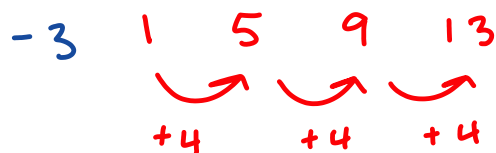


- 1 Here are the first four terms of an arithmetic sequence.

1 5 9 13

Find an expression, in terms of n , for the n th term of this sequence.



-3 1 5 9 13
 $+4$ $+4$ $+4$

$4n - 3$

(Total for Question 1 is 2 marks)



- 2 (a) Work out $3\frac{4}{5} - 1\frac{2}{3}$

$$\begin{array}{r}
 19 \\
 \hline
 5
 \end{array}
 -
 \begin{array}{r}
 5 \\
 \hline
 3
 \end{array}$$

$\times 3$ (arrow pointing down to the first fraction) $\times 5$ (arrow pointing down to the second fraction)

$$\begin{array}{r}
 57 \\
 \hline
 15
 \end{array}
 -
 \begin{array}{r}
 25 \\
 \hline
 15
 \end{array}$$

$$= \frac{32}{15}$$

$$\begin{array}{r}
 19 \\
 \times 3 \\
 \hline
 57 \\
 2
 \end{array}$$

(2)

Kevin was asked to work out $2\frac{1}{3} \times \frac{5}{8}$

Here is his working and his answer.

$$\begin{aligned}
 2\frac{1}{3} \times \frac{5}{8} &= \frac{7}{3} \times \frac{5}{8} \\
 &= \frac{35}{24} \\
 &= 1\frac{9}{24}
 \end{aligned}$$

Kevin's answer is wrong.

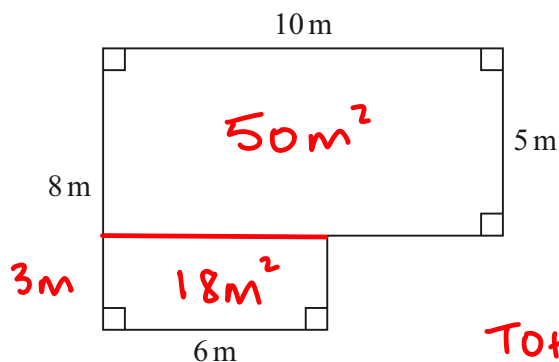
- (b) What mistake has Kevin made?

$$\frac{35}{24} = 1\frac{11}{24}$$

(1)

(Total for Question 2 is 3 marks)

- 3 The diagram shows a plan of a floor.



Petra is going to cover the floor with paint.

Petra has 3 tins of paint.

There are 2.5 litres of paint in each tin.

→ area

Petra thinks 1 litre of paint will cover 10 m^2 of floor.

- (a) Assuming Petra is correct, does she have enough paint to cover the floor?
You must show all your working.

$$\begin{array}{l} \times 3 \quad \left(\begin{array}{l} 1 \text{ Tin} = 2.5 \text{ L} \\ 3 \text{ Tins} = 7.5 \text{ L} \end{array} \right) \times 3 \end{array}$$

$$\begin{array}{l} \times 7.5 \quad \left(\begin{array}{l} 1 \text{ L} = 10 \text{ m}^2 \\ 7.5 \text{ L} = 75 \text{ m}^2 \end{array} \right) \times 7.5 \end{array}$$

yes, she has enough for 75 m^2

(4)

Actually, 1 litre of paint will cover 11 m^2 of floor.

- (b) Does this affect your answer to part (a)?
You must give a reason for your answer.

NO, she will just have more
left over

(1)

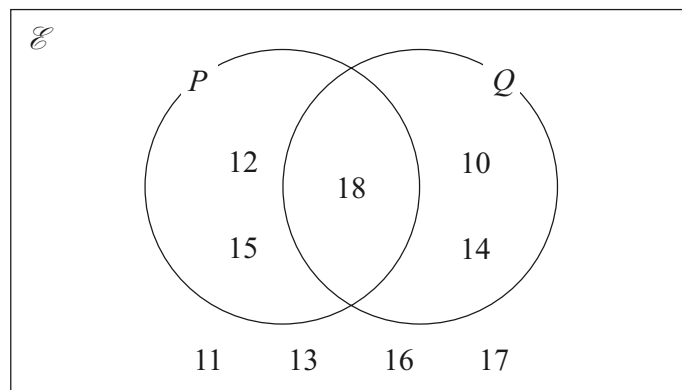
(Total for Question 3 is 5 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

4 Here is a Venn diagram.



(a) Write down the numbers that are in set P' (NOT P)

10, 11, 13, 14, 16, 17
(1)

A number is chosen at random from the universal set, $\mathcal{E}$

(b) Find the probability that this number is in the set $P \cup Q$

12, 15, 18, 10, 14

$\frac{5}{9}$
(2)

(Total for Question 4 is 3 marks)

500km

- 5 Sophie drives a distance of 513 kilometres on a motorway in France. She pays 0.81 euros for every 10 kilometres she drives.

