

1 Children go to camp on holiday.

(a) Fatima buys bananas and apples for the camp.

(i) Bananas cost \$0.85 per kilogram.

Fatima buys 20kg of bananas and receives a discount of 14%.

How much does she spend on bananas?

Answer(a)(i) \$ [3]

(ii) Fatima spends \$16.40 on apples after a discount of 18%.

Calculate the original price of the apples.

Answer(a)(ii) \$ [3]

(iii) The ratio number of bananas : number of apples = 4 : 5.

There are 108 bananas.

Calculate the number of apples.

Answer(a)(iii) [2]

- (b) The cost to hire a tent consists of two parts.

$$\boxed{\$c} + \boxed{\$d \text{ per day}}$$

The total cost for 4 days is \$27.10 and for 7 days is \$34.30.

Write down two equations in c and d and solve them.

$$\begin{aligned} \text{Answer(b) } c &= \dots\dots\dots \\ d &= \dots\dots\dots \end{aligned} \quad [4]$$

- (c) The children travel 270 km to the camp, leaving at 07 43 and arriving at 15 13.

Calculate their average speed in km/h.

$$\text{Answer(c) } \dots\dots\dots \text{ km/h} \quad [3]$$

- (d) Two years ago \$540 was put in a savings account to pay for the holiday.

The account paid **compound** interest at a rate of 6% per year.

How much is in the account now?

$$\text{Answer(d) } \$ \dots\dots\dots \quad [2]$$

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$$f(x) = 4x - 2$$

$$g(x) = \frac{2}{x} + 1$$

$$h(x) = x^2 + 3$$

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(a) (i) Find the value of $hf(2)$.

Answer(a)(i) [2]

(ii) Write $fg(x)$ in its simplest form.

Answer(a)(ii) $fg(x) =$ [2]

(b) Solve $g(x) = 0.2$.

Answer(b) $x =$ [2]

(c) Find the value of $gg(3)$.

Answer(c) [2]

- (d) (i) Show that $f(x) = g(x)$ can be written as $4x^2 - 3x - 2 = 0$.

Answer (d)(i)

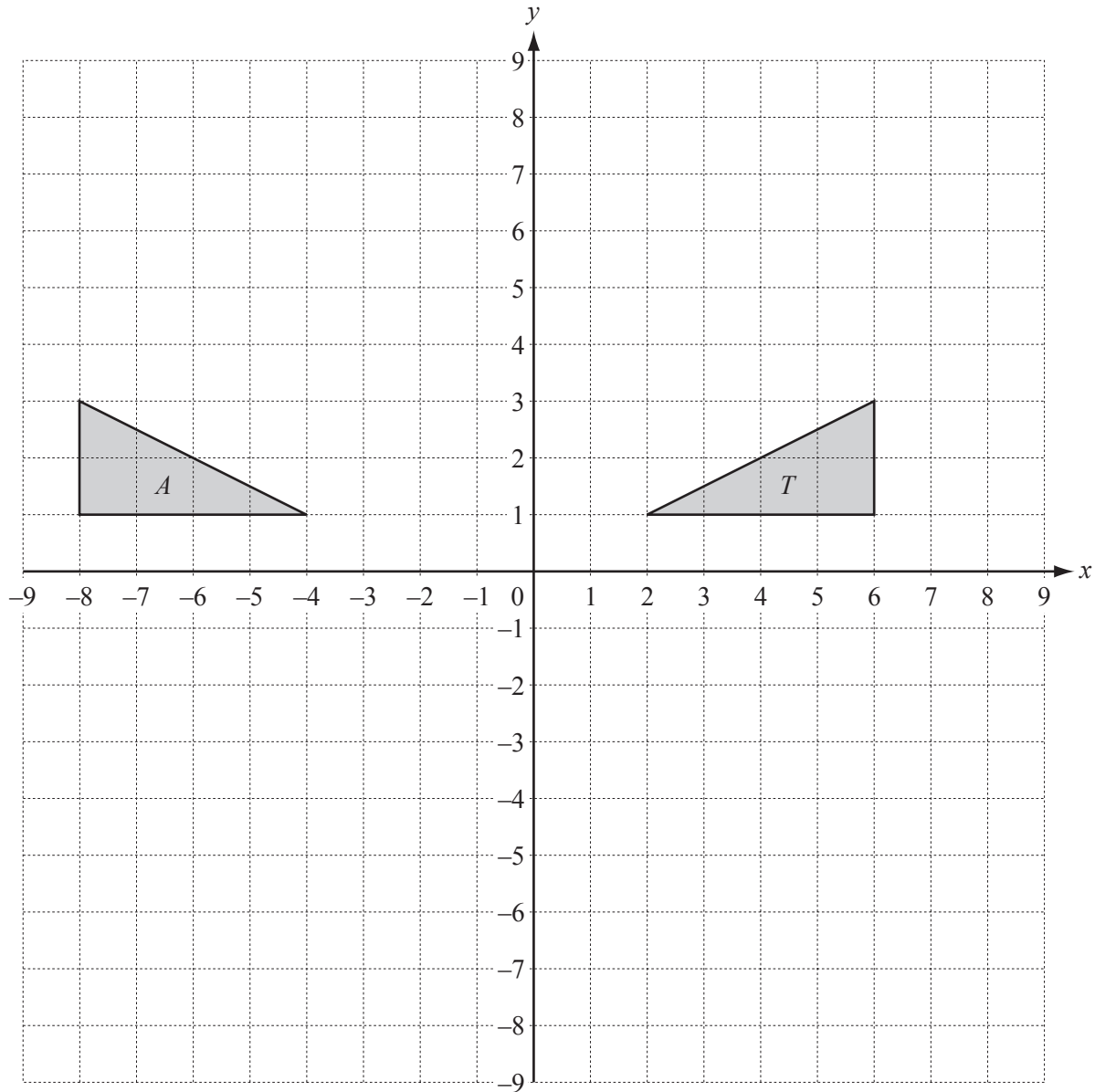
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[1]

