

Surname <i>StemUp Model Solution</i>	Centre Number	Candidate Number
First name(s)		0



GCSE

3300U30-1



A19-3300U30-1

MONDAY, 11 NOVEMBER 2019 – AFTERNOON

MATHEMATICS
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

1 hour 45 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.
A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the additional page at the back of the booklet. Question numbers must be given for all work written on the additional page.

Take π as 3.14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

In question **10**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

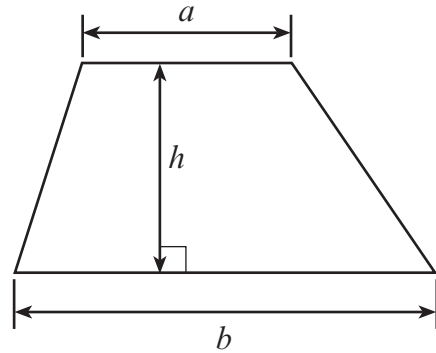
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	3	
2.	3	
3.	7	
4.	2	
5.	3	
6.	3	
7.	3	
8.	3	
9.	4	
10.	6	
11.	4	
12.	5	
13.	4	
14.	4	
15.	3	
16.	4	
17.	6	
18.	3	
19.	7	
20.	3	
Total	80	



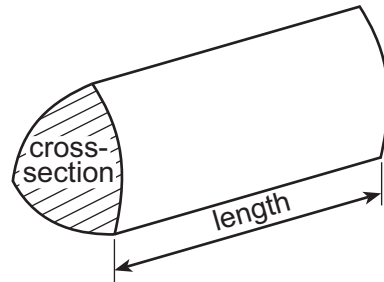
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Formula List – Intermediate Tier

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section $\times$ length



1. Complete each row of the following table.
The first row has been completed for you.

[3]

Place	Temperature at 10 a.m.	Change	Temperature at 6 p.m.
Cwmbran	2°C	Down 4°C	-2°C
Llanelli	-3°C	Down 1°C	-4°C
Llanidloes	-4°C	Up 3°C	-1°C
Porthmadog	-1°C	Up 4°C	3°C

2. Write 7%, $\frac{3}{5}$ and 0.3 in ascending order.

You must show all your working.

[3]

$$7\% = 0.07$$

$$\frac{3}{5} = \frac{6}{10} = 0.6$$

$$0.3 = 0.3 \quad \text{so} \quad 0.07 < 0.3 < 0.6$$

7%

0.3

 $\frac{3}{5}$

Smallest value



Greatest value



3. (a) Calculate the value of $3x + 4y$ when $x = -6$ and $y = 5$. [2]

$$3 \times (-6) + 4 \times 5$$

$$= -18 + 20 = 2$$

- (b) Simplify the expression $9g - 4f - 3g - 5f$. [2]

$$9g - 3g = 6g, \quad -4f - 5f = -9f$$

$$= 6g - 9f$$

- (c) Solve the equation $3m - 7 = 8$. [2]

$$3m = 8 + 7$$

$$3m = 15$$

$$m = 5$$

- (d) Expand $4(3x - 5)$. [1]

$$12x - 20$$



4. The mean of two numbers is 7.
The range of these two numbers is 8.

What are these two numbers?

[2]

$$\text{Sum of the two numbers} = 7 \times 2 = 14$$

$$\text{Difference (range)} = 8$$

$$\text{Smaller} = (14 - 8) \div 2 = 3, \quad \text{larger} = 3 + 8 = 11$$

$$\text{Check: } (3 + 11) \div 2 = 7, \quad 11 - 3 = 8$$

The numbers are

3

and

11

5.

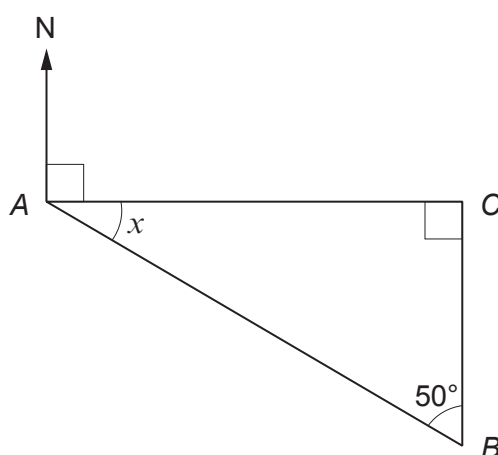


Diagram not drawn to scale

Calculate the size of angle x .
Hence, give the bearing of point B from point A .

