Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

7036525531

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.

[Turn over

1

Painter	Plumber	Electrician
$35 per hour	Fixed charge $40 plus $26.50 per hour	$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.

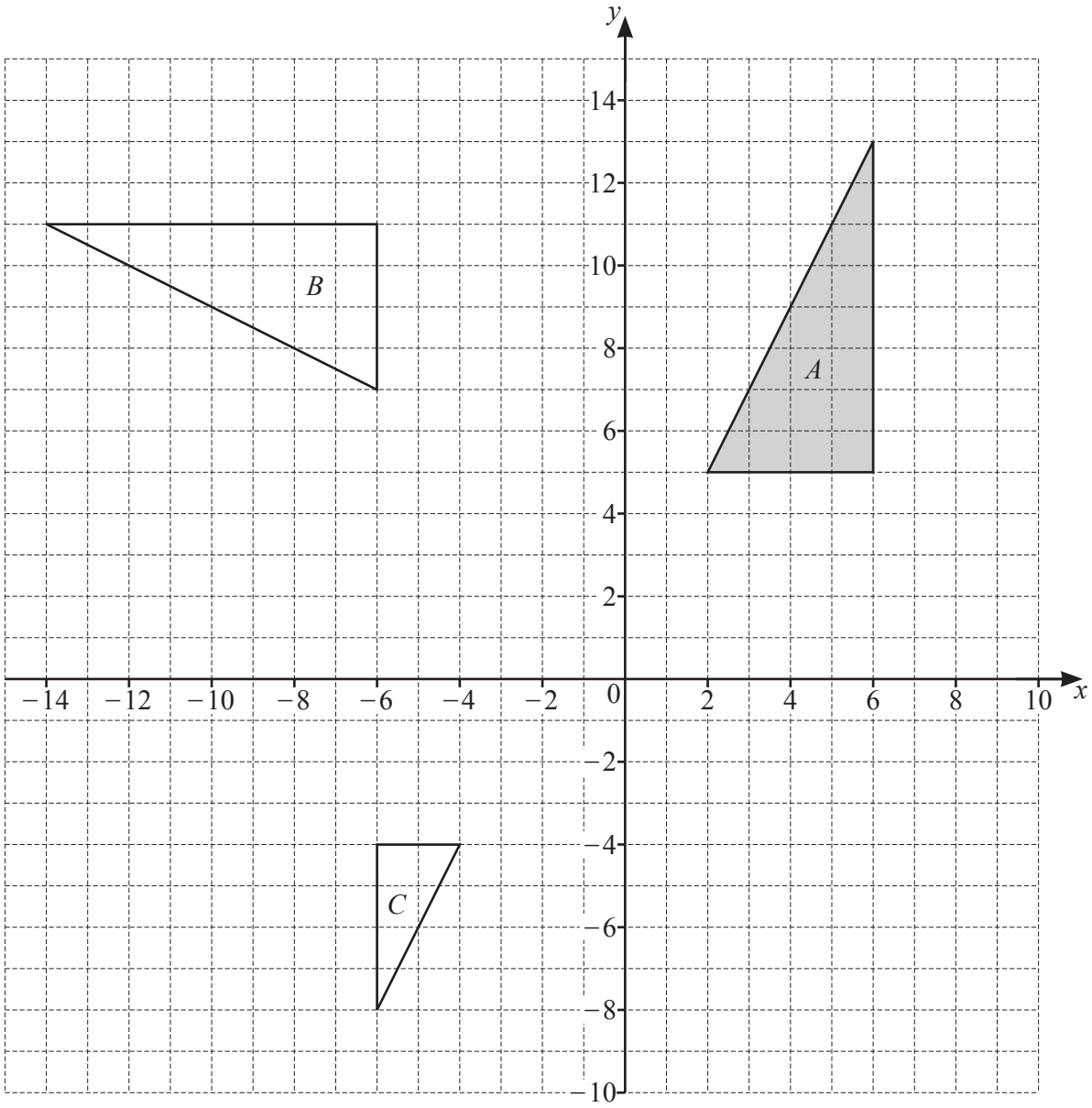
Calculate how many hours the electrician works.

..... 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]

2



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

(i) triangle A onto triangle B,

.....

..... [3]

(ii) triangle A onto triangle C.

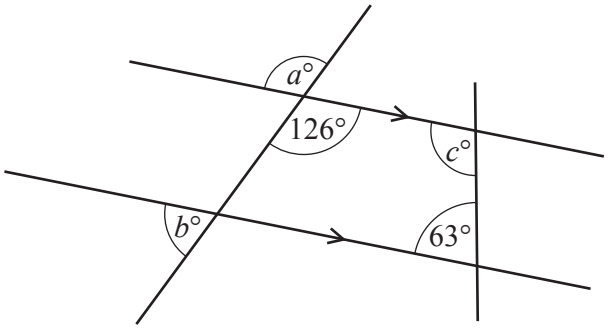
.....

