Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

3300U20-1

A20-3300U20-1

WEDNESDAY, 11 NOVEMBER 2020 – MORNING

MATHEMATICS
UNIT 2: CALCULATOR-ALLOWED
FOUNDATION TIER

1 hour 30 minutes

ADDITIONAL MATERIALS

A calculator will be required for 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 or use the π button on your calculator.

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 **9**, 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.	**4**	
2.	**4**	
3.	**3**	
4.	**3**	
5.	**2**	
6.	**3**	
7.	**4**	
8.	**4**	
9.	**5**	
10.	**7**	
11.	**4**	
12.	**4**	
13.	**4**	
14.	**5**	
15.	**2**	
16.	**2**	
17.	**5**	
Total	**65**	

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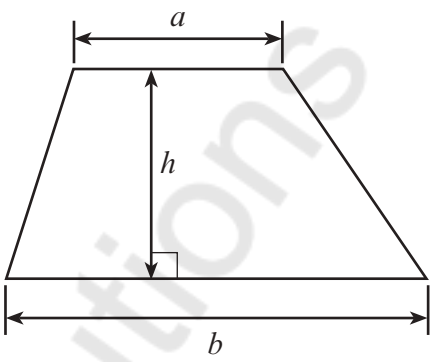
Formula List – Foundation Tier

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



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1. Fill in the boxes below to make each calculation correct. [4]

£1.63	+	£0.35 / 35p	=	£ 1.98
£1.73	+	0.53 p	=	£2.26
7	×	84p	=	£ 3.48
17	×	£ 0.41	=	£6.97

Space for working:

(a) £1.63 + £0.35 = £1.98

(b) £2.26 − £1.73 = £0.53

(c) 7 × 84P = 348P = 348/100 = £3.48

(d) 17 × £x / 17 = £6.97 / 17

£x = 0.41

CONVERSION

100 pence (P) = £1

35P = £x

100x/100 = 35/100

x = 0.35

35P = £0.35

£1.63 + £0.35 = £1.98

£1.73 + x P = £2.26

1.73 + x = 2.26

1.73 + x + (−1.73) = 2.26 + (−1.73)

x = 2.26 − 1.73

=

Examiner only

2. *(a)* Write the number three million, seven hundred thousand in figures. [1]

3,700,000

(b) In the boxes below, write the largest possible four-digit **even** number.
You may use digits more than once. [1]

9	9	9	8

(c) Write down all the factors of 15. [2]

1, 3, 5, 15

The factors of 15 are 1, 3, 5, 15

Examiner only

3. *(a)* Circle the best expression from those below to describe the chance of it snowing in Swansea on 1st May next year. [1]

impossible **unlikely** **an even chance** **likely** **certain**

Snow in May in Swansea is not Impossible But it's rare ↓ Unlikely

(b) Dyfrig has a bag containing identically-sized coloured balls.
There are ten black balls and ten green balls in the bag.

Dyfrig adds red balls to the bag. → Let red ball = $x = 20$

Now, when Dyfrig selects a ball at random, there is an even chance of selecting a red ball.

How many red balls did Dyfrig add to the bag? [1]

Total balls => 10 Black + 10 Green => 20 Balls

New Total balls => $T_{new} = 10 + 10 + x = 20 + x$

$\frac{x}{20+x} = \frac{1}{2} \rightarrow x = 20$

$P(R) = \frac{1}{2}$

$\frac{n(R)}{T_{new}} = \frac{1}{2}$

$\frac{x}{20+x} = \frac{1}{2}$ 2 3 5 1, 3, 5

$2x = 20 + x$

$2x - x = 20 + x - x$

$x = 20$ {1}

20 red balls

(c) A fair six-sided dice is rolled and a fair coin is thrown.
Which of the following events is least likely to occur?
Circle the correct answer. [1]

Rolling a 1 on the dice | Getting a head on the coin | Rolling an odd number on the dice | Getting a tail on the coin | Rolling a prime number on the dice

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Space for working:

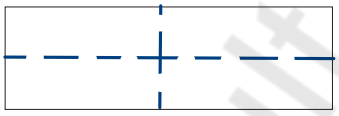
$P(\text{Rolling a 1}) = \frac{n(E)}{n(S)} = \frac{1}{6} = 0.2$

