

Wednesday 8 November 2023 – Morning

GCSE (9–1) Mathematics

J560/01 Paper 1 (Foundation Tier)

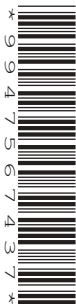
Time allowed: 1 hour 30 minutes

You must have:

- the Formulae Sheet for Foundation Tier (inside this document)

You can use:

- a scientific or graphical calculator
- geometrical instruments
- tracing paper



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- Use the π button on your calculator or take π to be 3.142 unless the question says something different.

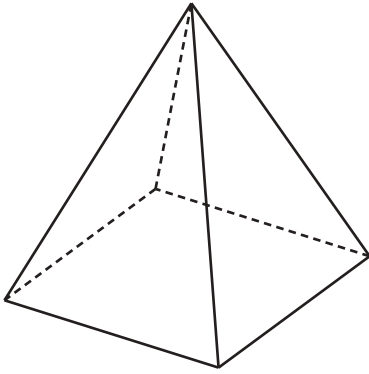
INFORMATION

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [].
- This document has **24** pages.

ADVICE

- Read each question carefully before you start your answer.

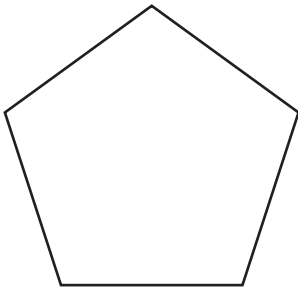
- 1 (a) Write down the mathematical name of this solid.
Choose from the list of names in the box.



cone	cube	cube	cylinder
prism	pyramid	sphere	

(a) **Pyramid** [1]

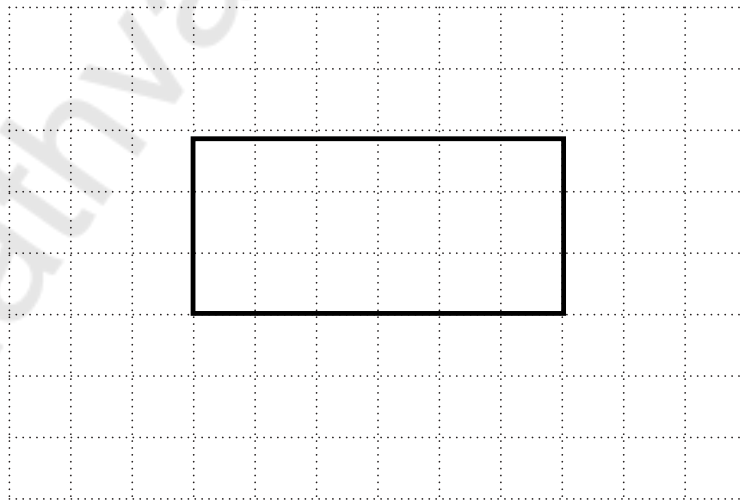
- (b) Write down the mathematical name of this polygon.



(b) **Pentagon** [1]

- (c) On the grid below, sketch a quadrilateral with these properties.

- All angles are equal
 - and
 - the diagonals are **not** at right angles to each other.
- 4-sided**



[1]

- 2 (a) Round 3648 to the nearest hundred.

3600 3700
 ↑
 3650

(a) **3600** [1]

- (b) Round £3.2875 to the nearest penny.

↑

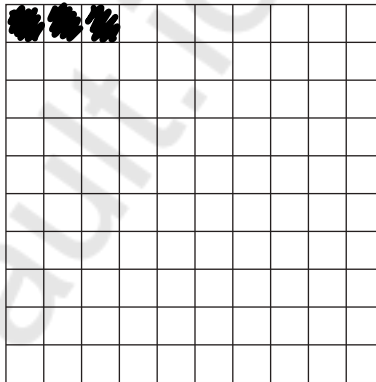
(b) £ **3.29** [1]

- 3 (a) What fraction of this shape is shaded?



(a) $\frac{3}{5}$ [1]

- (b) The diagram below is made up of 100 small squares.



Shade 3% of the diagram.