0.8

- (a) Work out an estimate for the total amount that Sophie pays.

$$\begin{array}{rcl}
 & 10 \text{ km} = 0.8 \text{ euros} & \\
 \times 5 \swarrow & & \searrow \times 5 \\
 & 50 \text{ km} = 4 \text{ euros} & \\
 \times 10 \swarrow & & \searrow \times 10 \\
 & 500 \text{ km} = 40 \text{ euros} &
 \end{array}$$

40

..... euros
(3)

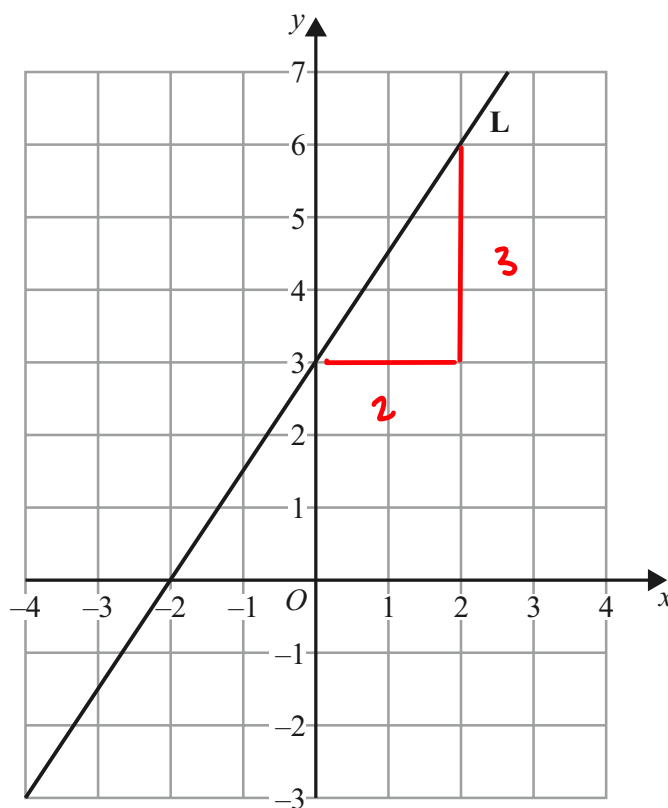
- (b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

Underestimate, rounded both the distance and cost down

.....
(1)

(Total for Question 5 is 4 marks)

6 Here is a straight line **L** drawn on a grid.



(a) Find an equation for **L**.

$$\text{Gradient} = \frac{3}{2}$$

$$\text{y-intercept} = 3$$

$$y = \frac{3}{2}x + 3$$

(3)

M is a different straight line with equation $y = 5x$

(b) Write down the equation of a straight line parallel to **M**.

same gradient

$$y = 5x + 4$$

(1)

(Total for Question 6 is 4 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



- 7 Kasim has some small jars, some medium jars and some large jars.
He has a total of 400 jars.

$\frac{3}{8}$ of the 400 jars are empty.

For the empty jars,

number of small jars : number of medium jars = 3 : 4

number of medium jars : number of large jars = 1 : 2

Work out the percentage of Kasim's jars that are empty small jars.

$$\frac{1}{8} \text{ of } 400 = 50 \quad (400 \div 8 = 50)$$

$$\frac{3}{8} \text{ of } 400 = 150 \quad (50 \times 3 = 150)$$

150 empty

$$S : M \quad M : L$$

$$3 : 4 \quad 1 : 2$$

$$3 : 4 \quad 4 : 8$$

$$S : M : L$$

$$3 : 4 : 8 = 15$$

$$\begin{array}{ccc} \times 10 & & \times 10 \\ \downarrow & & \downarrow \\ 30 : 40 : 80 & = & 150 \end{array}$$

$$\frac{30}{400} = \frac{15}{200} = \frac{7.5}{100}$$

7.5 %

(Total for Question 7 is 5 marks)

8 Len has 8 parcels.

The mean weight of the 8 parcels is 2.5 kg.