..... [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]

3 (a)



NOT TO SCALE

The diagram shows two straight lines intersecting two parallel lines.

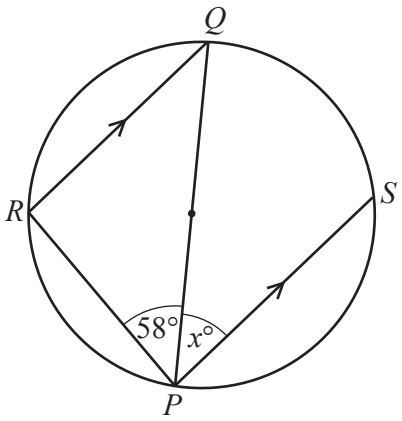
Find the values of a, b and c.

$a =$ .....

$b =$ .....

$c =$ ..... [3]

(b)



NOT TO SCALE

Points R and S lie on a circle with diameter PQ.
RQ is parallel to PS.
Angle $RPQ = 58°$.

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

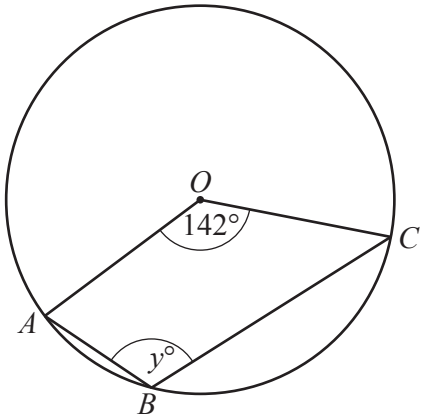
.....

.....

.....

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

(c)



NOT TO SCALE

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

Find the value of y.

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

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 $\frac{37}{105}$.

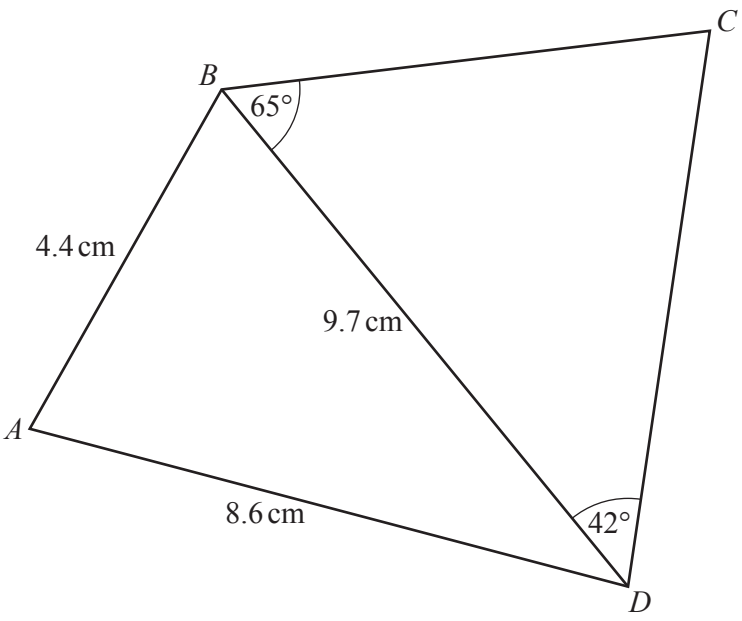
[3]

(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]

5



NOT TO SCALE

(a) Calculate angle *ADB*.

Angle *ADB* = ... [3]

(b) Calculate *DC*.