↳ $\frac{3}{100}$

[1]

- 4 (a) Write down the **three** factors of 25.

$$\begin{array}{l} 1 \quad 25 \\ 5 \end{array}$$

(a) **1** , **5** , and **25** [2]

- (b) Write down a square number between 40 and 70.

$$7^2 = 49$$

$$8^2 = 64$$

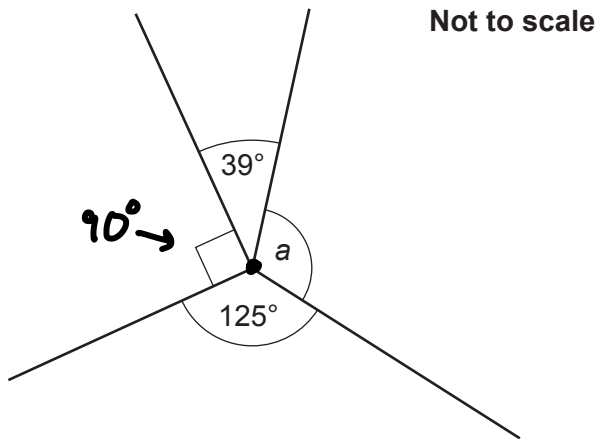
(b) **49** [1]

- 5 Find the number that is halfway between 4.2 and 6.

$$\frac{4.2 + 6}{2} = \frac{10.2}{2} = 5.1$$

..... **5.1** [2]

- 6 Four lines meet at a point.



Work out the size of angle a .

$$360 - (39 + 90 + 125) = 106^\circ$$

$$a = \dots\dots\dots 106 \dots\dots\dots^\circ [2]$$

- 7 A painter mixes red paint and yellow paint in the ratio 2 : 3.
They make a total of 1.5 litres of paint.

Work out how much red paint they use.
Give your answer in millilitres.

$$1\text{L} = 1000\text{ ml}$$

↘
×1000

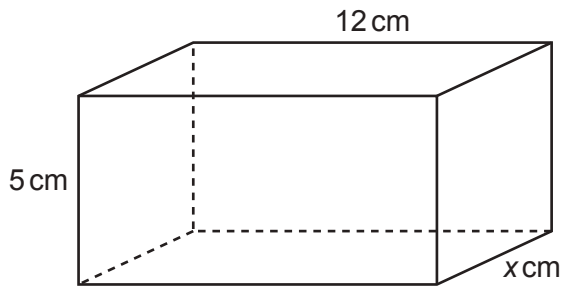
$$1.5\text{L} = 1500\text{ ml}$$

R	300	300	= 600ml	}	5 parts
Y	300	300	= 600ml		

$1500 \div 5 = 300\text{ml}$

$$\dots\dots\dots 600 \dots\dots\dots \text{ml} [3]$$

- 8 The diagram shows a cuboid with dimensions 12 cm, 5 cm and x cm.



Not to scale

The volume of the cuboid is 240 cm^3 .

Find the value of x .

$$V = l \times w \times h$$

$$240 \text{ cm}^3 = 12 \text{ cm} \times w \times 5 \text{ cm}$$

$$240 \text{ cm}^3 = 60w \text{ cm}^2$$

$$\frac{240}{60} = w$$

$$x = \underline{4} \dots\dots\dots [3]$$

- 9 Heidi and Yoshi compete in the same car race.
Heidi completes the race in 6 hours.
Heidi's average speed was 50 miles per hour.
Yoshi's average speed was 48 miles per hour.

D
S T

Calculate how long it took Yoshi to complete the race.
Give your answer in hours and minutes.

Heidi

$$\begin{aligned} S &= 50 \text{ mph} \\ T &= 6 \text{ h} \\ D &= S \times T \\ &= 50 \times 6 \\ &= 300 \text{ miles} \end{aligned}$$

Yoshi

$$\begin{aligned} S &= 48 \text{ mph} \\ D &= 300 \text{ miles} \\ T &= \frac{300}{48} = \underline{6.25} \text{ h} \\ &\quad \quad \quad \times 60 = 15 \text{ mins} \\ &= 6 \text{ h } 15 \text{ mins} \end{aligned}$$

..... 6 hours 15 minutes [4]

- 10 Alex and Emma use this recipe to make scones.
The recipe shows the ingredients needed to make 16 scones.

Ingredients to make 16 scones	
400g	flour
50g	sugar
100g	butter
80g	sultanas
70ml	milk
2	eggs

$\div 2$ 8 scones $\times 3$ 24 scones

35ml

105ml

- (a) Alex makes 24 scones.

He uses a tablespoon to measure the amount of milk he needs.
The size of a tablespoon is 15 ml.