The mean weight of 3 of the parcels is 2 kg.

Work out the mean weight of the other 5 parcels.

$$\begin{array}{r} 25 \\ \times 8 \\ \hline 200 \\ \text{✓} \end{array}$$

$$8 \times 2.5 = 20 \quad (\text{Total weight of 8 parcels})$$

$$3 \times 2 = 6 \quad (\text{Total weight of 3 parcels})$$

$$20 - 6 = 14 \quad (\text{Total weight of 5 parcels})$$

$$14 \div 5 = 2.8$$

..... 2.8 kg

(Total for Question 8 is 3 marks)

$$\begin{array}{r} 02.8 \\ 5 \overline{)14.0} \end{array}$$

9 In a sale, the normal price of a coat is reduced by $R\%$

Given that

$$\text{sale price} = 0.7 \times \text{normal price}$$

find the value of R .

$$R = \dots\dots\dots 30$$

(Total for Question 9 is 1 mark)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

10 Solve the simultaneous equations

$$5x - 2y = 23 \quad \times 2$$

$$2x - 3y = 18 \quad \times 5$$

$$\begin{array}{r} 10x - 4y = 46 \\ - \quad 10x - 15y = 90 \\ \hline \end{array}$$

$$\begin{array}{r|l} 11y & -44 \\ \div 11y & \div 11y \\ \hline y & -4 \end{array}$$

$$-4y \quad + \quad 15y$$

$$\begin{array}{r} 90 \\ - 46 \\ \hline 44 \end{array}$$

$$2x - 3y = 18$$

$$2x - 3(-4) = 18$$

$$2x + 12 = 18$$

$$-12 \quad -12$$

$$2x = 6$$

$$\div 2 \quad \div 2$$

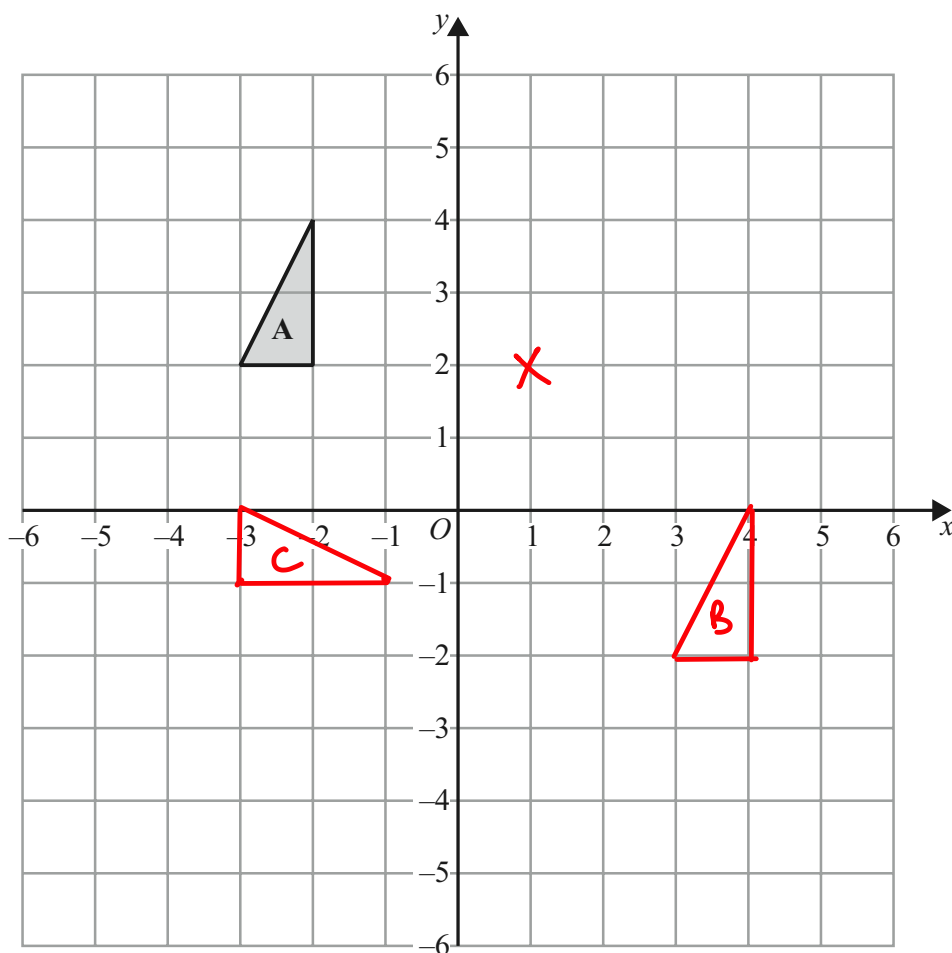
$$x = 3$$

$$x = 3$$

$$y = -4$$

(Total for Question 10 is 4 marks)

11



Triangle **A** is translated by the vector $\begin{pmatrix} 6 \\ -4 \end{pmatrix}$ to give triangle **B**.

