Surname	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	3
2.	3	6
3.	7	13
4.	2	15
5.	3	18
6.	3	21
7.	3	24
8.	3	27
9.	4	31
10.	6	37
11.	4	41
12.	5	
13.	4	
14.	4	
15.	3	
16.	4	
17.	6	
18.	3	
19.	7	
20.	3	
Total	80	

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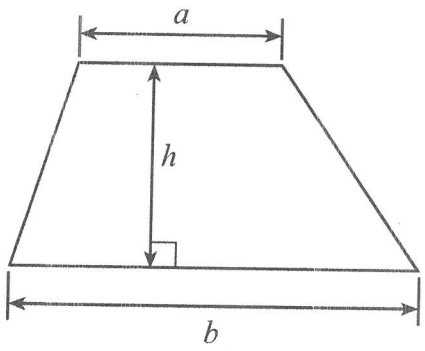
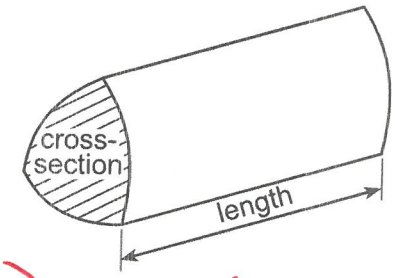
Formula List – Intermediate Tier

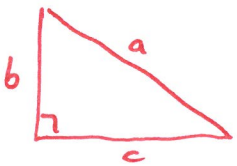
Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



SOH CAH TOA

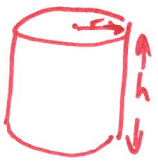


$a^2 = b^2 + c^2$

Area $\Delta = \frac{1}{2} \times$ base $\times$ height

$A = \pi r^2$

$C = 2\pi r$



$V = \pi r^2 \times h$

8 km ≈ 5 miles

1 litre ≈ 1.75 pints

1 kg ≈ 2.2 lb

1 litres = $1000\,cm^3$

MVD DST

Pop Density = $\frac{\text{Pop}}{\text{Area}}$

15 mins = $\frac{1}{4}$ hr = 0.25

30 min = $\frac{1}{2}$ hr = 0.5

45 min = $\frac{3}{4}$ hr = 0.75

Examiner only

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

B1 B1 B1

2. Write 7%, $\frac{3}{5}$ and 0·3 in ascending order.

You must show all your working. [3]

7% = 0·07

0·3 = 0·30

$\frac{3}{5}$ = 0·60

$5\overline{)3.0}$ = 0·6

B2

7% 0·3 $\frac{3}{5}$

B1

Smallest value ⟶ Greatest value

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Examiner only

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

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

$= -18 + 20$

$= 2$

B1 B1

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

$6g - 9f$

B1 B1

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

$+7 \quad +7$

$3m = 15$

$\div 3 \quad \div 3$

$1m = 5$

B1 B1

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

$12x - 20$

B1

Examiner only

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

What are these two numbers? [2]

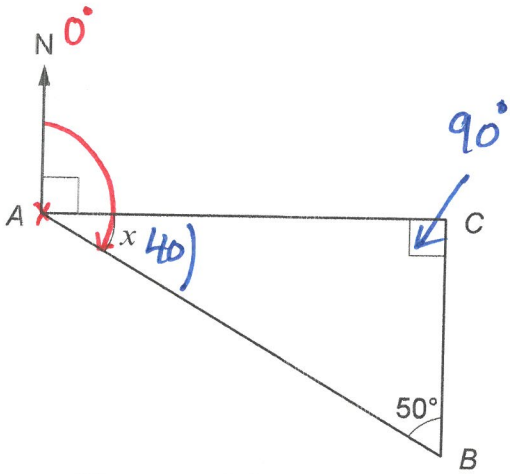
Mean = Total / Count ⇒ Total = 7×2 = 14

So need two numbers that add to 14 and have a difference of 8

B2

The numbers are **3** and **11**

5.