How many tablespoons of milk should Alex use to make 24 scones?

$$105\text{ml} \div 15\text{ml} = 7$$

(a) 7 [3]

- (b) Emma has 1 kg of flour and 240 g of sultanas.
She has lots of all of the other ingredients.

Work out the maximum number of scones that Emma can make.
You must show your working.

$$1\text{kg} = 1000\text{g}$$

$$\text{Flour } 1000\text{g} \div 400\text{g} = 2.5 \text{ times}$$

$$\text{Sultanas } 240\text{g} \div 80\text{g} = 3 \text{ times}$$

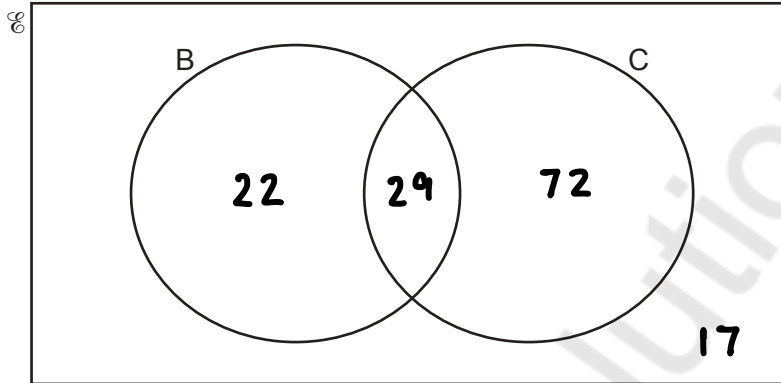
$$2.5 \times 16 = 40$$

(b) 40 [4]

11 140 people are asked if they have a bicycle (B) or a car (C).

- 22 people only have a bicycle.
- 72 people only have a car.
- 29 people have both a bicycle and a car.

(a) Show this information on the Venn diagram.



[1]

(b) (i) How many people do not have a bicycle or a car?

$$140 - (22 + 29 + 72) = 17$$

(b)(i)17..... [1]

(ii) Write your answer in the correct place on the Venn diagram. [1]

(c) One of the 140 people is chosen at random.

Work out the probability they have a car.

$$\frac{29 + 72}{140} = \frac{101}{140}$$

(c) $\frac{101}{140}$ [2]

12 The costs to hire a motorhome are shown below.

Motorhome hire	
First day	£130
Each extra day	£ 90
Each mile travelled	60p

Finley hired a motorhome and travelled 560 miles.
The total cost of hiring the motorhome was £916.

Calculate how many days Finley hired the motorhome for.
You must show your working.

$$£916 - £130 = £786$$

$$560 \text{ miles} \times 60\text{p} = 33600\text{p} \xrightarrow{\div 100} £336$$

$$£786 - £336 = £450$$

$$£450 \div £90 = 5 \text{ extra days}$$

$$1 + 5 = 6$$

..... **6** days [5]

Turn over

13 A climber is in a competition.

Here are their scores after two events.

Event	Score	
1	24	out of 30 points
2	32	out of 38 points
3		out of 52 points

Event 3 is out of 52 points.

The climber's overall score is found by adding the three scores together.

Find the score the climber needs in event 3 to achieve 85% of the total points.

$$\begin{aligned} \text{Total points} &= 30 + 38 + 52 \\ &= 120 \end{aligned}$$

$$\begin{aligned} 85\% \text{ of } 120 &= 0.85 \times 120 \\ &= 102 \end{aligned}$$