- (ii) Solve the equation $4x^2 - 3x - 2 = 0$.

Show all your working and give your answers correct to 2 decimal places.

Answer(d)(ii) $x =$ or $x =$ [4]



Triangles T and A are drawn on the grid above.

- (a) Describe fully the **single** transformation that maps triangle T onto triangle A .

Answer(a) [2]

- (b) (i) Draw the image of triangle T after a rotation of 90° anticlockwise about the point $(0,0)$.

Label the image B . [2]

- (ii) Draw the image of triangle T after a reflection in the line $x + y = 0$.

Label the image C . [2]

- (iii) Draw the image of triangle T after an enlargement with centre $(4, 5)$ and scale factor 1.5.

Label the image D . [2]

- (c) (i) Triangle T has its vertices at co-ordinates $(2, 1)$, $(6, 1)$ and $(6, 3)$.

Transform triangle T by the matrix $\begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$.

Draw this image on the grid and label it E .

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- (ii) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$. [3]

Answer(c)(ii) [3]

- (d) Write down the matrix that transforms triangle B onto triangle T .

Answer(d) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

- 4 Boris has a recipe which makes 16 biscuits.

The ingredients are

160 g flour,

160 g sugar,

240 g butter,

200 g oatmeal.

- (a) Boris has only 350 grams of oatmeal but plenty of the other ingredients.

- (i) How many biscuits can he make?

Answer(a)(i) [2]

- (ii) How many grams of butter does he need to make this number of biscuits?

Answer(a)(ii) g [2]

- (b) The ingredients are mixed together to make dough.

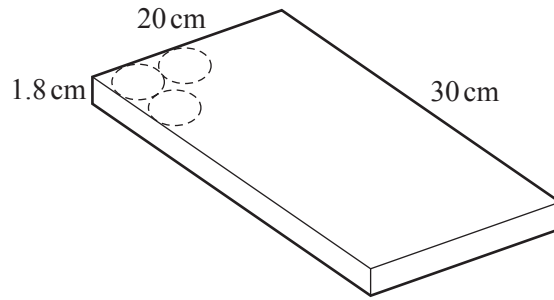
This dough is made into a sphere of volume 1080 cm^3 .

Calculate the radius of this sphere.

[The volume, V , of a sphere of radius r is $V = \frac{4}{3} \pi r^3$.]

Answer(b) cm [3]

(c)

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The 1080 cm^3 of dough is then rolled out to form a cuboid $20 \text{ cm} \times 30 \text{ cm} \times 1.8 \text{ cm}$.