90 + 40 = 130

90 + 50 = 140

Diagram not drawn to scale

Calculate the size of angle x.
Hence, give the bearing of point B from point A. [3]

$x = 180 - 140$

$= 40$

M1

A1

$x =$ **40** ° Bearing of point B from point $A =$ **130** °

B1

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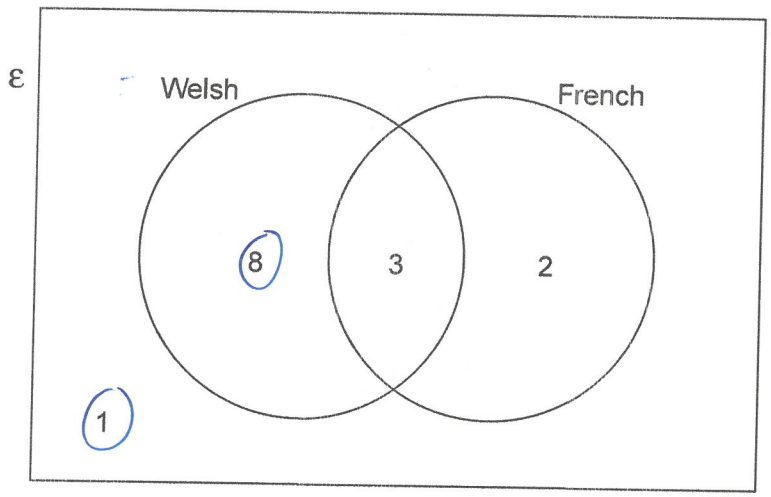
6. A group of pupils is asked whether they can speak Welsh, French, both languages, or neither language.

Their answers are shown in the Venn diagram below.
The universal set, ε, contains all the pupils in the group.



(a) How many of the pupils cannot speak French? [1]

9 B1

(b) One pupil from the group is chosen at random.
What is the probability that this pupil can speak both Welsh and French? [2]

3/14 B1 B1

Examiner only

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]

1 4 9 16 25 36 49

The whole number is 36

B3

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Examiner only

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

3500 g
+ 534 g
4034 g = 4.034 kg
1

B1

(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

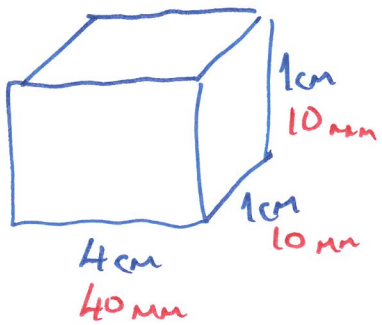
780 cm
+ 35 cm
815 cm
1

B1

(c) How many mm^3 are there in 4 cm^3? Volume
Circle the correct answer. [1]

0·4 mm^3 4 mm^3 40 mm^3 400 mm^3 (4000 mm^3)

B1



$V = 4 \times 1 \times 1 = 4\ cm^3$

$= 40 \times 10 \times 10 = 4000\ mm^3$

Examiner only

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

$\frac{60}{300} \times 100 = \frac{60\cancel{0}}{3\cancel{0}} = \frac{60}{3} = 20$ M1

A1

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]

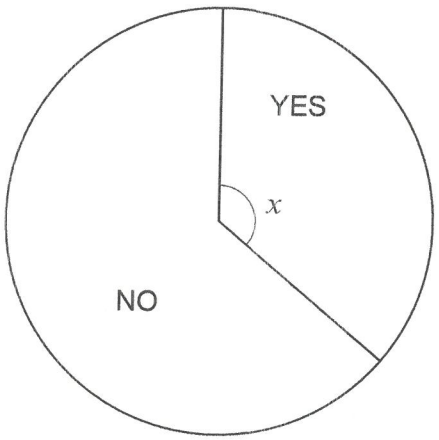


Diagram not drawn to scale

40% of 360° 10% of 360 = 36

× 4

144

÷ 2 M1

A1

x = 144 °

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Examiner only

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 cm, *ED* = 8 cm and the perpendicular distance between *FC* and *ED* is 6 cm.
The area of the rectangle *ABCF* is 91 cm^2.