$$102 - (24 + 32) = 46$$

14 For each graph below, select its possible equation from this list.

A $y = -3$

B $y = x$

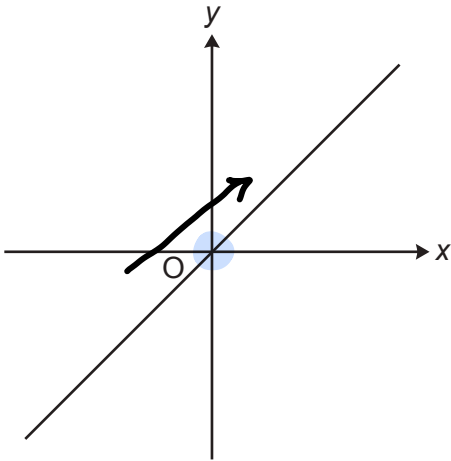
C $y = x + 1$

D $y = x^2$

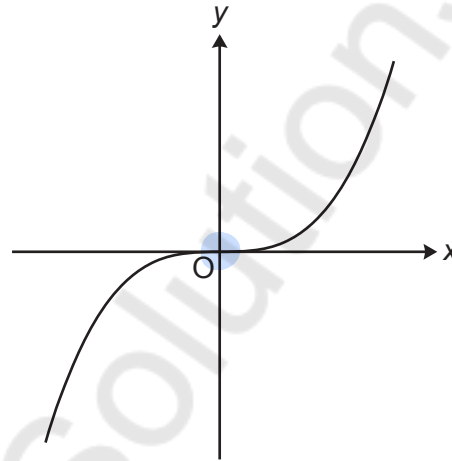
E $x = -3$

F $y = x^3$

Write the letter of the equation beneath each graph.



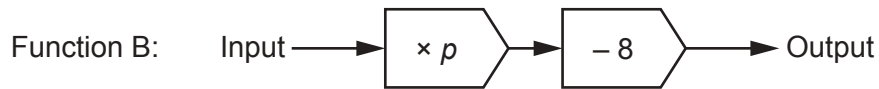
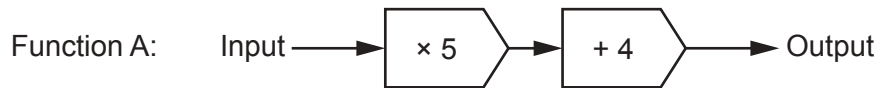
B



F

[2]

15 Here are two functions.



When the input of each function is 6, the output of Function A is equal to the output of Function B.

Work out the value of p in Function B.

$$\begin{aligned} \text{Function A} \quad 6 \times 5 &= 30 \\ 30 + 4 &= 34 \text{ (output)} \end{aligned}$$

$$\begin{aligned} \text{Function B} \quad 6 \times p &= 6p \\ 6p - 8 &= 6p - 8 \\ 6p - 8 &= 34 \\ \quad + 8 \quad + 8 & \\ 6p &= 42 \\ \div 6 \quad \quad \quad \div 6 & \\ p &= 7 \end{aligned}$$

$$p = \dots 7 \dots [4]$$

16 (a) Multiply out.

$$5a(2-a)$$

$$10a - 5a^2$$

(a) $10a - 5a^2$ [2]

(b) Solve.

$$5x + 9 > 12$$

$$-9 \quad -9$$

$$5x > 3$$

$$\div 5$$

$$\div 5$$

$$x > \frac{3}{5}$$

(b) $x > \frac{3}{5}$ [2]

(c) Solve by factorising.

$$x^2 + 7x + 12 = 0$$

	12	
1	12	
2	6	
3	4	

$$(x + 3)(x + 4) = 0$$

$$x + 3 = 0$$

$$x + 4 = 0$$

$$-3 \quad -3$$

$$-4 \quad -4$$

$$x = -3$$

$$x = -4$$

(c) $x = -3$ or $x = -4$ [3]

17 A prime number is a whole number that has exactly two factors.

(a) Explain why 1 is not a prime number.

1 only has one factor
 [1]

(b) a and b are prime numbers.

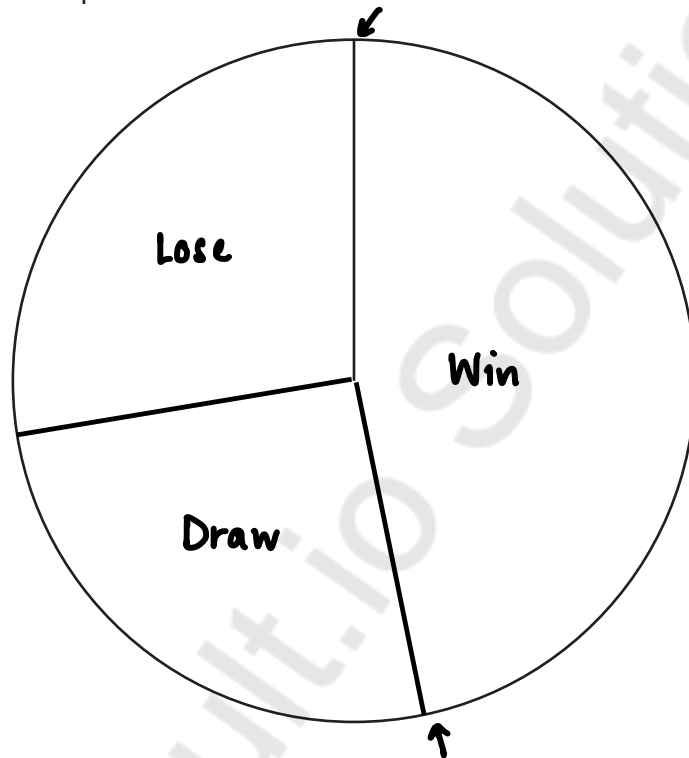
Write down the 6 factors of a^2b .