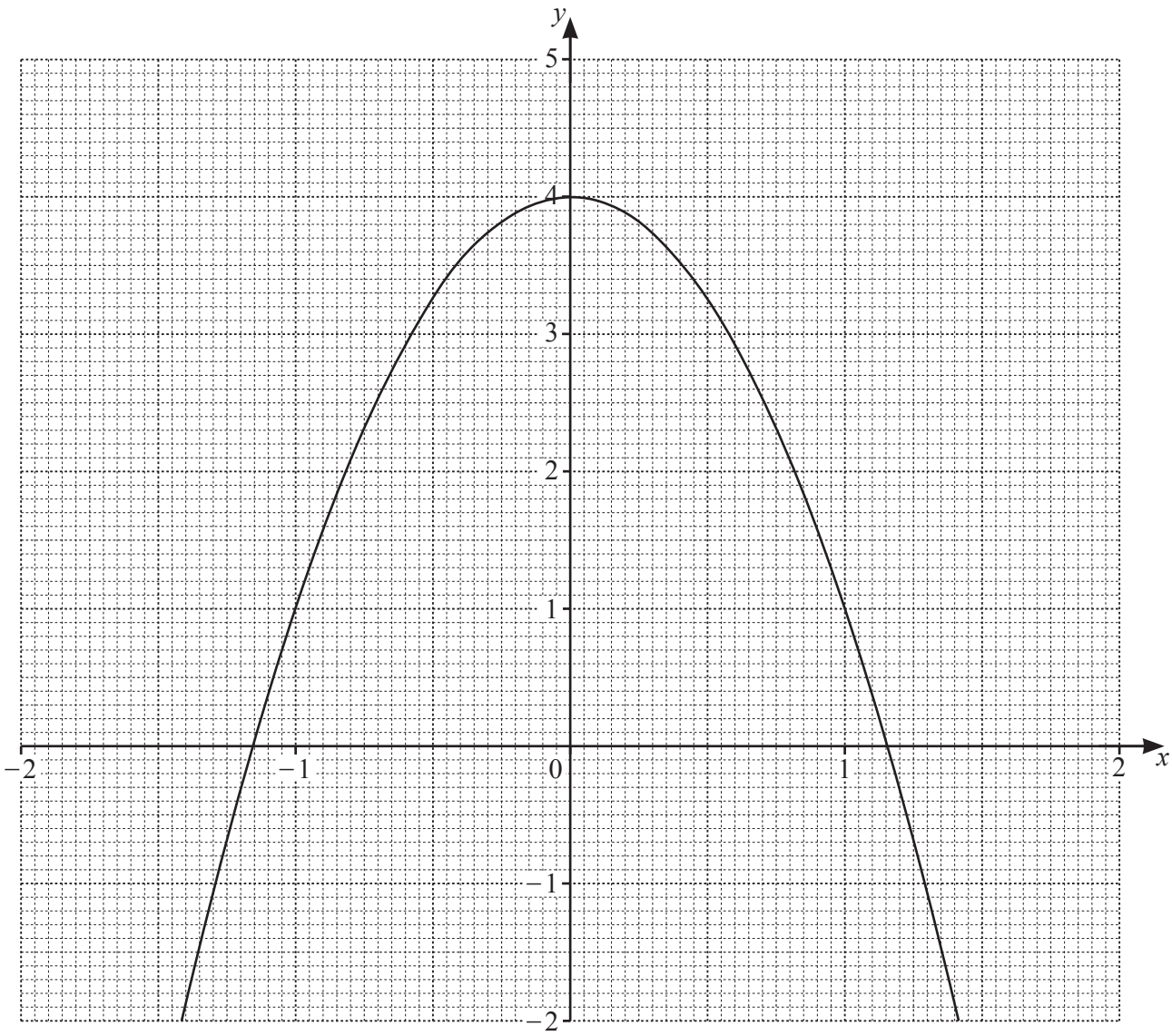
DC = ... cm [4]

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

..... cm [3]

[Turn over

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]

(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 $-2 \leqslant x \leqslant 1.5$.

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 $-2 \leqslant x \leqslant 1.5$. [4]

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

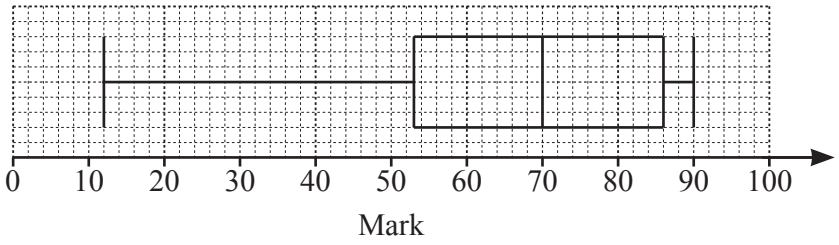
$x =$ ..... or $x =$ ..... [2]

(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]

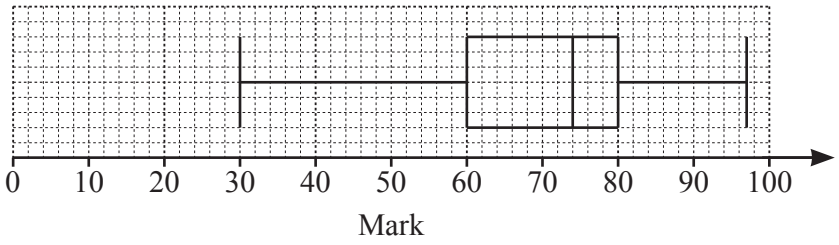
(ii) Work out the range.