Triangle **B** is rotated 90° clockwise about the point $(1, 2)$ to give triangle **C**.

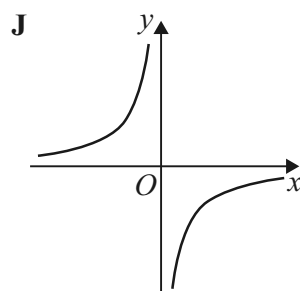
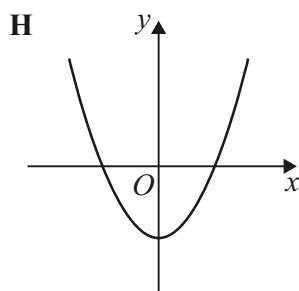
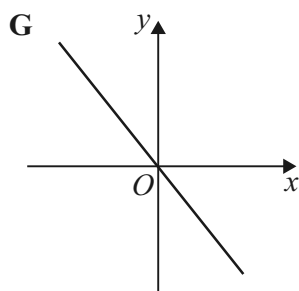
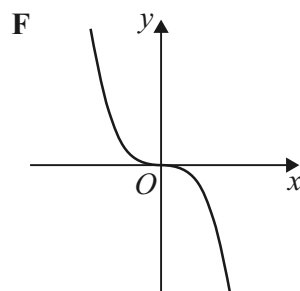
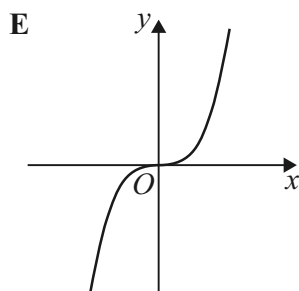
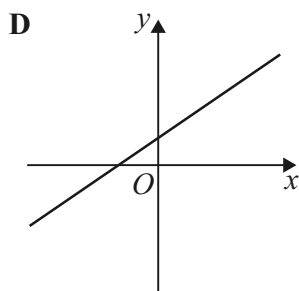
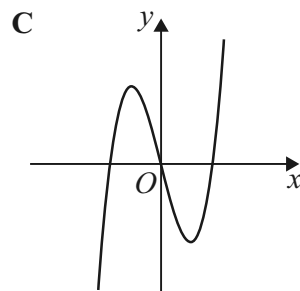
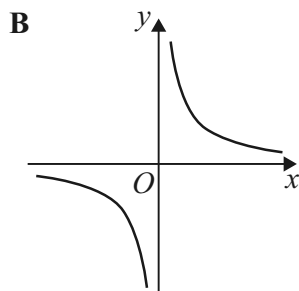
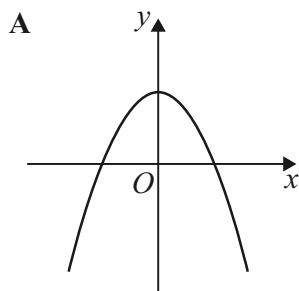
Describe fully the single transformation that maps triangle **A** onto triangle **C**.

Rotated 90° clockwise about $(-4, 1)$

(Total for Question 11 is 3 marks)



12 Here are some graphs.



Write down the letter of the graph that could have the equation

(i) $y = x^2 - 4$

H

(1)

(ii) $y = -x^3$

F

(1)

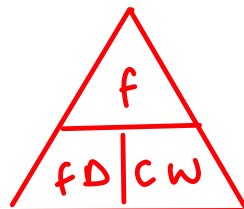
(iii) $y = -\frac{5}{x}$

J

(1)

(Total for Question 12 is 3 marks)