(b) **1 a b a² ab a²b** [2]

18 (a) The table shows the results for a sports club's 'A' team.

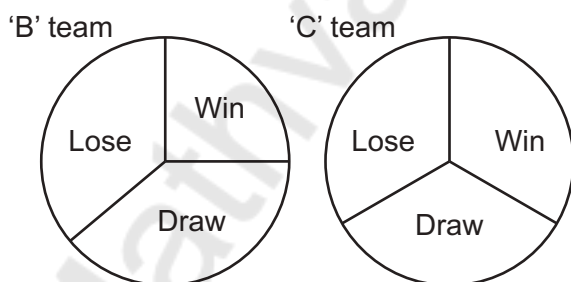
Result	Frequency	Angle
Win	18	162°
Draw	10	90°
Lose	12	108°
Total	40	360°

Complete a labelled pie chart to show these results.



[4]

(b) Here are the results for the sports club's 'B' team and 'C' team.



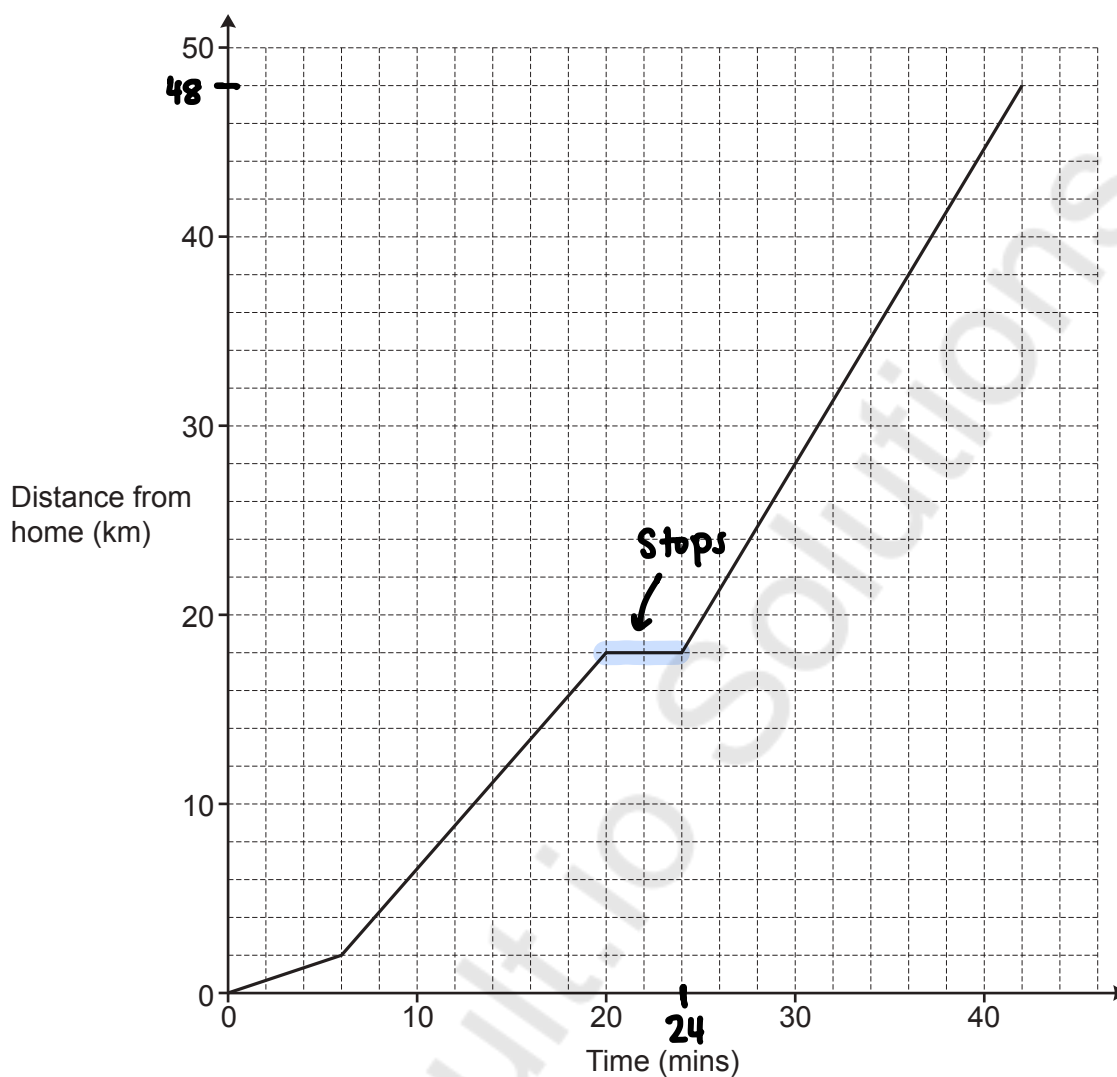
The 'C' team manager says

The pie charts show that the 'C' team won more games than the 'B' team.

Referring to the pie charts, explain why the 'C' team manager may not be correct.

The pie charts do not show how many matches were played by each team [1]

- 19 The graph shows Taylor's journey from home to an airport. During the journey Taylor stops for petrol.



- (a) For how long did Taylor stop for petrol?

(a) 4 mins [1]

- (b) Taylor drives the same route back home from the airport at an average speed of 45 km/h. Taylor leaves the airport at 22:00.

Work out the time when Taylor arrives home.

$$\frac{D}{S} = T \quad T = \frac{D}{S}$$

$$D = 48 \text{ km}$$