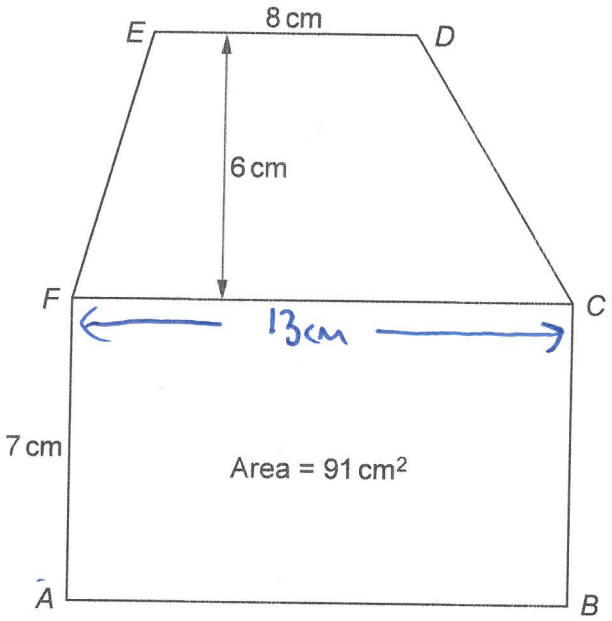

Diagram not drawn to scale

Calculate the area of the trapezium *CDEF*.
You must show all your working. [4 + 2 OCW]

For rectangle $7 \times FC = 91$ M1

$FC = 91 \div 7$

$FC = 13$ cm A1

$7 \overline{)91}$ 13

For Trapezium: Area $= \frac{1}{2}(8+13) \times 6$ M1

$= \frac{1}{2} \times 21 \times 6$ A1

$= 21 \times 3 = 63$ cm^2

OCW +1 org +1 units

Examiner only

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 − 0.9 M1

A1

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

0.3 × 200 = 60 M1

A1

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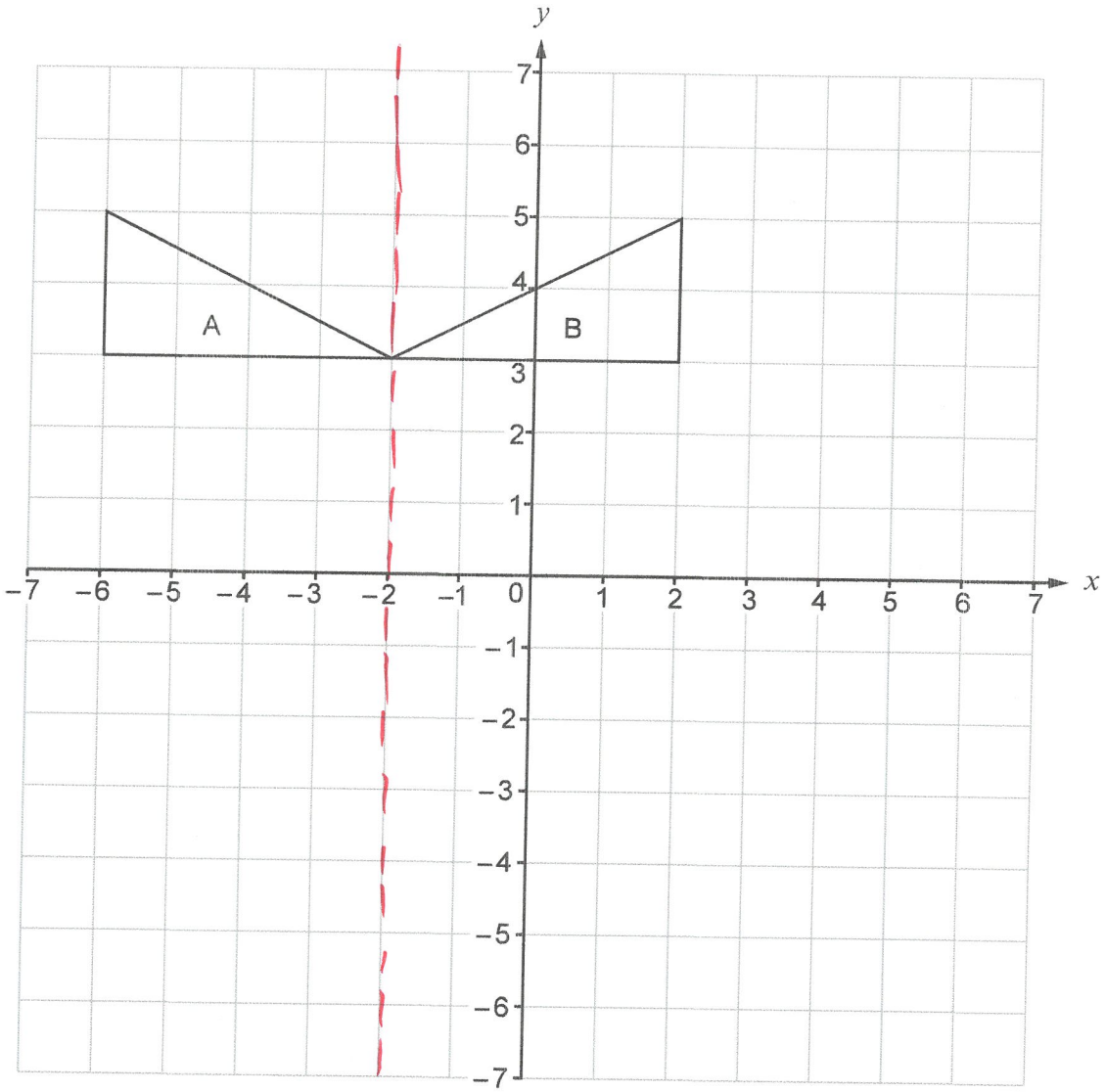
Examiner only