$P(\text{a head}) = \frac{n(E)}{n(S)} = \frac{1}{2} = 0.5$

$P(\text{odd no}) = \frac{3}{6} = \frac{1}{2} = 0.5$

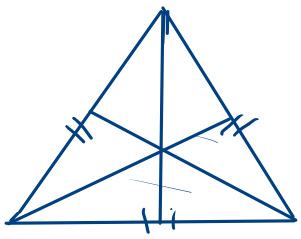
$P(\text{tail}) = \frac{3}{6} = \frac{1}{2} = 0.5$ $P(\text{prime no}) = \frac{3}{6} = 0.5$

4. *(a)* Draw all the lines of symmetry on the rectangle below. [2]



(b) What is the special name given to a triangle that has three lines of symmetry? [1]

EQUILATERAL Triangle



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5. In this question, you must complete the boxes using **only** the digits 0, 1 and 2.
In each part, you must use **all three** of the digits.

(a) Write the size of an angle which is an obtuse angle. [1]

1	2	0

°

$>90^\circ \quad < 180^\circ$

$90^\circ < \theta < 180^\circ$

110 150 120 130

(b) Write the size of an angle which is a reflex angle. [1]

2	1	0

°

$>180^\circ \quad < 360^\circ$

$180^\circ < \theta < 360^\circ$

210

6. Kate writes down three **different even** numbers.

The mean of Kate's numbers is 8.
She did **not** write down the number 8.

What possible even numbers could Kate have written down? [3]

Key facts → Kate wrote down 3 diff numbers ; → x, y, z

→ Mean of Kate's no is 8 → Mean = $\frac{\text{Sum of numbers}}{\text{no of item}} = \frac{x+y+z}{3}$

$\frac{x+y+z}{3} \neq \frac{8}{1}$ $\quad x+y+z = 24$

Possible even no around 8 include :

2, 4, 6, 8, 10, 12, 14, 16

x, y, z

4, 6, 14 $\quad$ 2, 10, 12 $\quad$ 2, 6, 16

Possible numbers Kate could have written are 2 , 10 and 12

Examiner only

7. *(a)* Calculate $\frac{\sqrt{0{\cdot}9216}}{8}$. [1]

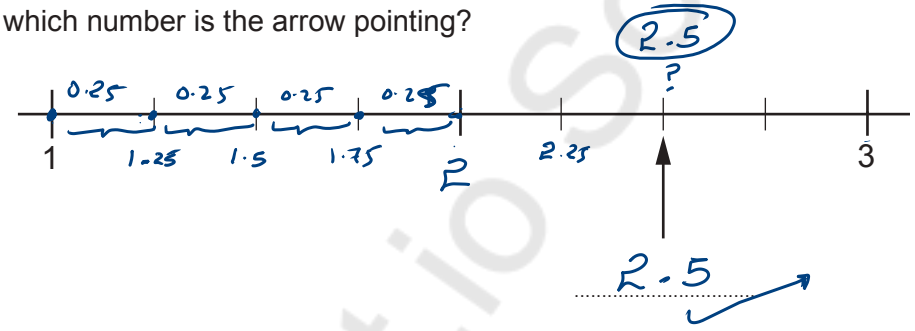
$\Rightarrow \frac{\sqrt{0{\cdot}9216}}{8} \Rightarrow \frac{0{\cdot}96}{8} \Rightarrow 0{\cdot}12$

(b) Calculate $\frac{3}{5}$ of 632.

Write your answer as a decimal. [2]

$= \frac{3}{5} \times \frac{632}{1} = \frac{1896}{5} = 379{\cdot}2$

(c) A number line is shown below.
To which number is the arrow pointing? [1]



2·5

8. Complete the table below so that each row will show equivalent fractions, decimals and percentages.
The first row has been completed for you. [4]

Fraction	Decimal	Percentage
$\frac{1}{4}$	0·25	25%
$\frac{3}{10}$	0·3	30%
$\frac{9}{20}$	0·45	45%

Examiner only

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

Two friends are making cuboids out of centimetre cubes.
Gareth's cuboid is shown below.