[3]

$$x = 180^\circ - 90^\circ - 50^\circ \quad (\text{angles in a triangle})$$

$$x = 40^\circ$$

$$\text{Bearing} = 90^\circ + 40^\circ = 130^\circ$$

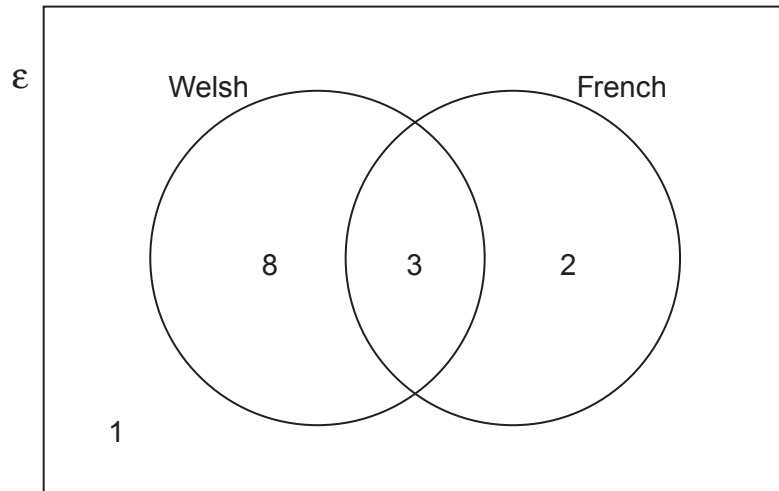
$$x = 40^\circ$$

$$\text{Bearing of point } B \text{ from point } A = 130^\circ$$



6. A group of pupils is asked whether they can speak Welsh, French, both languages, or neither language.

Their answers are shown in the Venn diagram below.
The universal set, $\mathcal{E}$, contains all the pupils in the group.



- (a) How many of the pupils cannot speak French?

[1]

$$8 + 1 = 9$$

- (b) One pupil from the group is chosen at random.
What is the probability that this pupil can speak both Welsh and French?

[2]

$$\text{Total} = 8 + 3 + 2 + 1 = 14$$

$$P(\text{both}) = \frac{3}{14}$$



7. Find the whole number which satisfies all of the following conditions:

- It is a whole number between 1 and 40 inclusive.
- The number is a multiple of 4 but not a multiple of 8.
- 3 is a factor of this number.
- The number is a square number.

[3]

Multiples of 4 up to 40: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40

Not multiples of 8: 4, 12, 20, 28, 36

3 is a factor: 12, 36

Square number: $36 = 6 \times 6$

The whole number is 36



8. (a) What is the total mass when 534 g is added to 3.5 kg?
Circle the correct answer.

[1]

4.034 g

4.034 kg

537.5 g

537.5 kg

884 g

$$534 \text{ g} = 0.534 \text{ kg}, \quad 0.534 + 3.5 = 4.034 \text{ kg}$$

- (b) What is the total length when 35 cm is added to 7.8 m?
Circle the correct answer.

[1]

113 cm

42.8 m

42.8 cm

815 cm

815 m

$$7.8 \text{ m} = 780 \text{ cm}, \quad 780 + 35 = 815 \text{ cm}$$

- (c) How many mm^3 are there in 4 cm^3 ?
Circle the correct answer.

[1]

0.4 mm^3 4 mm^3 40 mm^3 400 mm^3 4000 mm^3

$$1 \text{ cm}^3 = 10 \times 10 \times 10 = 1000 \text{ mm}^3, \quad 4 \times 1000 = 4000 \text{ mm}^3$$



9. (a) Express 60 out of 300 as a percentage. [2]

$$60 \div 300 \times 100$$

$$= 0.2 \times 100 = 20\%$$

Answer is 20 %

- (b) Some people were asked a question.

40% of the people answered 'Yes'.

A sketch of a pie chart showing this information is shown below.