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

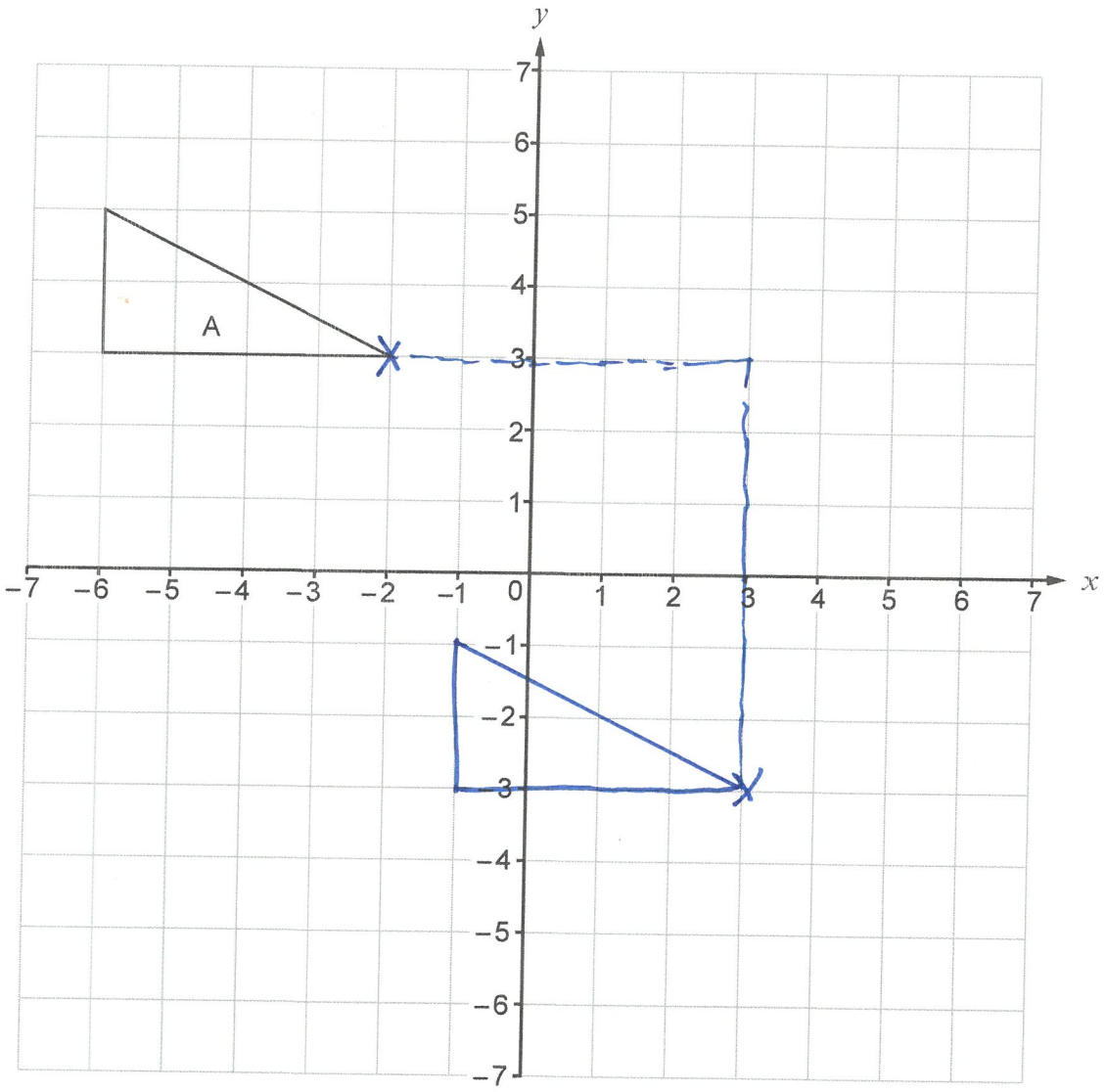


Reflection along the line $x = -2$ B1

B1

Examiner only

(b) (i) Translate triangle A using the column vector $\begin{pmatrix} 5 \\ -6 \end{pmatrix}$ → across 5 ↓ down 6 [2]



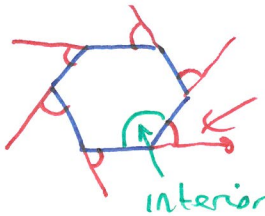
B1

B1

(ii) Write down the column vector that will reverse the translation in part (i). [1]

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

B1



Examiner only

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

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

360 ÷ 36 = 10 sides M1 A1

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

Interior angle = 180 − 36 = 144° M1

144° × 10 = 1440 A1

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

1st term: $1^2 - 6 = 1 - 6 = -5$ B1

2nd term: $2^2 - 6 = 4 - 6 = -2$ B1

3rd term: $3^2 - 6 = 9 - 6 = 3$

1st term = −5 2nd term = −2 3rd term = 3

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

5, 11, 17, 23, ...

+6 +6 +6 B1

$6n - 1$ B1

Examiner only

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

(a) $81 =$ [1]

3^3 9^3 9^4 18^2 3^4

B1

(b) $2{\cdot}1^5 =$ [1]

32·5 10·5 40·84101 30·84101 32·1

B1

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

6·48 3·6 4·32 3·3 2·16

B1

(a)