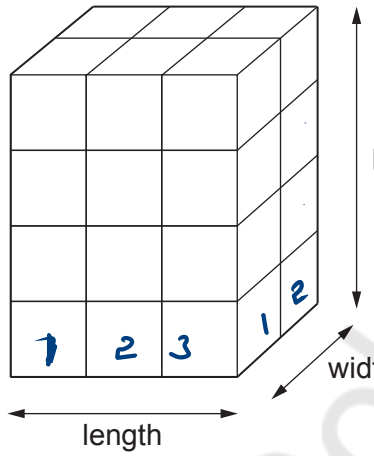


Diagram not drawn to scale

For Gareth's
$\Rightarrow L = 3$
$W = 2$
$H = 4$

For Ivy
$L = 3$
$W = 6 \times 2 = 12$
$H = 5 \times 4 = 20$

Ivy makes a different cuboid. Her cuboid has:

- the same length as Gareth's cuboid,
- a width six times the width of Gareth's cuboid,
- a height five times the height of Gareth's cuboid.

What is the volume of Ivy's cuboid?
You must show all your working.

[3 + 2 OCW]

By formula : $V = L \times W \times H$
$= 3 \times 12 \times 20$
$= 36 \times 20$
$= 720$

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10. *(a)* (i) Evaluate $\frac{1}{(0{\cdot}25)^2}$. [1]

$= \frac{1}{0.25^2} = \frac{1}{0.25 \times 0.25} = \frac{1}{0.0625} = 16$

$= \frac{1}{\left(\frac{1}{16}\right)} = 1 \div \left(\frac{1}{16}\right) = 1 \times \frac{16}{1} = 16$

(ii) Evaluate $5{\cdot}4^3 \times 3{\cdot}7^2$.
Give your answer correct to the nearest 10. [2]

$(5.4)^3 \times (3.7)^2 = (5.4 \times 5.4 \times 5.4) \times (3.7 \times 3.7)$

$= 157.464 \times 13.69 = 2155.682$

$= 2160 \qquad = 2160.000$

(b) Find 62% of 7·8. [2]

$62\% = 62 \times \frac{1}{100} \qquad 1\% = \frac{1}{100}$

$= \frac{62}{100} \times \frac{7.8}{1} = \frac{62 \times 7.8}{100} = \frac{483.6}{100} = 4.836$

(c) (i) Which one of the following numbers is a multiple of 19?
Circle your answer. [1]

91 151 199 219 **247**

$19 \times 1 = 19$
$19 \times 2 = 38$
$19 \times 13 = 247$

(ii) Which one of the following numbers is a cube number?
Circle your answer. [1]

1197 **2197** 3197 4197 5197

$13 \times 13 \times 13$

$\sqrt[3]{2197} = 13$

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11. *(a)* Write down the next two numbers in the following sequence. [2]

50 , 39 , 28 , 17 , 6 , −5

=> 17 − 11 = 6 ; 6 − 11 => −5

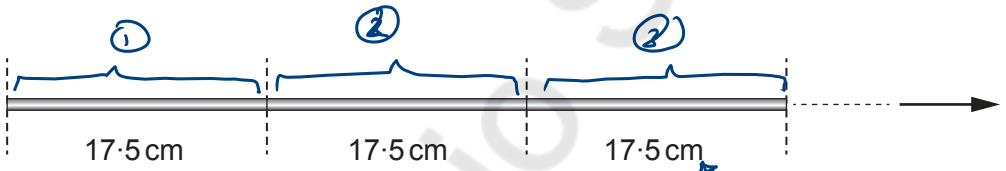
(b) Use the formula $x = 4a + 3b$ to find the value of x when $a = 7{\cdot}2$ and $b = -4{\cdot}6$. [2]

$x = 4a + 3b$

$x = 4(7.2) + 3(-4.6) = (4 \times 7.2) - (3 \times 4.6)$

$x = 28.8 - 13.8 = 15$

12. Identical rods can be placed end to end, as shown below.
Each rod is 17·5 cm long.



How many of these rods can be placed, in this way, between two points 4 metres apart? [4]