Calculate the size of angle x so that the pie chart can be drawn accurately. [2]

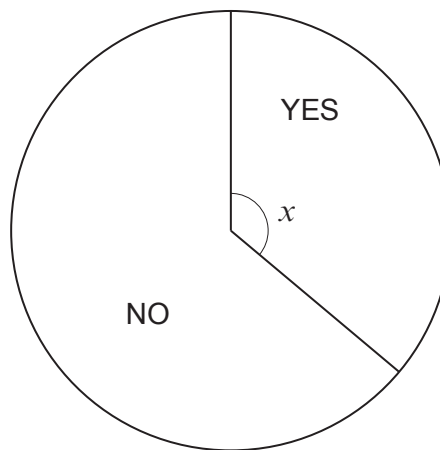


Diagram not drawn to scale

$$40\% \text{ of } 360^\circ = 0.4 \times 360^\circ$$

$$= 144^\circ$$

$$x = \dots\dots\dots 144 \dots\dots\dots^\circ$$



10. In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

The diagram below shows a rectangle $ABCF$ and a trapezium $CDEF$.
 $AF = 7\text{ cm}$, $ED = 8\text{ cm}$ and the perpendicular distance between FC and ED is 6 cm .
 The area of the rectangle $ABCF$ is 91 cm^2 .

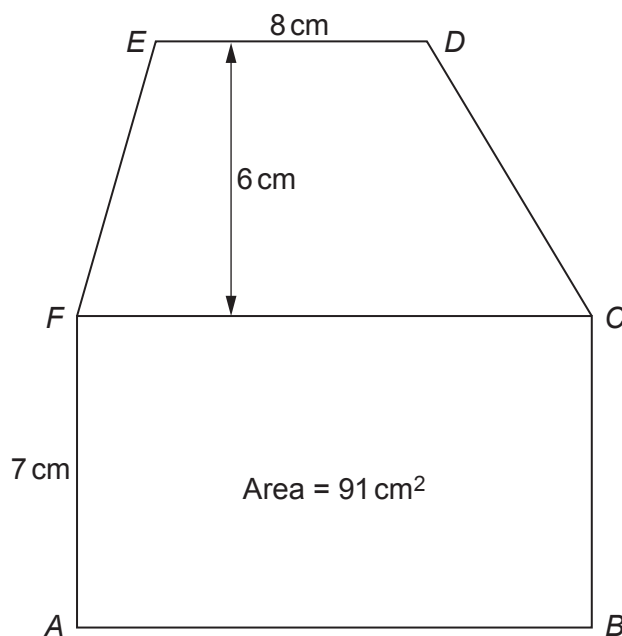


Diagram not drawn to scale

Calculate the area of the trapezium $CDEF$.
 You must show all your working.

[4 + 2 OCW]

$$\text{Area of rectangle } ABCF = AF \times FC$$

$$91 = 7 \times FC, \quad \text{so } FC = 91 \div 7 = 13\text{ cm}$$

The parallel sides of the trapezium are $FC = 13\text{ cm}$ and $ED = 8\text{ cm}$,
 and the perpendicular height is 6 cm .

$$\text{Area of trapezium} = \frac{1}{2}(a + b)h$$

$$= \frac{1}{2} \times (13 + 8) \times 6$$

$$= \frac{1}{2} \times 21 \times 6$$

$$= 21 \times 3$$

$$= 63\text{ cm}^2$$

The area of the trapezium $CDEF$ is 63 cm^2 .



11. 200 young people are taking part in a conference held at Aberystwyth.

(a) One of the young people is chosen at random to be the chairperson.

Complete the table below to find the probability that the person chosen lives outside the United Kingdom (UK). [2]

	North Wales	Mid Wales	South Wales	Elsewhere in the UK	Outside the UK
Probability	0.2	0.3	0.25	0.15	0.1