Boris cuts out circular biscuits of diameter 5 cm.

(i) How many whole biscuits can he cut from this cuboid?

Answer(c)(i) [1]

(ii) Calculate the volume of dough left over.

Answer(c)(ii) cm^3 [3]

5 (a) The times, t seconds, for 200 people to solve a problem are shown in the table.

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Time (t seconds)	Frequency
$0 < t \leq 20$	6
$20 < t \leq 40$	12
$40 < t \leq 50$	20
$50 < t \leq 60$	37
$60 < t \leq 70$	42
$70 < t \leq 80$	50
$80 < t \leq 90$	28
$90 < t \leq 100$	5

Calculate an estimate of the mean time.

Answer(a) s [4]

(b) (i) Complete the cumulative frequency table for this data.

Time (t seconds)	$t \leq 20$	$t \leq 40$	$t \leq 50$	$t \leq 60$	$t \leq 70$	$t \leq 80$	$t \leq 90$	$t \leq 100$
Cumulative Frequency	6	18	38			167		

[2]

(ii) Draw the cumulative frequency graph on the grid opposite to show this data. [4]

(c) Use your cumulative frequency graph to find

(i) the median time,

Answer(c)(i) s [1]

(ii) the lower quartile,

Answer(c)(ii) s [1]

(iii) the inter-quartile range,

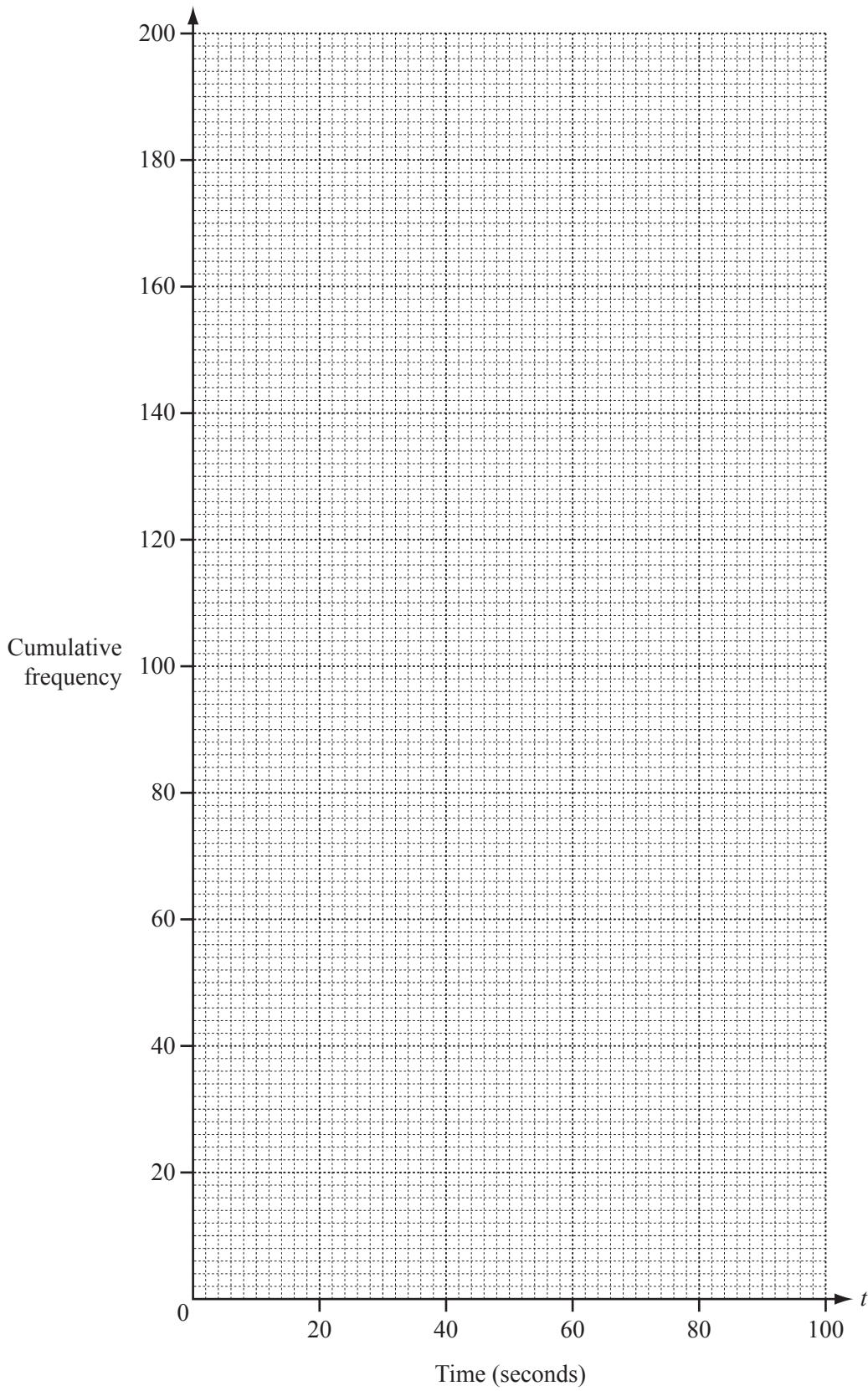
Answer(c)(iii) s [1]