$$S = 45 \text{ km/h}$$

$$T = \frac{48}{45} = 1.0\dot{6} \text{ h}$$

$$0.0\dot{6} \text{ h} \times 60 = 4 \text{ mins}$$

$$1 \text{ h } 4 \text{ mins}$$

(b) 23:04 [4]

- 20 (a) Write an expression for the weight, in grams, of an object weighing x kilograms.

$$1 \text{ kg} = 1000 \text{ g}$$

$\xrightarrow{\times 1000}$

(a) $1000x$ g [1]

- (b) Write an expression for the area, in m^2 , of a garden of area $y \text{ cm}^2$.

$$x \text{ kg} = 1000x \text{ g}$$

$$\text{cm}^2 \xrightarrow{\div 10,000} \text{m}^2$$

$$y \text{ cm}^2 \div 10000 = \frac{y}{10,000} \text{ m}^2$$

(b) $\frac{y}{10,000}$ m^2 [1]

- 21 (a) A student is using trigonometry to work out an angle, B , in a right-angled triangle.

They tell the teacher that $\sin B = \frac{5}{4}$.

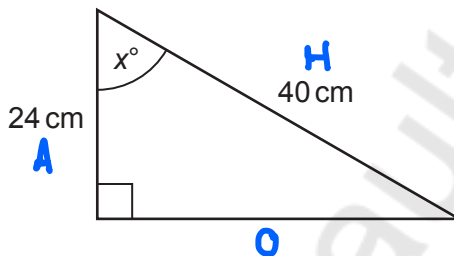
$$\frac{5}{4} = 1.25$$

Explain why this student must be wrong.



..... Sin must be less than or equal to 1 [1]

- (b) Here is a right-angled triangle.



Not to scale

SOH CAH TOA

$$\cos \theta = \frac{A}{H}$$

Work out the value of x .