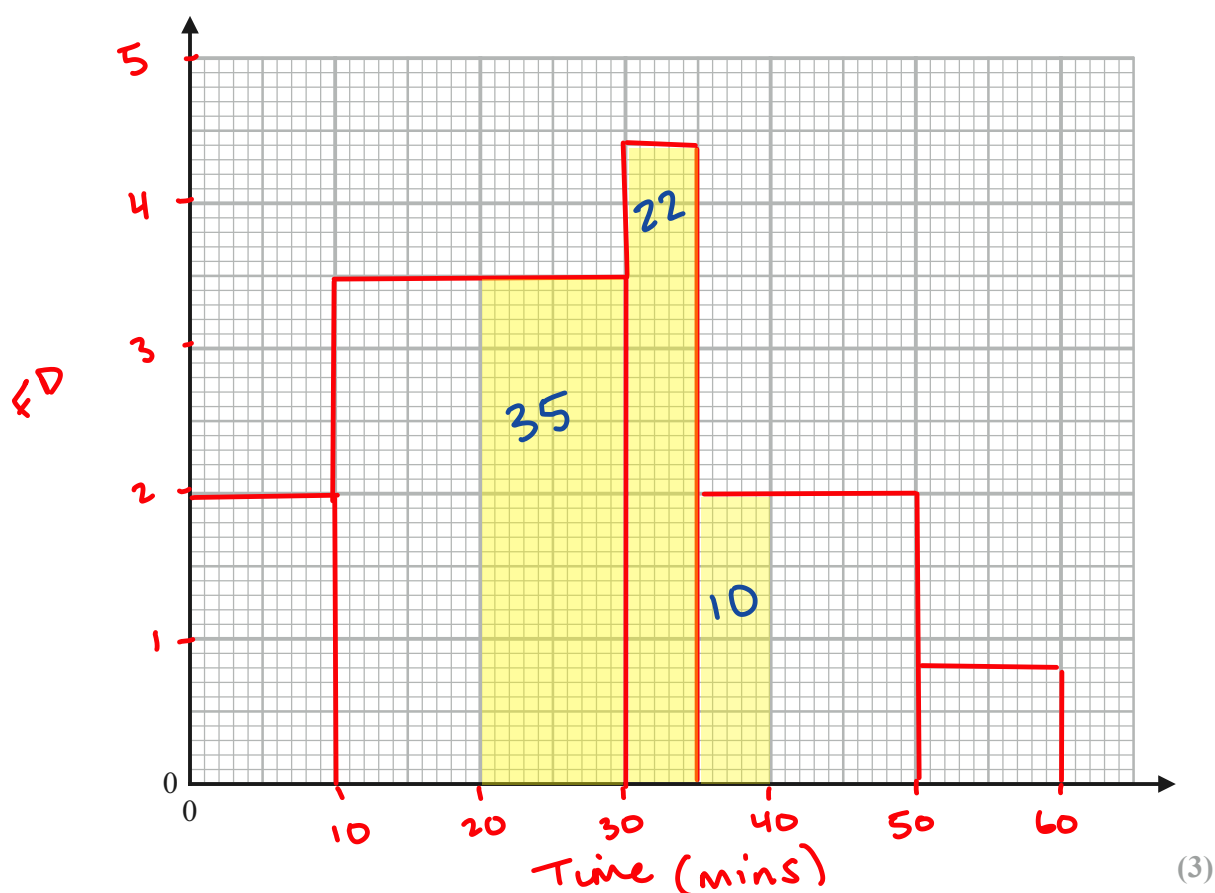
- 13 The table gives information about the amount of time that each of 150 people were in a shop.



Time (t minutes)	Frequency
$0 < t \leq 10$	20
$10 < t \leq 30$	70
$30 < t \leq 35$	22
$35 < t \leq 50$	30
$50 < t \leq 60$	8

$$\begin{aligned}
 20 \div 10 &= 2 \\
 70 \div 20 &= 3.5 \\
 22 \div 5 &= 4.4 \\
 30 \div 15 &= 2 \\
 8 \div 10 &= 0.8
 \end{aligned}$$

- (a) On the grid, draw a histogram for this information.



- (b) Work out an estimate for the fraction of these 150 people who were in the shop for between 20 minutes and 40 minutes.

$$35 + 22 + 10 = 67$$

$$\frac{67}{150}$$

(2)

(Total for Question 13 is 5 marks)



14 Expand and simplify $(3x - 1)(2x + 3)(x - 5)$

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

$$6x^2 + 9x - 2x - 3$$

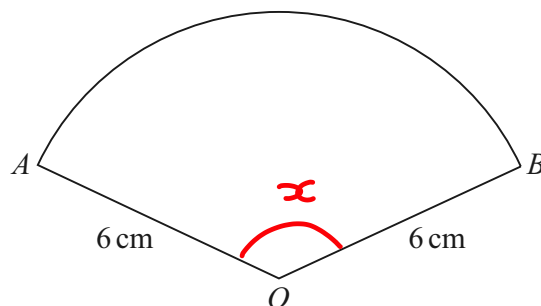
$$(6x^2 + 7x - 3)(x - 5)$$

$$= 6x^3 - 30x^2 + 7x^2 - 35x - 3x + 15$$

$$= 6x^3 - 23x^2 - 38x + 15$$

(Total for Question 14 is 3 marks)

15 OAB is a sector of a circle with centre O and radius 6 cm.



The length of the arc AB is 5π cm.