(iv) how many people took between 65 and 75 seconds to solve the problem,

Answer(c)(iv) [1]

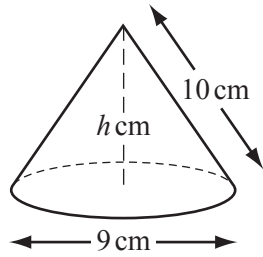
(v) how many people took longer than 45 seconds to solve the problem.

Answer(c)(v) [2]



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A solid cone has diameter 9 cm, slant height 10 cm and vertical height h cm.

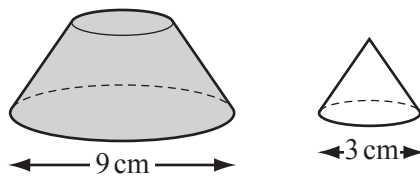
- (a) (i) Calculate the curved surface area of the cone.
[The curved surface area, A , of a cone, radius r and slant height l is $A = \pi rl$.]

Answer(a)(i) cm² [2]

- (ii) Calculate the value of h , the vertical height of the cone.

Answer(a)(ii) $h =$ [3]

(b)



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Sasha cuts off the top of the cone, making a smaller cone with diameter 3 cm.
This cone is **similar** to the original cone.

- (i) Calculate the **vertical** height of this small cone.

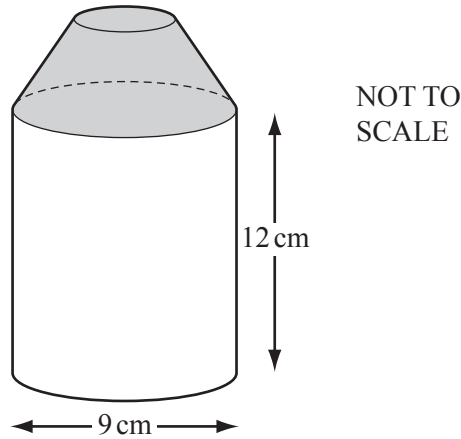
Answer(b)(i) cm [2]

(ii) Calculate the curved surface area of this small cone.

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Answer(b)(ii) cm² [2]

(c)