$$1 - (0.2 + 0.3 + 0.25 + 0.15)$$

$$= 1 - 0.9 = 0.1$$

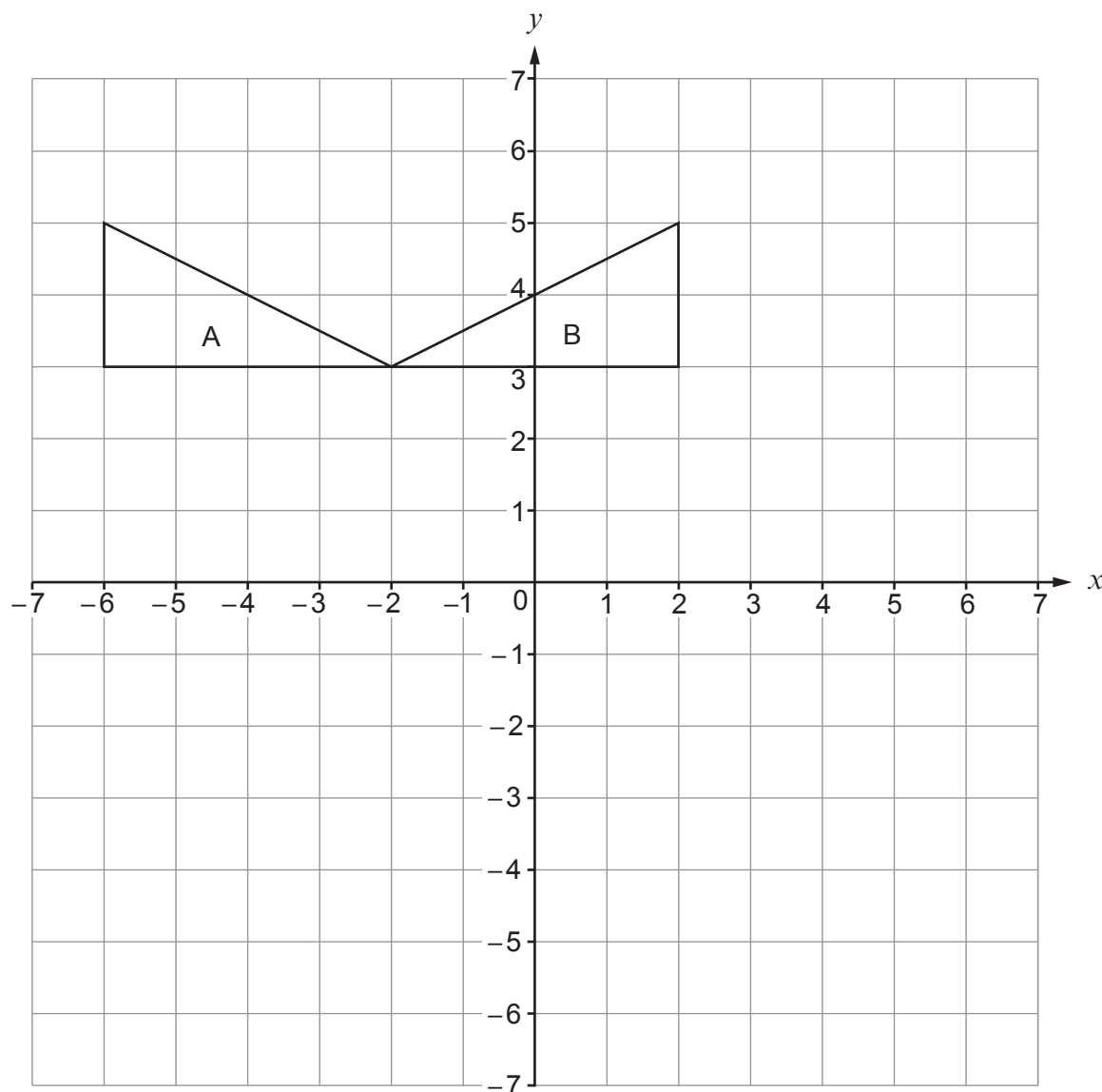
(b) How many of the 200 young people live in Mid Wales? [2]

$$0.3 \times 200$$

$$= 60 \text{ young people}$$



12. (a) Describe fully the single transformation that transforms triangle A onto triangle B. [2]