$3 \times 3 \times 3 = 27$

$\times 3$

81

2

$2 \times 2 \times 2 \times 2 \times 2 = 32$

$0{\cdot}1 \times 0{\cdot}1 \times 0{\cdot}1 \times 0{\cdot}1 \times 0{\cdot}1$

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

$9 \quad 16$

$\downarrow \quad \downarrow$

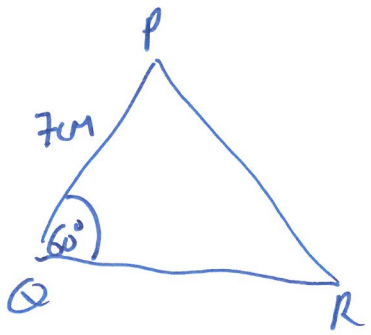
$3 \quad 4$

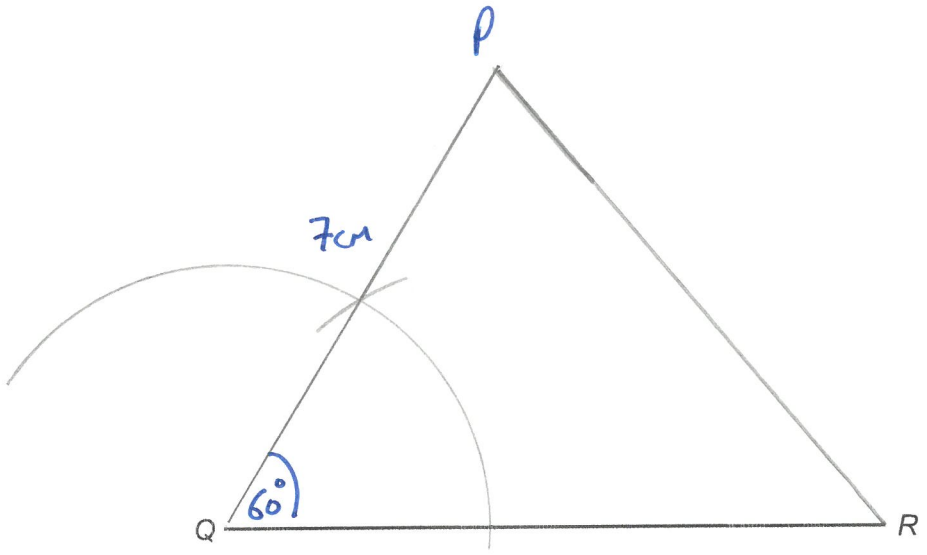
Examiner only

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

- $P\hat{Q}R = 60°$,
- $PQ = 7\,\text{cm}$.

Side QR has been drawn for you. [2]