$$\cos x = \frac{24}{40}$$

$$x = \cos^{-1} \left(\frac{24}{40} \right)$$

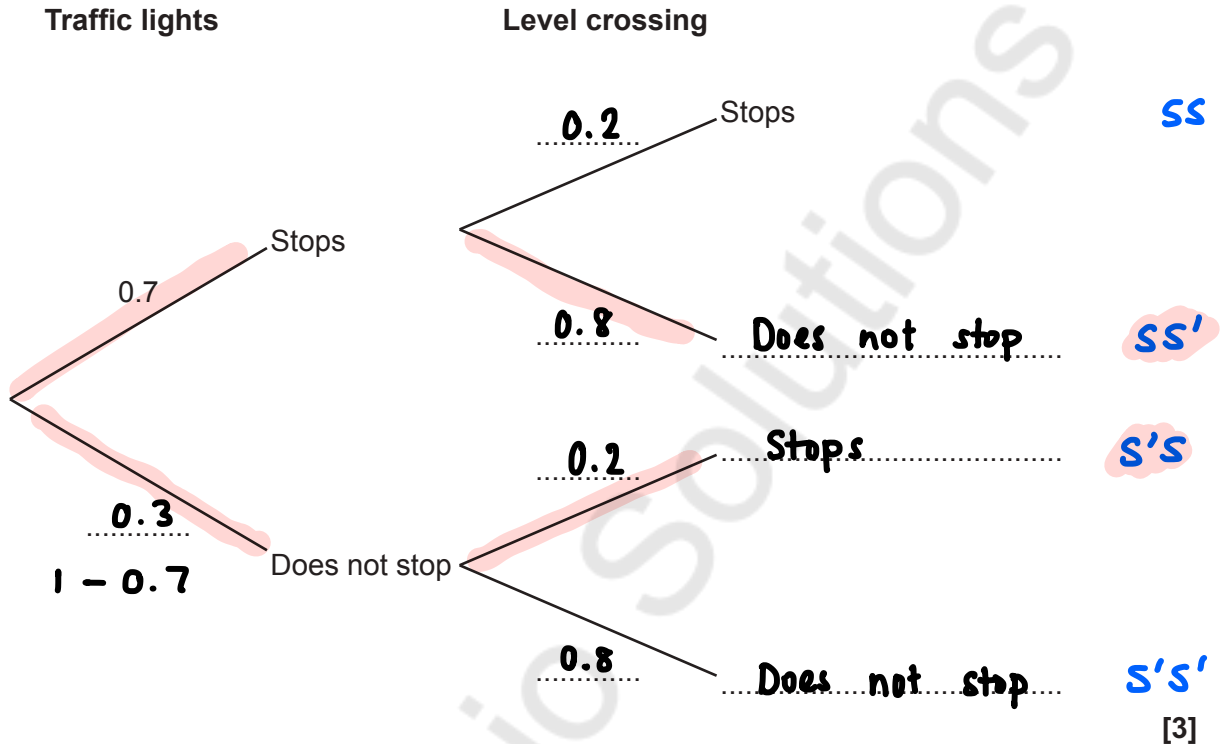
$$= 53.13010235$$

$$\approx 53.1$$

$x =$ 53.1 [3]

- 22 On a bus route there is a set of traffic lights and a level crossing.
The probability that the bus stops at the traffic lights is 0.7.
The probability that the bus stops at the level crossing is 0.2.

(a) Use the information to complete the tree diagram.



- (b) Find the probability that the bus stops at either the traffic lights or at the level crossing but not both.

$$p(SS') + p(S'S)$$

$$(0.7 \times 0.8) + (0.3 \times 0.2)$$

$$0.56 + 0.06 = 0.62$$

(b) 0.62 [3]

- 23 (a) The measurements, in centimetres, of two triangles are shown in the table.

	Side 1	Side 2	Side 3
Triangle 1	2.5	3.2	4
Triangle 2	7	8.96	11.2

Are the two triangles mathematically similar?
Show how you decide.

Side 1

$$SF = \frac{7}{2.5} = 2.8$$

Side 2

$$SF = \frac{8.96}{3.2} = 2.8$$

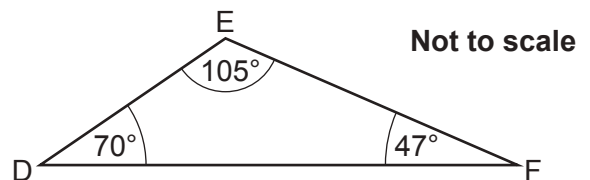
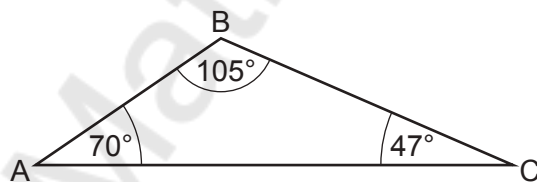
Side 3

$$SF = \frac{11.2}{4} = 2.8$$

Yes because the scale factors are the same.

[3]

- (b) Are these two triangles definitely congruent?
Give a reason.