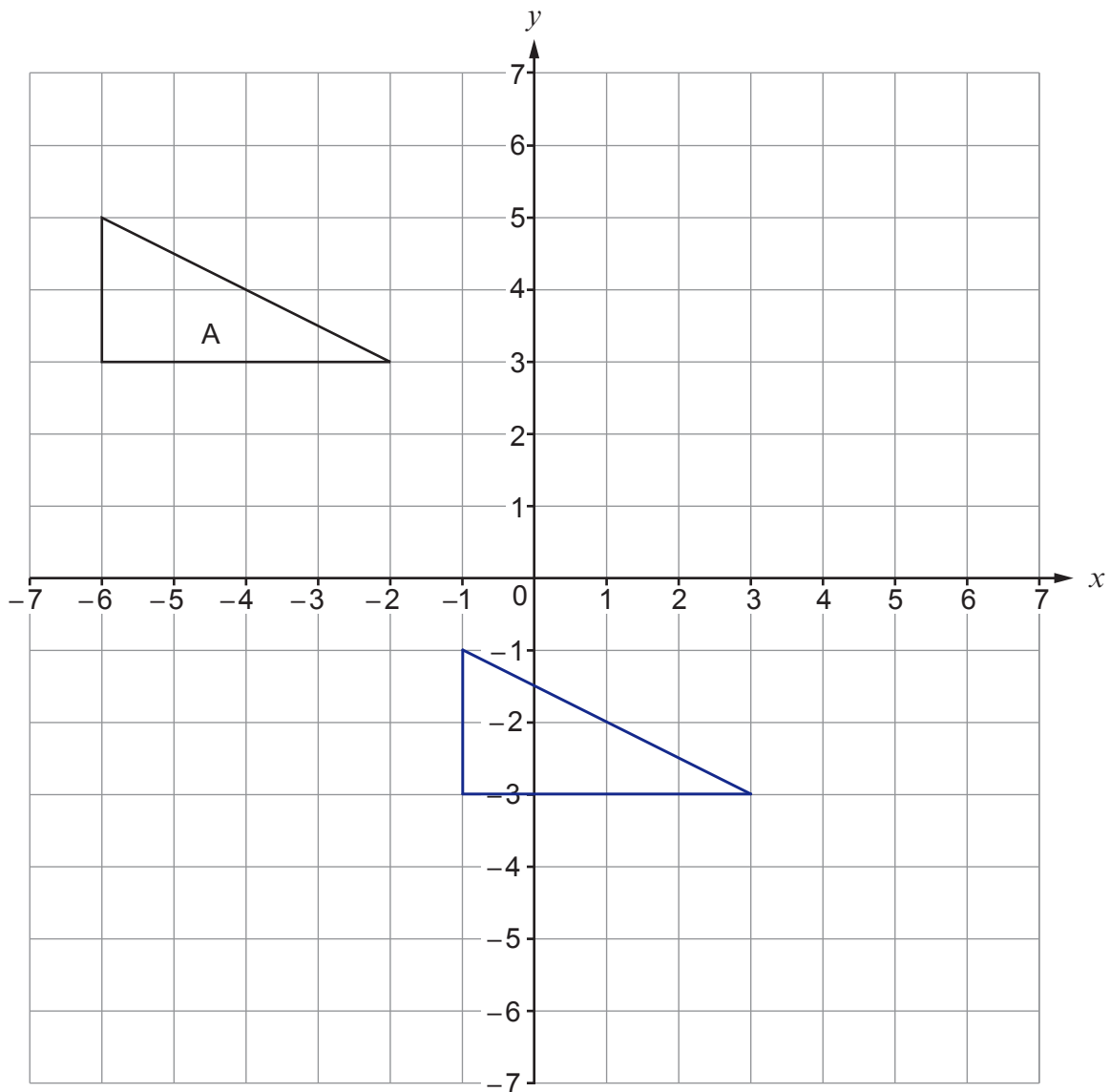


Reflection in the line $x = -2$



- (b) (i) Translate triangle A using the column vector $\begin{pmatrix} 5 \\ -6 \end{pmatrix}$.

[2]



- (ii) Write down the column vector that will reverse the translation in part (i).

[1]

$$\begin{pmatrix} -5 \\ 6 \end{pmatrix}$$



13. The exterior angle of a regular polygon is 36° .

(a) How many sides does the polygon have? [2]

$$\text{Number of sides} = 360^\circ \div 36^\circ$$

$$= 10$$

(b) Calculate the sum of all the interior angles of this regular polygon. [2]

$$\text{Sum} = (n - 2) \times 180^\circ$$

$$= (10 - 2) \times 180^\circ = 8 \times 180^\circ$$

$$= 1440^\circ$$

14. (a) Write down the first three terms of the sequence whose n th term is given by $n^2 - 6$. [2]

$$1^2 - 6 = -5, \quad 2^2 - 6 = -2, \quad 3^2 - 6 = 3$$

$$\text{1st term} = -5$$

$$\text{2nd term} = -2$$

$$\text{3rd term} = 3$$

(b) Write down an expression for the n th term of the following sequence. [2]