400 cm

Since 1 metre = 100 cm

4 metres = x

$x = 4 \times 100 = 400$ cm

To find how many 17·5 cm rods can fit into 400 cm

=> then we divide

=> $\frac{400}{17.5}$ => 22.857

Number of rods = 22

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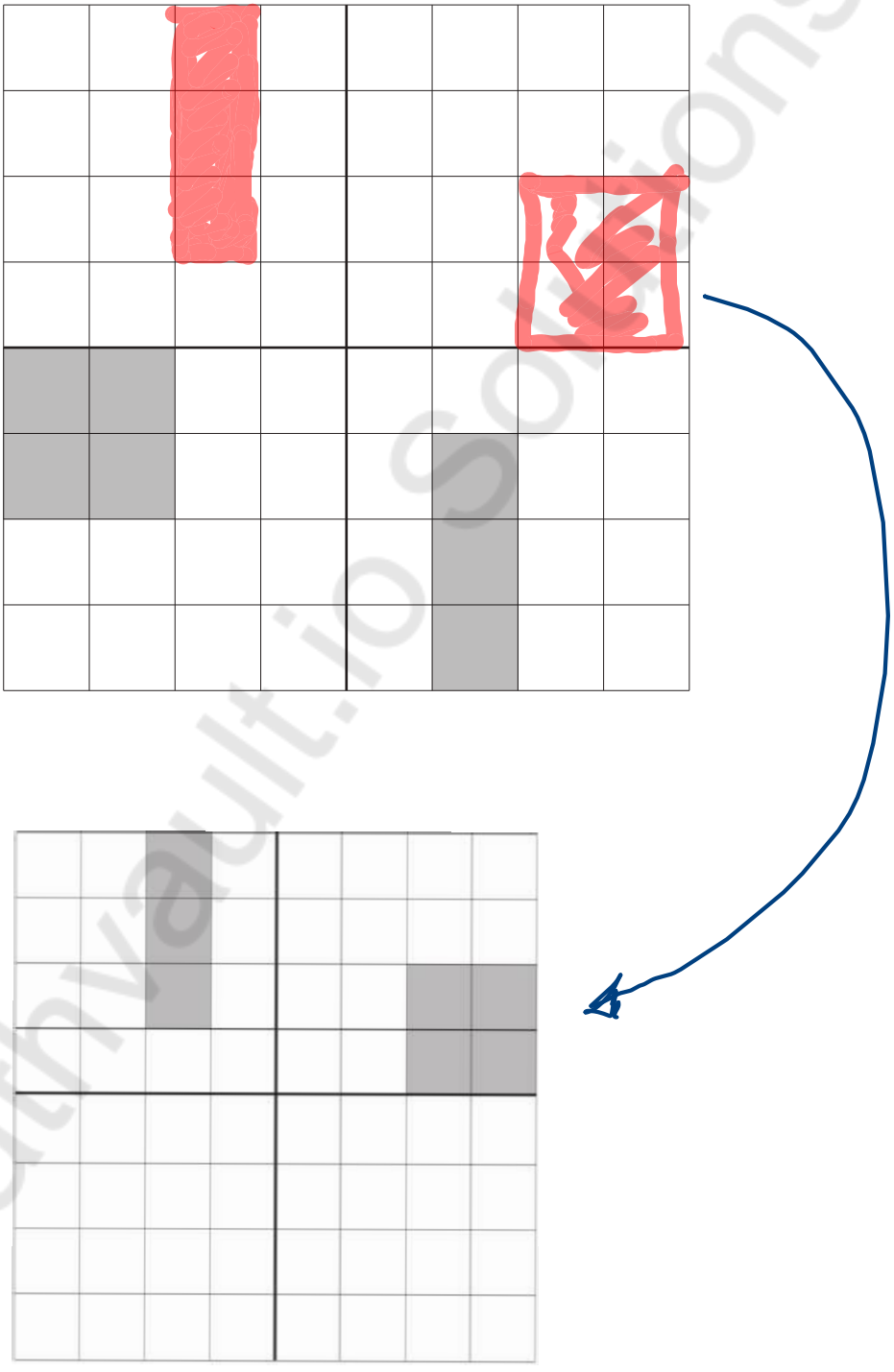
13. *(a)* Shade the least number of squares so that the grid has rotational symmetry of order 2. The squares you shade must be in the upper two quadrants. [2]



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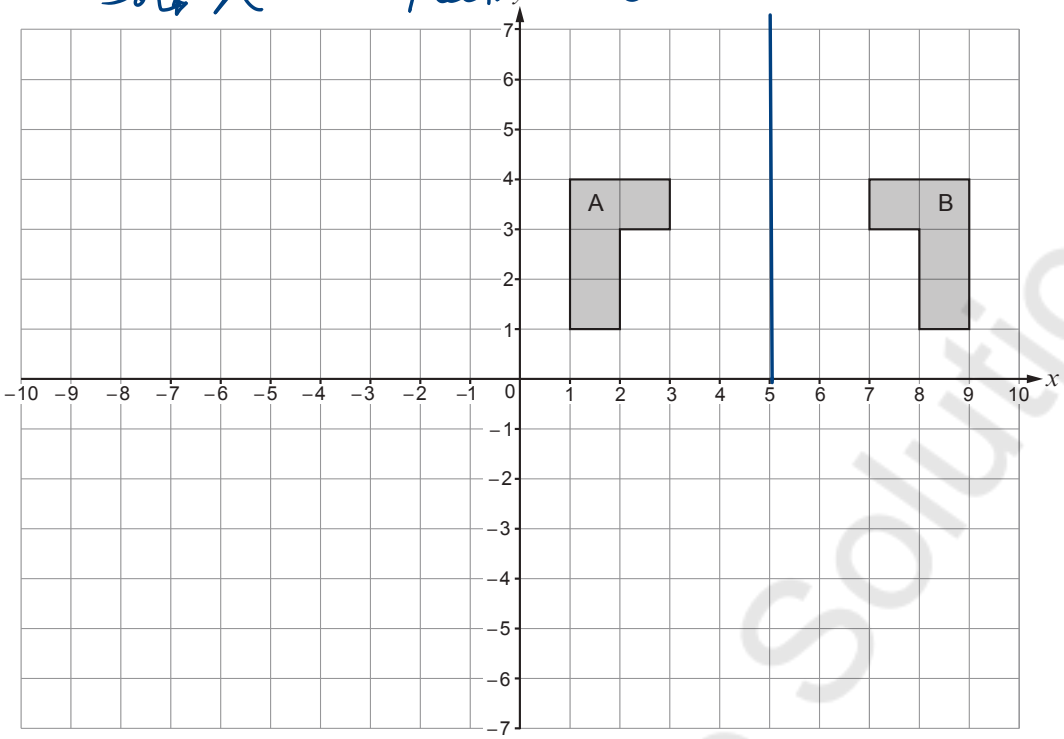
(b) Describe fully the **single** transformation that transforms shape A onto shape B. [2]

There's → A reflection at $x = 5$



* Rotational ✗
* Reflection ✓

* There's a Reflection at line $x = 5$

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14. *(a)* Solve $5(2x + 3) = 20$. [3]

$5(2x+3) = 20$

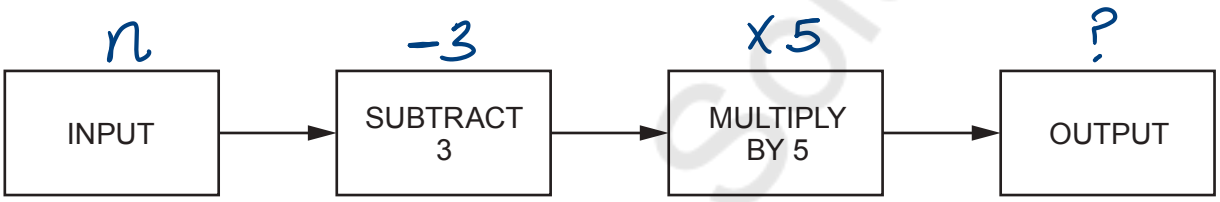
$10x + 15 = 20$

$10x + (-15) = 20 + (-15)$

$10x = 20 - 15 = 5$

$\frac{10x}{10} = \frac{5}{10} = \frac{1}{2}$ or 0.5

(b) A number machine is shown below.



Write down an expression for the OUTPUT when the INPUT is n. [2]

Let the Input $= n$

$(n - 3) \times 5 \Rightarrow 5(n-3)$

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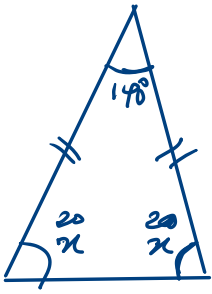
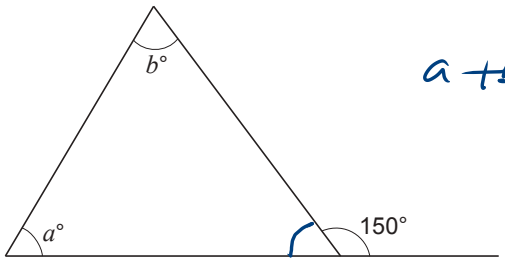


15. *(a)* Is it possible for an isosceles triangle to have an angle of 140°?
Circle your answer.
You **must** give an explanation for your answer. [1]