Work out, in terms of π , the area of the sector.
Give your answer in its simplest form.

$$\frac{x}{360} \times \pi \times 12 = 5\pi$$

$$\frac{x}{360} \times 12 = 5$$

$$\times 360 \quad \times 360$$

$$x \times 12 = 1800$$

$$\div 12 \quad \div 12$$

$$x = 150$$

$$\begin{array}{r} 360 \\ \times 5 \\ \hline 1800 \\ 3 \end{array}$$

$$\begin{array}{r} 0150 \\ 12 \overline{)1800} \end{array}$$

$$15\pi \text{ cm}^2$$

(Total for Question 15 is 4 marks)

$$\frac{150}{360} \times \pi \times 6^2$$

$$\frac{15}{36} \times \pi \times 36$$

$$= 15\pi$$

$$\frac{150}{360} = \frac{15}{36}$$



- 16 There are only n orange sweets and 1 white sweet in a bag.

Saira takes at random a sweet from the bag and eats the sweet.

She then takes at random another sweet from the bag and eats this sweet.

$$\text{Orange} = n$$

$$\text{White} = 1$$

$$\text{Total} = n + 1$$

Show that the probability that Saira eats two orange sweets is $\frac{n-1}{n+1}$

$$\frac{n}{n+1} \times \frac{n-1}{n} = \frac{\cancel{n}(n-1)}{\cancel{n}(n+1)}$$

$$= \frac{n-1}{n+1}$$

(Total for Question 16 is 2 marks)



17 (a) Rationalise the denominator of $\frac{1}{\sqrt{7}}$

$$\frac{1}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} =$$

$$\frac{\sqrt{7}}{7}$$

(1)

(b) Simplify fully $\sqrt{80} - \sqrt{5}$

$$\begin{aligned}\sqrt{80} &= \sqrt{16} \times \sqrt{5} \\ &= 4\sqrt{5}\end{aligned}$$

$$4\sqrt{5} - \sqrt{5} = 3\sqrt{5}$$

$$3\sqrt{5}$$

(2)

(Total for Question 17 is 3 marks)

18 Show that $0.\dot{1}\dot{5} + 0.2\dot{2}\dot{7}$ can be written in the form $\frac{m}{66}$ where m is an integer.

$$\begin{array}{r} 100x = 15.1515 \dots \\ - \quad x = 0.1515 \dots \\ \hline \end{array}$$

$$\begin{array}{r} 99x = 15 \\ \div 99 \quad \div 99 \\ x = \frac{15}{99} \end{array}$$

$$\frac{15}{99} = \frac{5}{33} = \frac{10}{66}$$

$$\begin{array}{r} 100x = 22.72727 \dots \\ - \quad x = 0.22727 \dots \\ \hline \end{array}$$

$$\begin{array}{r} 99x = 22.5 \\ \div 99 \quad \div 99 \\ x = \frac{22.5}{99} \end{array}$$

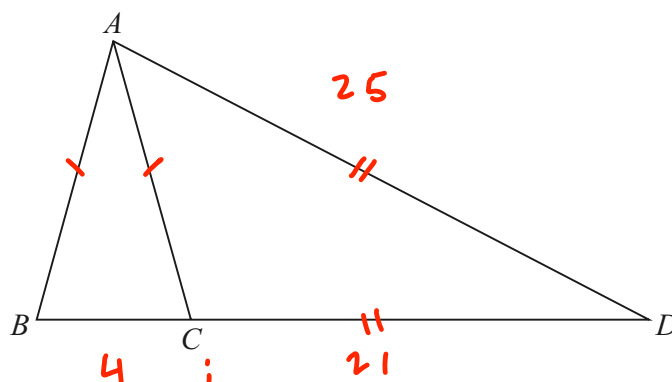
$$\frac{22.5}{99} = \frac{7.5}{33} = \frac{15}{66}$$

$$\begin{array}{r} 07.5 \\ 3 \overline{) 22.5} \end{array}$$

$$\frac{10}{66} + \frac{15}{66} = \frac{25}{66}$$

(Total for Question 18 is 3 marks)