5, 11, 17, 23, ...

$$\text{Difference} = 6, \text{ so } 6n: 6, 12, 18, 24; \quad 5 = 6 - 1$$

$$n\text{th term} = 6n - 1$$



15. Circle the correct answer for each of the following.

(a) $81 =$

[1]

3^3

9^3

9^4

18^2

3^4

$$3 \times 3 \times 3 \times 3 = 81$$

(b) $2 \cdot 1^5 =$

[1]

$32 \cdot 5$

$10 \cdot 5$

$40 \cdot 84101$

$30 \cdot 84101$

$32 \cdot 1$

$$2 \cdot 1^2 = 4 \cdot 1, \quad 2 \cdot 1^3 = 9 \cdot 261, \quad 2 \cdot 1^4 = 19 \cdot 4481, \quad 2 \cdot 1^5 = 40 \cdot 84101$$

(c) $(12 \cdot 96)^{\frac{1}{2}} =$

[1]

$6 \cdot 48$

$3 \cdot 6$

$4 \cdot 32$

$3 \cdot 3$

$2 \cdot 16$

$$\sqrt{12 \cdot 96} = 3 \cdot 6 \quad (3 \cdot 6 \times 3 \cdot 6 = 12 \cdot 96)$$

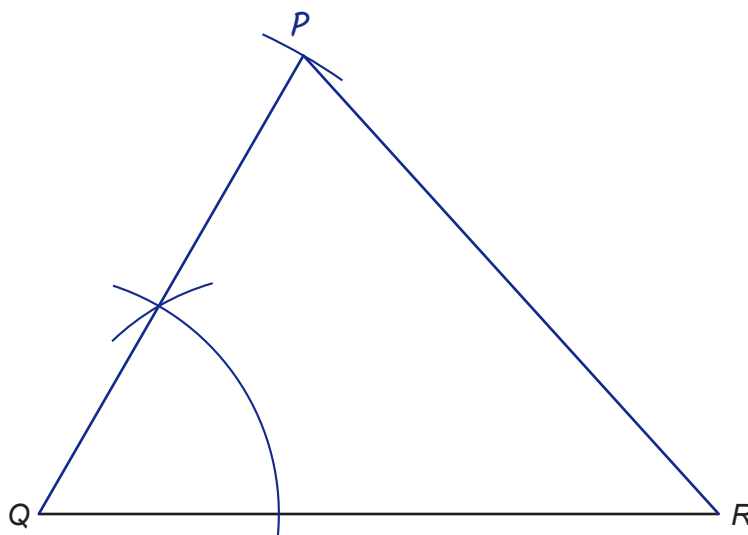


16. (a) Using only a ruler and a pair of compasses, construct a triangle PQR , so that it satisfies **both** of the following conditions:

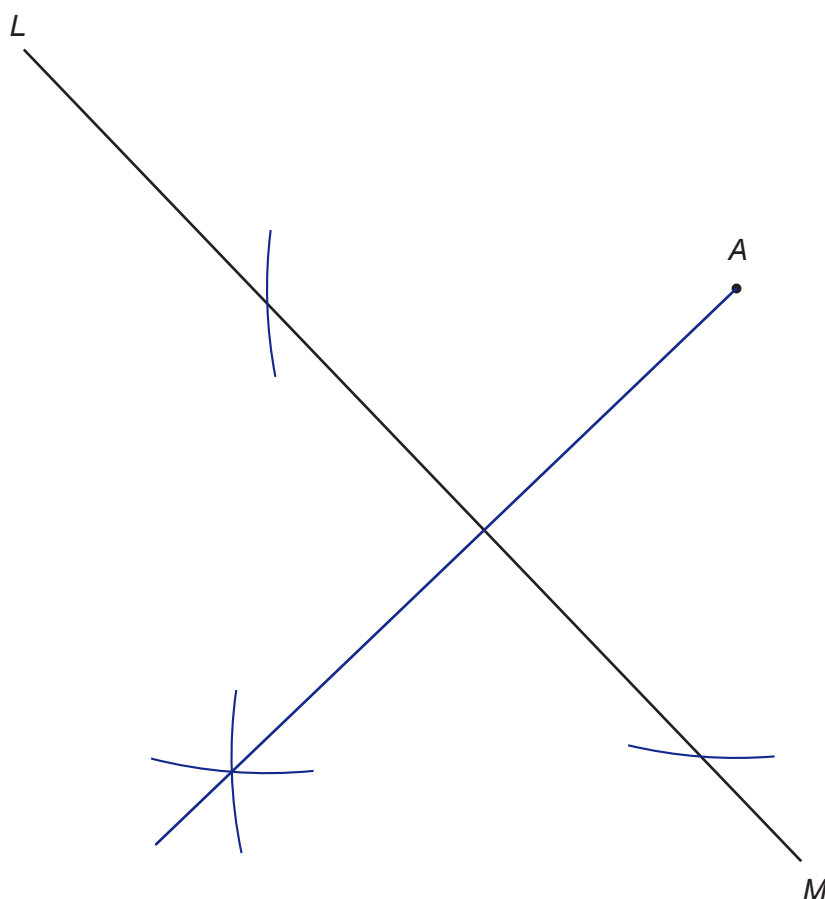
- $\hat{PQR} = 60^\circ$,
- $PQ = 7\text{ cm}$.