..... [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)	$0 < h \leqslant 20$	$20 < h \leqslant 30$	$30 < h \leqslant 34$	$34 < h \leqslant 40$	$40 < h \leqslant 60$
Frequency	4	9	20	15	2

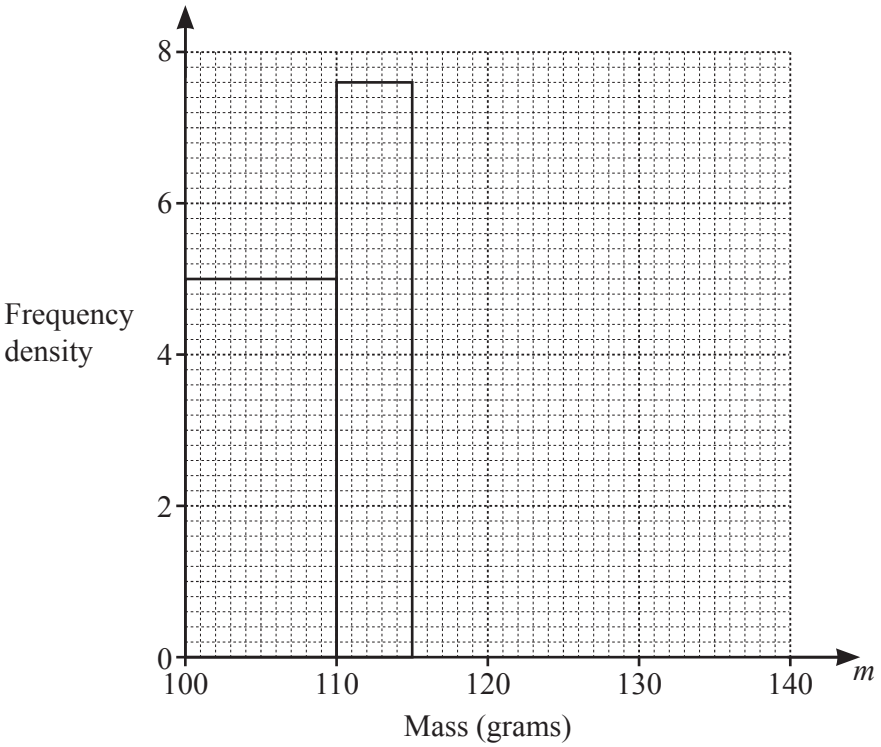
Calculate an estimate of the mean.

..... 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)	$100 < m \leqslant 110$	$110 < m \leqslant 115$	$115 < m \leqslant 125$	$125 < m \leqslant 140$
Frequency	50	x	44	51

The histogram shows some of the information from the table.



(i) Work out the value of x.

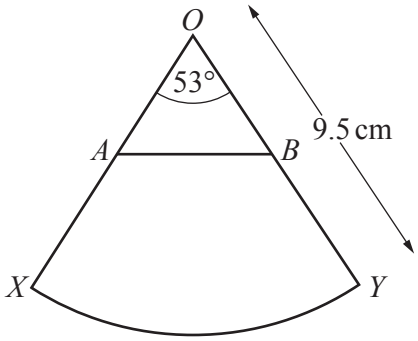
$x =$ ..... [1]

(ii) Complete the histogram.

[2]

[Turn over

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 $41.7\,\text{cm}^2$, correct to 1 decimal place.

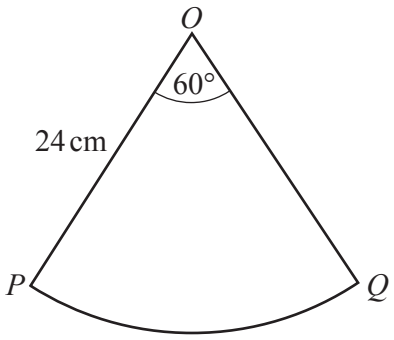
[2]

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

Calculate OA.

$OA =$ ..... cm [4]

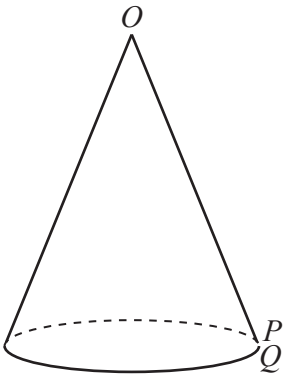
(b)



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]

9 **(a)** Factorise.

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

..... [2]

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

..... [2]

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

..... [2]

(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.

$a =$ .....

$b =$ ..... [2]

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 ÷ volume]

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

(b) A bag contains 15000 cm^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]

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.

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

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

(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
- $\left|\overrightarrow{BC}\right| = \sqrt{8}$.

Find the coordinates of D.

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

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