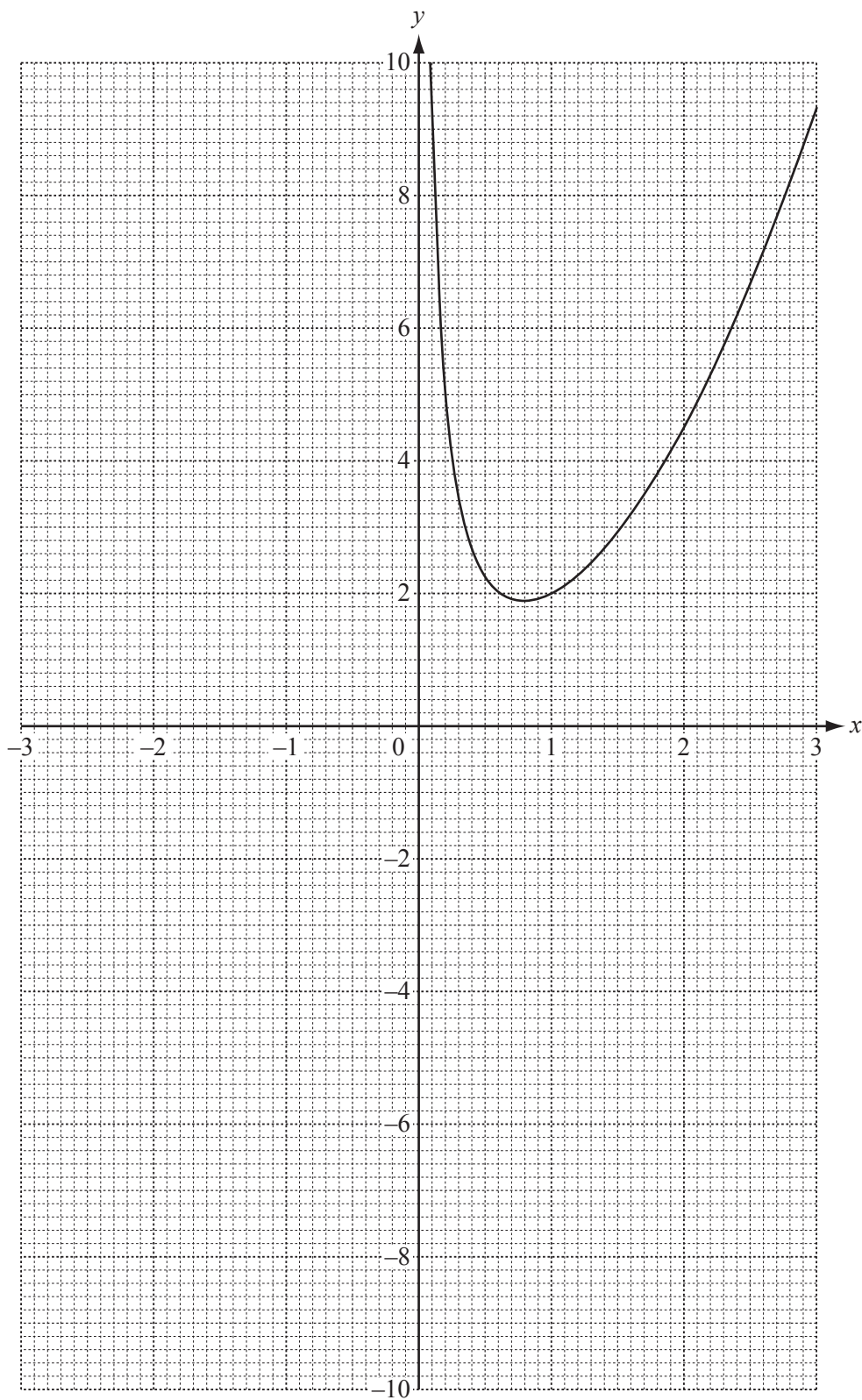


The shaded solid from **part (b)** is joined to a solid cylinder with diameter 9 cm and height 12 cm.
Calculate the **total** surface area of the whole solid.

Answer(c) cm² [5]

- 7 The diagram shows the accurate graph of $y = f(x)$ where $f(x) = \frac{1}{x} + x^2$ for $0 < x \leq 3$.

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(a) Complete the table for $f(x) = \frac{1}{x} + x^2$.

x	-3	-2	-1	-0.5	-0.3	-0.1
$f(x)$		3.5	0	-1.8		

[3]

(b) On the grid, draw the graph of $y = f(x)$ for $-3 \leq x < 0$.

[3]

(c) By drawing a tangent, work out an estimate of the gradient of the graph where $x = 2$.

Answer(c)

[3]

(d) Write down the inequality satisfied by k when $f(x) = k$ has three answers.

Answer(d)

[1]

(e) (i) Draw the line $y = 1 - x$ on the grid for $-3 \leq x \leq 3$.

[2]

(ii) Use your graphs to solve the equation $1 - x = \frac{1}{x} + x^2$.

Answer(e)(ii) $x =$

[1]

(f) (i) Rearrange $x^3 - x^2 - 2x + 1 = 0$ into the form $\frac{1}{x} + x^2 = ax + b$, where a and b are integers.