Side QR has been drawn for you.

[2]



- (b) Using only a ruler and a pair of compasses, construct a line from the point A that is perpendicular to the line LM . [2]



17. Dylan is having a weekend break in Wrexham.
The probability that he will visit *Erddig Gardens* is 0.7.
The probability of Dylan going to the *Bersham Heritage Centre* is independent of him visiting *Erddig Gardens*.

The probability that he visits *Erddig Gardens* **and** goes to the *Bersham Heritage Centre* is 0.28.

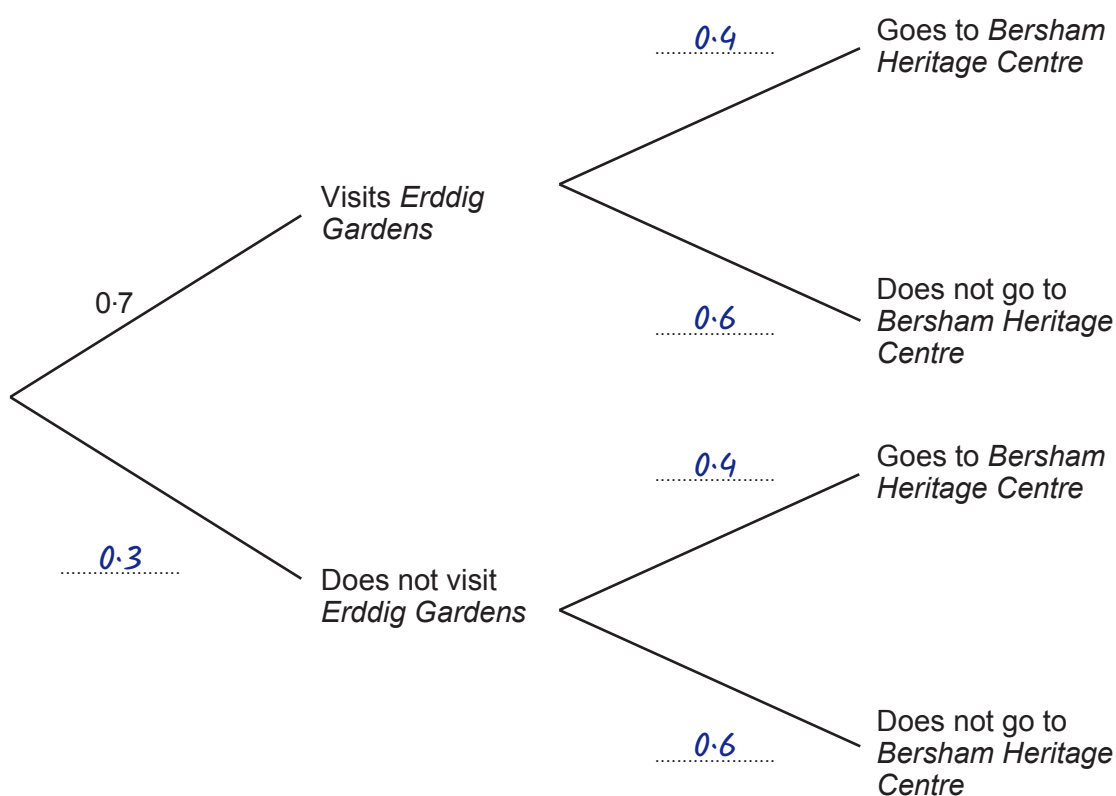
- (a) Complete the following tree diagram.