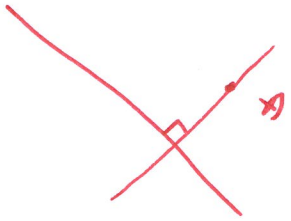


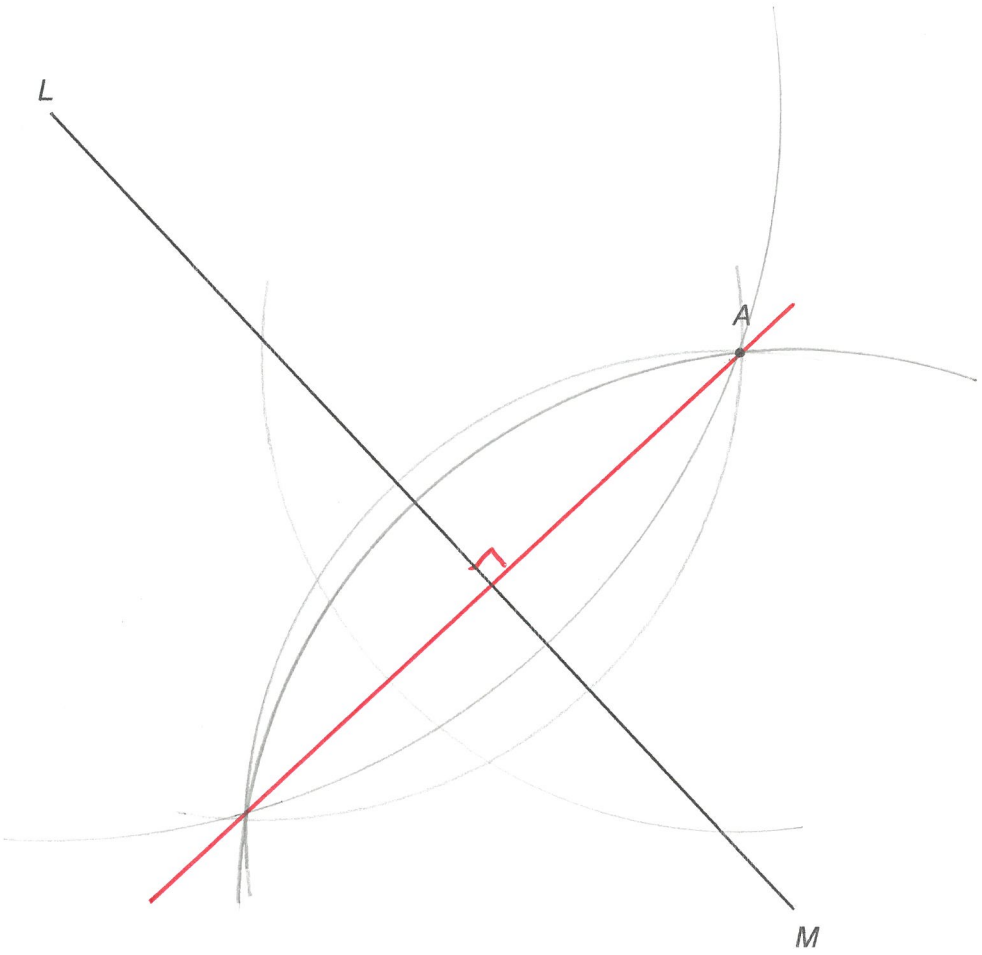
M1

A1

Examiner only

(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]





B2.

Examiner only