19



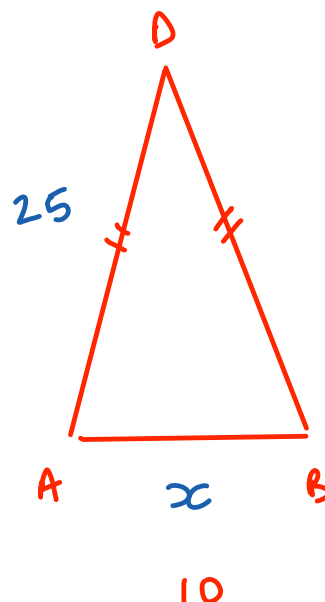
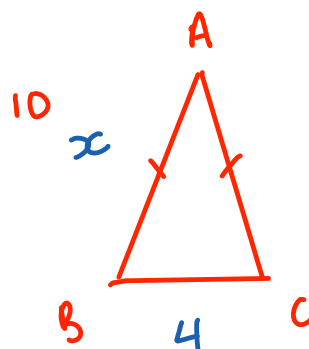
ABC and DAB are similar isosceles triangles.

$$AB = AC$$

$$AD = BD$$

$$BC : CD = 4 : 21$$

Find the ratio $AB : AD$



$$\frac{25}{x} = \frac{x}{4}$$

Tip: When you have two fractions equal to each other you can cross multiply to get rid of the denominator

$$100 = x^2$$

$$10 = x$$

$$AB : AD$$

$$10 : 25$$

$$10 : 25$$

(Total for Question 19 is 3 marks)

20 $2^x = \frac{2^n}{\sqrt[3]{2}}$ $2^y = (\sqrt{2})^5$

Given that $x + y = 8$

work out the value of n .

$$2^x = 2^n \div 2^{1/3}$$

$$2^x = 2^{n-1/3}$$

$$x = n - \frac{1}{3}$$

$$2^y = (2^{1/2})^5$$

$$2^y = 2^{5/2}$$

$$y = \frac{5}{2}$$

$$n - \frac{1}{3} + \frac{5}{2} = \frac{8}{1}$$

$$n - \frac{2}{6} + \frac{15}{6} = \frac{48}{6}$$

$$\frac{35}{6}$$

$$n = \dots\dots\dots$$

(Total for Question 20 is 3 marks)

$$\begin{array}{r|l} n + \frac{13}{6} & = \frac{48}{6} \\ - \frac{13}{6} & - \frac{13}{6} \\ \hline n & = \frac{35}{6} \end{array}$$

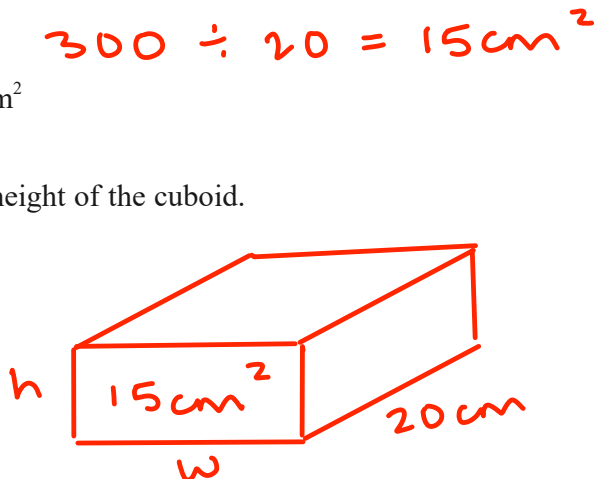
- 21 A solid cuboid has a volume of 300 cm^3
The cuboid has a total surface area of 370 cm^2

The length of the cuboid is 20 cm .

The width of the cuboid is greater than the height of the cuboid.

Work out the height of the cuboid.

You must show all your working.