No because the lengths of the sides is not known.

[1]

- 24 $\begin{matrix} c & & p & & 20 \\ & & & & \times 100 \\ 2 \text{ kg of carrots and 5 kg of potatoes cost } \text{£}6.36. & \longrightarrow & 636 \text{ p} \\ 3 \text{ kg of carrots and 2 kg of potatoes cost } \text{£}5.25. & \longrightarrow & 525 \text{ p} \end{matrix}$

Find the cost of 1 kg of carrots and the cost of 1 kg of potatoes.
You must show your working.

$$\begin{array}{rcl} 2c + 5p = 636 & \times 3 & 6c + 15p = 1908 \\ 3c + 2p = 525 & \times 2 & \underline{6c + 4p = 1050} \\ & & 11p = 858 \\ & & \div 11 \qquad \qquad \div 11 \\ & & p = 78 \text{ pence} \\ & & \xrightarrow{\div 100} \text{£}0.78 \end{array}$$

$$\begin{array}{rcl} 2c + 5p = 636 \\ 2c + 5(78) = 636 \\ 2c + 390 = 636 \\ \quad - 390 \quad - 390 \\ \hline 2c = 246 \\ \div 2 \qquad \qquad \div 2 \\ c = 123 \xrightarrow{\div 100} \text{£}1.23 \end{array}$$

1 kg of carrots cost £ 1.23.....

1 kg of potatoes cost £ 0.78.....

[5]

- 25 Riley and Sam are conducting surveys.
They are both given the same list of 12463 people from which to select their sample.

Riley selects every 56th person.

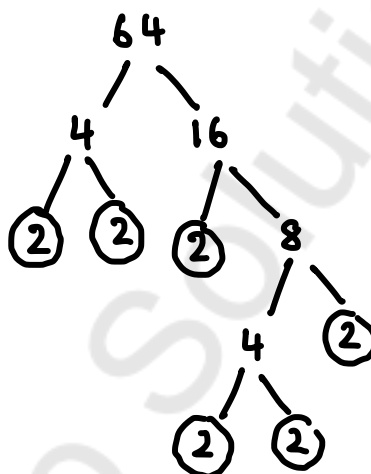
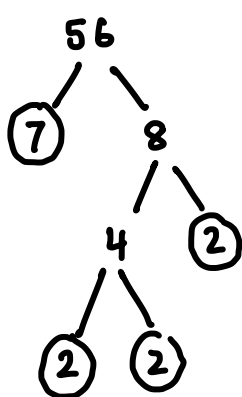
Sam selects every 64th person.

They both start counting from the first name in the list.

Work out how many people will be selected to be in both surveys.

You must show your working.

LCM of 56 and 64



$$56 = 2 \times 2 \times 2 \times 7$$

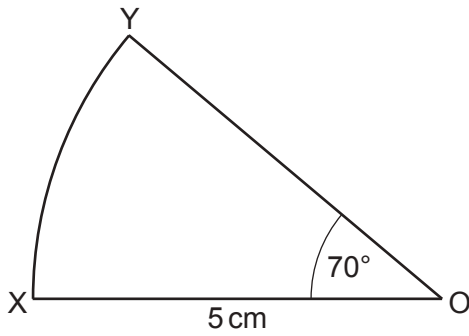
$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

$$\begin{aligned} \text{HCF} &= 2 \times 2 \times 2 \\ &= 8 \end{aligned}$$

$$\begin{aligned} \text{LCM} &= 8 \times 7 \times 2 \times 2 \times 2 \\ &= 448 \end{aligned}$$

$$\begin{aligned} 12463 \div 448 &= 27.8 \\ &\approx 27 \end{aligned}$$

26 XOY is a sector of a circle, centre O.



Not to scale

Show that the area of the sector is 15.3 cm^2 , correct to 3 significant figures.

[3]

$$\frac{\theta}{360} \times \pi r^2 \quad r = 5 \quad \theta = 70$$

$$\frac{70}{360} \times \pi (5)^2 = 15.27163095$$

$$\approx 15.3 \text{ cm}^2$$

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

The page contains a large area of lined paper for writing answers. A vertical solid line on the left side creates a margin. The rest of the page is filled with horizontal dotted lines. A large, light gray watermark reading "Mathvault.io Solutions" is oriented diagonally from the bottom-left towards the top-right across the entire page.

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