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*.

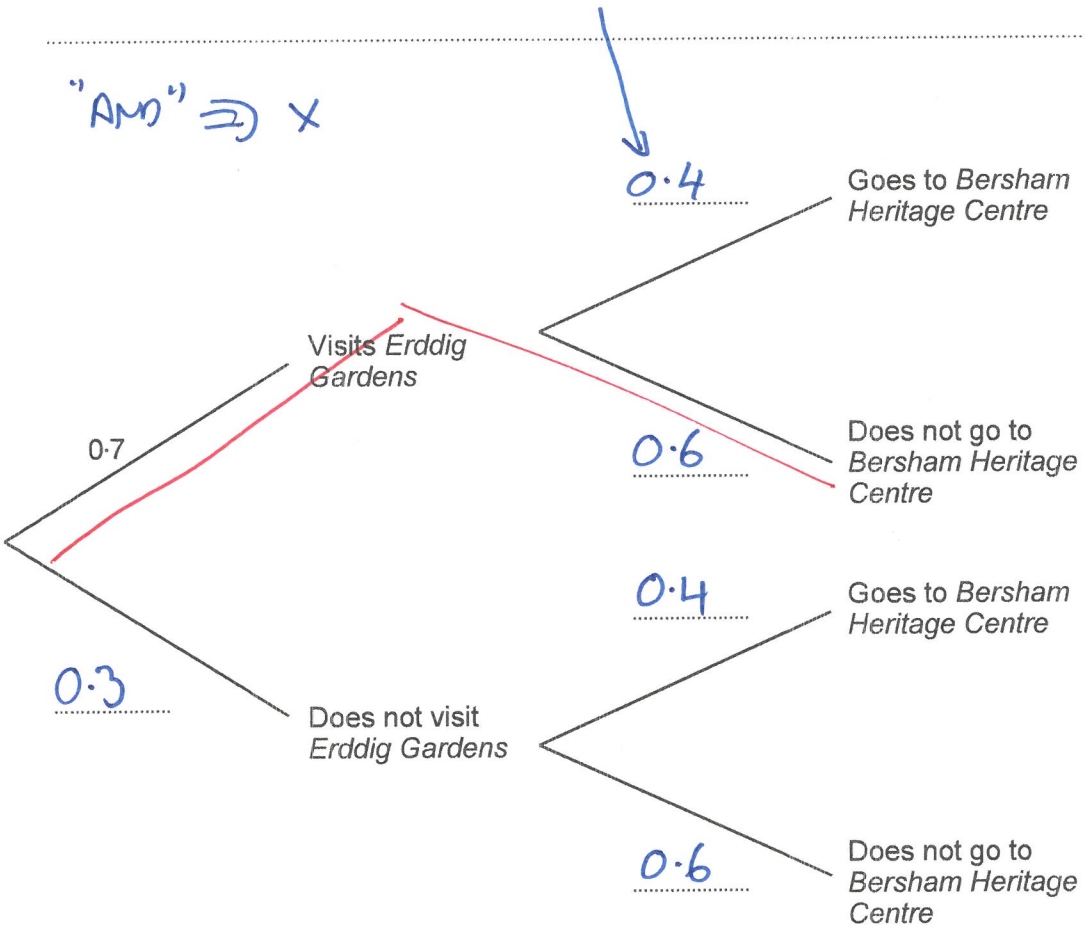
The probability that he visits *Erddig Gardens* **and** goes to the *Bersham Heritage Centre* is 0·28.

(a) Complete the following tree diagram. [4]

$0.7 \times ? = 0.28$ M1

A1

"AND" ⇒ ×



B1

B1

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

$0.7 \times 0.6 = 0.42$ M1

A1

DIMENSIONS.

Examiner only

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]

Formula	Formula could be for
~~$3.14r^2 - dw$~~	area
$w^3 + r^2d$	Volume
~~$3w + 2d + h$~~	length.
$dhr + 5d^3$	Volume
~~$4d + \pi r^2$~~	NONE
$\frac{dwh}{r}$	Area.

M | $M^2 - MM$
Area − Area = Area

$M^3 + M^2M$
$M^3 + M^3$

M + M + M = length

MMM + M^3
$M^3 + M^3$ = Volume

M + M^2
length + area

$\frac{MMM}{M}$ = MM
= M^2
= Area

QUADRATIC EQUATIONS

Examiner only

19. *(a)* Factorise $x^2 + 4x - 21$. Hence, solve $x^2 + 4x - 21 = 0$. [3]

$(x-3)(x+7)$ $\quad 1 \quad 21$ $\quad -3 \quad +7$ B2

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

either $x-3=0$ or $x+7=0$ B1

$x=3$ $\quad x=-7$

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

$\times 5 \times 2$

$\frac{5\times2(2x-3)}{5} + \frac{5\times2(4x+5)}{2} = \frac{5\times2(11)}{2}$ M1

$2(2x-3) + 5(4x+5) = 5(11)$

$4x - 6 + 20x + 25 = 55$ A1

$24x + 19 = 55$

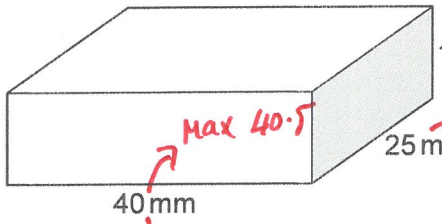
$24x = 55 - 19$

$24x = 36$ A1

$x = \frac{36}{24}$ A1

Examiner only

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



MIN 11.5mm
MAX 25.5
MAX 40.5
MIN 39.5

Diagram not drawn to scale

Four of these cuboids are stacked together as shown below.

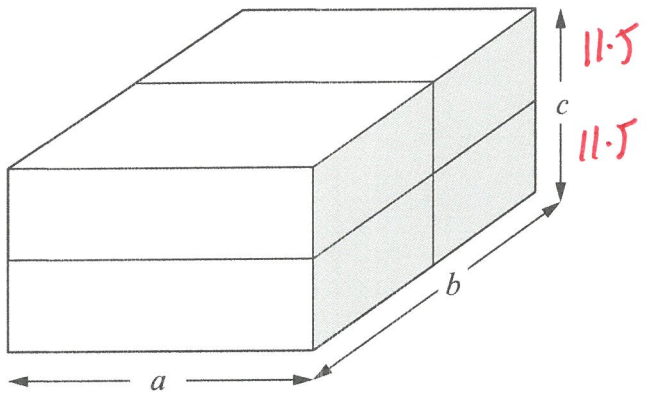


Diagram not drawn to scale

(a) Write down the **greatest** possible value of length a.
Give your answer in mm. [1]

40.5mm B1

(b) Calculate the **greatest** possible value of length b.
Give your answer in mm. [1]

25.5
+ 25.5
51.0 mm
1 1 B1

(c) Calculate the **least** possible value of length c.
Give your answer in mm. [1]

11.5
+ 11.5
23.0 mm
1 B1

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