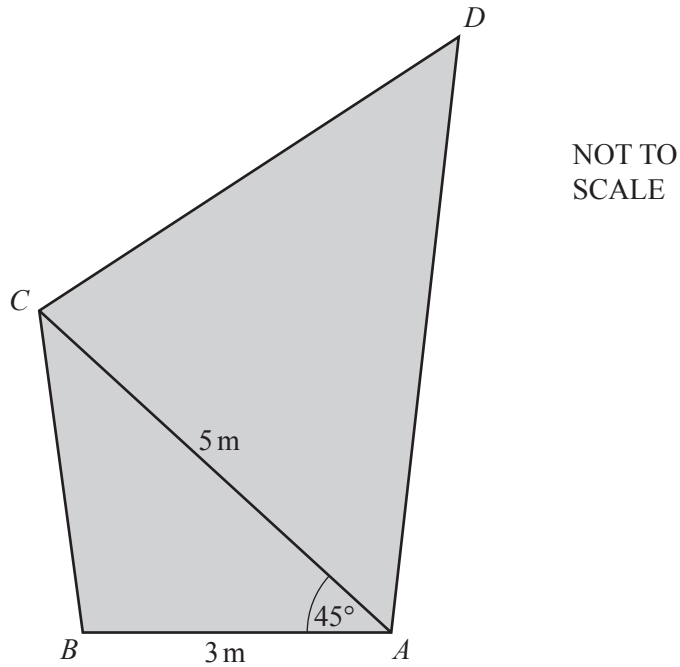
Answer(f)(i)

[2]

(ii) Write down the equation of the line that could be drawn on the graph to solve $x^3 - x^2 - 2x + 1 = 0$.

Answer(f)(ii) $y =$

[1]



Parvatti has a piece of canvas $ABCD$ in the shape of an irregular quadrilateral.

$AB = 3$ m, $AC = 5$ m and angle $BAC = 45^\circ$.

- (a) (i) Calculate the length of BC and show that it rounds to 3.58 m, correct to 2 decimal places.

You must show all your working.

Answer(a)(i)

[4]

- (ii) Calculate angle BCA .

Answer(a)(ii) Angle $BCA = \dots\dots\dots$ [3]

(b) $AC = CD$ and angle $CDA = 52^\circ$.

(i) Find angle DCA .

Answer(b)(i) Angle $DCA = \dots\dots\dots$ [1]

(ii) Calculate the area of the canvas.

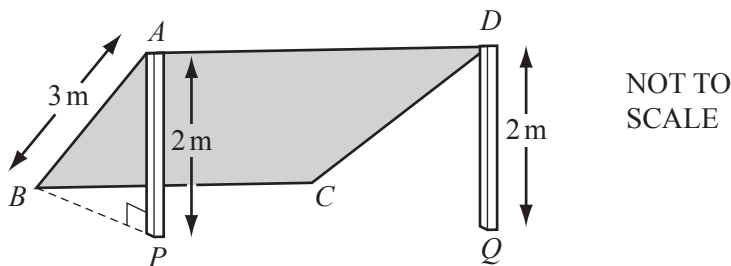
Answer(b)(ii) $\dots\dots\dots$ m^2 [3]

(c) Parvatti uses the canvas to give some shade.

She attaches corners A and D to the top of vertical poles, AP and DQ , each of height 2 m.

Corners B and C are pegged to the horizontal ground.

AB is a straight line and angle $BPA = 90^\circ$.



Calculate angle PAB .

Answer(c) Angle $PAB = \dots\dots\dots$ [2]

- 9 (a) Emile lost 2 blue buttons from his shirt.

A bag of spare buttons contains 6 white buttons and 2 blue buttons.

Emile takes 3 buttons out of the bag at random **without replacement**.

Calculate the probability that

- (i) all 3 buttons are white,

Answer(a)(i) [3]

- (ii) exactly one of the 3 buttons is blue.

Answer(a)(ii) [3]

(b) There are 25 buttons in another bag.

This bag contains x blue buttons.

Two buttons are taken at random **without replacement**.

The probability that they are both blue is $\frac{7}{100}$.

(i) Show that $x^2 - x - 42 = 0$.

Answer (b)(i)

(ii) Factorise $x^2 - x - 42$.

[4]

Answer(b)(ii) [2]

(iii) Solve the equation $x^2 - x - 42 = 0$.

Answer(b)(iii) $x =$ or $x =$ [1]

(iv) Write down the number of buttons in the bag which are **not** blue.

Answer(b)(iv) [1]

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