Volume :

$$20hw = 300$$

$$2hw = 30$$

$$hw = 15$$

$$\rightarrow w = \frac{15}{h}$$

SA :

$$h \times w = hw \times 2 = 2hw$$

$$20 \times h = 20h \times 2 = 40h$$

$$20 \times w = 20w \times 2 = 40w$$

$$2hw + 40h + 40w = 370$$

$$30 + 40h + 40w = 370$$

$$\div 20 \left(\begin{array}{l} 40h + 40w = 340 \\ 2h + 2w = 17 \end{array} \right) \div 20$$

$$2h + 2\left(\frac{15}{h}\right) = 17 \quad \times h$$

$$2h^2 + 30 = 17h$$

$$2h^2 - 17h + 30 = 0$$

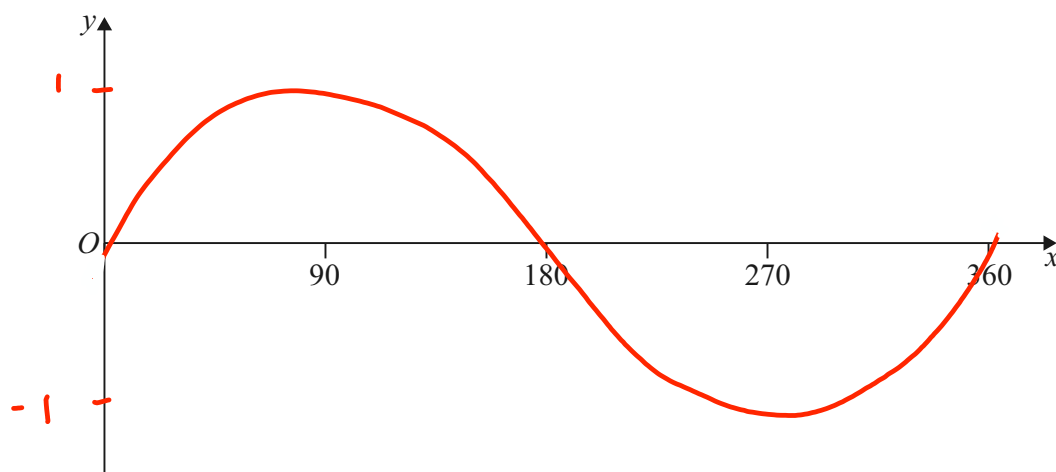
$$(2h - 5)(h - 6)$$

$$h = \underline{2.5} \text{ or } 6$$

$$2.5 \text{ cm}$$

(Total for Question 21 is 5 marks)

22 (a) Sketch the graph of $y = \sin x^\circ$ for $0 \leq x \leq 360$



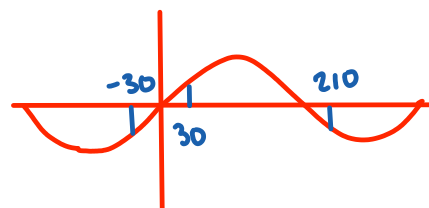
(2)

(b) Solve the equation $2 \sin x^\circ = -1$ for $0 \leq x \leq 360$

$$\sin x = -\frac{1}{2}$$

$$\sin 30 = \frac{1}{2}$$

$$x = -30^\circ, 210^\circ$$



$$210^\circ, 330^\circ$$

(2)

(Total for Question 22 is 4 marks)

$$-30 + 360 = 330$$

Tip: The Sine graph repeats every 360° , -30 is not in the range $0 \leq x \leq 360$ and so we do $-30 + 360$ to find the other value that is in the given range.

23 C is a circle with centre (0, 0)

L is a straight line.

The circle C and the line L intersect at the points P and Q.

The coordinates of P are (5, 10)

The x coordinate of Q is -2

L has a positive gradient and crosses the y-axis at the point (0, k)

Find the value of k.

$$x^2 + y^2 = r^2$$

$$5^2 + 10^2 = r^2$$

$$25 + 100 = r^2$$

$$125 = r^2$$

$$x^2 + y^2 = 125$$

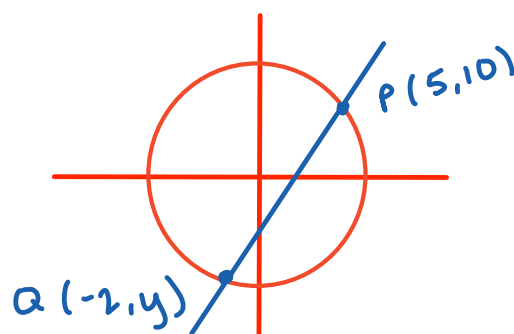
$$P = (5, 10)$$

$$Q = (-2, -11)$$

$$\text{Gradient} = \frac{10 - -11}{5 - -2}$$

$$= \frac{21}{7} = 3$$

$$y = 3x + c$$



$$(-2)^2 + y^2 = 125$$

$$4 + y^2 = 125$$

$$y^2 = 121$$

$$y = 11 \text{ or } -11$$

$$Q = (-2, -11)$$

$$10 = 3(5) + c$$

$$10 = 15 + c$$

$$-5 = c$$

$$k = -5$$

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS