factorisation.

$$x^2 + 5x - 24 = 0$$

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

(d) Find the number of books Myra buys.

..... [1]

- 12 (a)** Find the gradient of the curve $y = 2x^3 - 7x + 4$ when $x = -2$.

..... [3]

- (b)** A is the point $(7, 2)$ and B is the point $(-5, 8)$.

- (i)** Calculate the length of AB .

..... [3]

- (ii)** Find the equation of the line that is perpendicular to AB and that passes through the point $(-1, 3)$.
Give your answer in the form $y = mx + c$.

$y =$ [4]

19

(iii) AB is one side of the parallelogram $ABCD$ and

- $\overrightarrow{BC} = \begin{pmatrix} -a \\ -b \end{pmatrix}$ where $a > 0$ and $b > 0$
- the gradient of BC is 1
- $|\overrightarrow{BC}| = \sqrt{8}$.

Find the coordinates of D .

(..... ,) [4]

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.