[4]

$$P(\text{does not visit Erddig}) = 1 - 0.7 = 0.3$$

$$0.7 \times P(\text{Bersham}) = 0.28, \text{ so } P(\text{Bersham}) = 0.28 \div 0.7 = 0.4$$

$$P(\text{does not go to Bersham}) = 1 - 0.4 = 0.6$$



- (b) Calculate the probability that Dylan visits *Erddig Gardens* but does not go to the *Bersham Heritage Centre*. [2]

$$P(\text{visits Erddig and not Bersham}) = 0.7 \times 0.6$$

$$= 0.42$$



18. In the following formulae, each measurement of length is represented by a letter.

Consider the dimensions implied by the formulae.

For each case, write down whether the formula could be for a **length**, an **area**, a **volume** or **none of these**.

The first one has been done for you.

[3]

<u>Formula</u>	<u>Formula could be for</u>
$3 \cdot 14 r^2 - dw$	area
$w^3 + r^2 d$	<i>volume</i>
$3w + 2d + h$	<i>length</i>
$dhr + 5d^3$	<i>volume</i>
$4d + \pi r^2$	<i>none of these</i>
$\frac{dwh}{r}$	<i>area</i>



19. (a) Factorise $x^2 + 4x - 21$. Hence, solve $x^2 + 4x - 21 = 0$.

[3]

$$x^2 + 4x - 21 = (x + 7)(x - 3)$$

$$(x + 7)(x - 3) = 0$$

$$x + 7 = 0 \text{ or } x - 3 = 0$$

$$x = -7 \text{ or } x = 3$$

- (b) Solve the equation $\frac{2x-3}{5} + \frac{4x+5}{2} = \frac{11}{2}$.

[4]

Multiply every term by 10:

$$2(2x - 3) + 5(4x + 5) = 55$$

$$4x - 6 + 20x + 25 = 55$$

$$24x + 19 = 55$$

$$24x = 36$$

$$x = \frac{36}{24} = 1.5$$



20. A cuboid has dimensions of 40 mm, 25 mm and 12 mm.
All of these measurements are correct to the nearest mm.

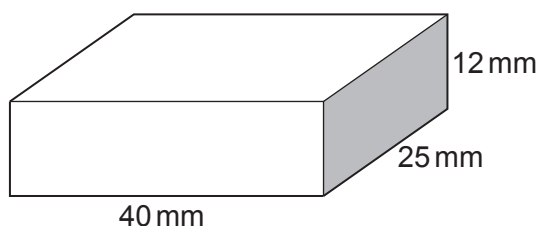


Diagram not drawn to scale

Four of these cuboids are stacked together as shown below.

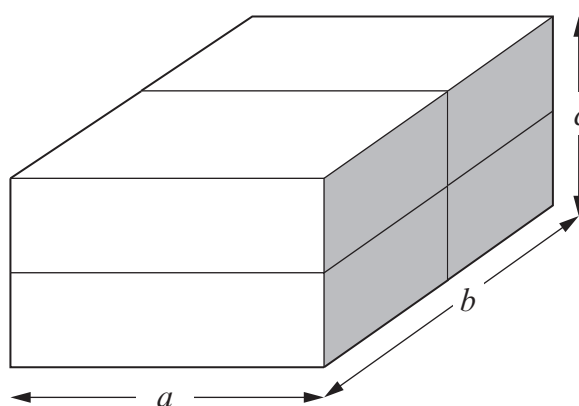


Diagram not drawn to scale

- (a) Write down the **greatest** possible value of length a .
Give your answer in mm.

[1]

$$40 + 0.5 = 40.5 \text{ mm}$$

- (b) Calculate the **greatest** possible value of length b .
Give your answer in mm.

[1]

$$\text{Greatest value of 25 mm is } 25.5 \text{ mm}$$

$$b = 25.5 + 25.5 = 51 \text{ mm}$$

- (c) Calculate the **least** possible value of length c .
Give your answer in mm.

[1]

$$\text{Least value of 12 mm is } 11.5 \text{ mm}$$

$$c = 11.5 + 11.5 = 23 \text{ mm}$$



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