YES NO

It is possible to have an angle of 140° since the base angle of the isosceles △ are the same as 20°

(b)



$a + b = 150°$

Diagram not drawn to scale

Which of the following equations is correct for the diagram shown above?
Circle your answer. [1]

$a + b = 30$ $a + b = 210$ $b - a = 150$

$a - b = 150$ $a + b = 150$

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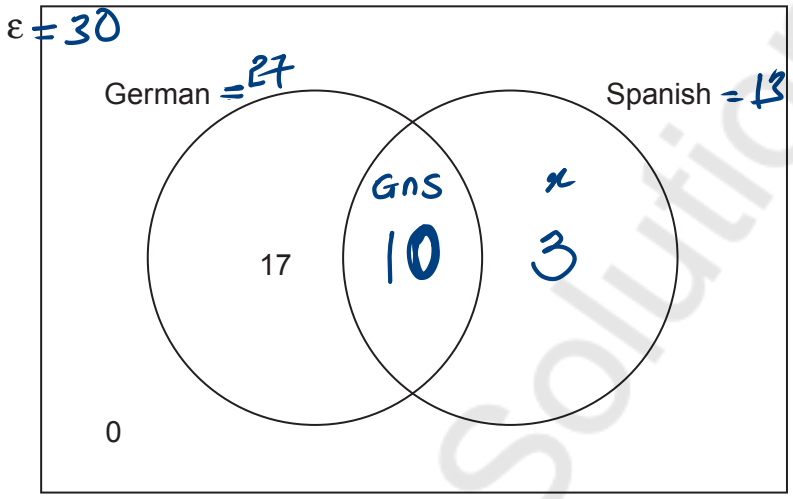
16. Each of 30 students studies German, Spanish or both languages.

A student is chosen at random.
The probability that the student studies both German and Spanish is $\frac{1}{3}$.

Complete the Venn diagram. [2]



Space for working:

$P(Gns) = \frac{1}{3}$

$n(Gns) = P(Gns) \times \varepsilon$

$= \frac{1}{3} \times 30$

$n(Gns) = 10$

$17 + 10 + x = 30$

$27 + x = 30$

$x = 30 - 27 = 3$

17. In the diagram below, *ABCD* is a rectangle with *AB* = 5 cm.
ABP is a quarter of a circle with centre *A*.
AP = *PD*.

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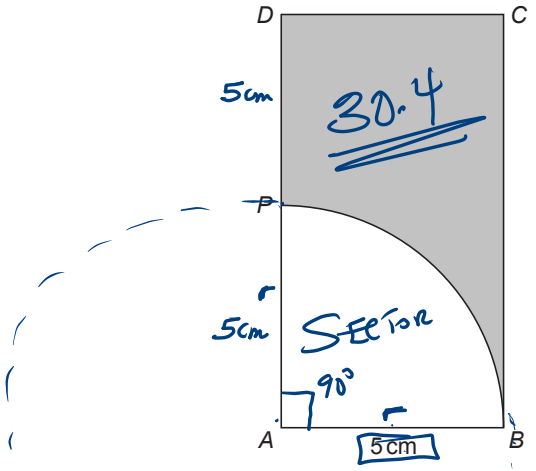

Diagram not drawn to scale

Since AP = PD
AP = radius = 5cm
AD = 5cm

Calculate the area of the shaded section shown above.
You must show all your working. [5]

Since AP = radius = 5 cm
⇒ then it follows that PD = 5 cm
⇒ |AD| = AP + PD = 5cm + 5cm = 10cm
AD = 10cm ; AB = 5cm
Length = AD = 10cm Width = AB = 5cm

Area of the Unshaded region = $\frac{\theta}{360°} \times \pi r^2$ ⇒ Sector ABP

$= \frac{90}{360} \times \pi \times 5^2 = \frac{1}{4} \times \pi \times 25 = \boxed{\frac{25\pi}{4}}$

Area of Rectangle ⇒ L × W ⇒ 10 × 5
⇒ 50 cm²

END OF PAPER

Area of the Shaded region = ?

A_{Shaded} ⇒ Area of Rectangle − $A_{Unshaded}$

$\pi = 3.142$

$= 50 - \frac{25\pi}{4}$

$\Rightarrow 50 - \frac{25 \times 3.14}{4} \Rightarrow 50 - \frac{78.5}{4} = 50 - 19.6$

$= \underline{30.4}$

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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