Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

C300UB0-1

S25-C300UB0-1-R2

WEDNESDAY, 4 JUNE 2025 – MORNING

MATHEMATICS – Component 2
Calculator-Allowed Mathematics
HIGHER TIER

2 hours 15 minutes

ADDITIONAL MATERIALS

An additional formulae sheet.

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** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·142 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.

You are reminded of the need for good English and orderly, clear presentation in your answers.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**7**	
3.	**5**	
4.	**6**	
5.	**5**	
6.	**6**	
7.	**6**	
8.	**6**	
9.	**3**	
10.	**2**	
11.	**3**	
12.	**6**	
13.	**5**	
14.	**4**	
15.	**4**	
16.	**4**	
17.	**6**	
18.	**5**	
19.	**4**	
20.	**3**	
21.	**6**	
22.	**2**	
23.	**2**	
24.	**5**	
25.	**8**	
Total	**120**	

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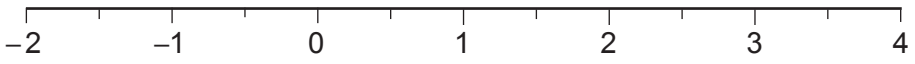
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Answer **all** questions.

1. (a) Solve $3(4x - 2) = 7 - 8x$. [3]

(b) Represent the solution to the inequality $-2 \leqslant 4n < 4$ on the number line below. [2]



(c) Factorise $2x^2 - 14x$. [2]

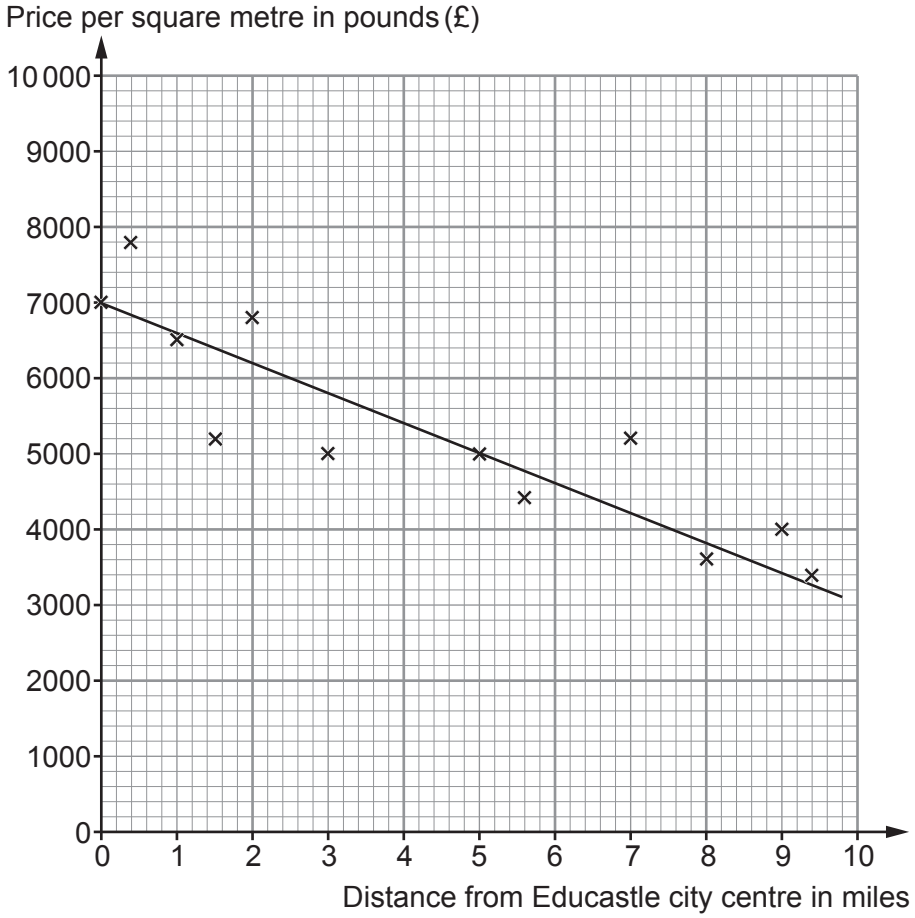
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2. When selling an apartment, the selling price can be calculated using the price per square metre of floor area.

The scatter diagram shows the price per square metre of 12 apartments and their distance from Educastle city centre.
It also shows the line of best fit for the data.



(a) Describe the relationship between the price per square metre of an apartment and its distance from Educastle city centre. [1]

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(b) Use the line of best fit to estimate the price per square metre of an apartment that is 4 miles from Educastle city centre. [1]

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(c) Ellie says,

"All apartments 6 miles from Educastle city centre cost £4600 per square metre."

Is Ellie's statement correct?

Yes ☐ No ☐

Give the reason for your answer. [1]

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(d) The table below shows information about the house prices of 35 houses on a street outside Educastle city centre.

Price, p, thousand pounds	Frequency
$100 < p \leqslant 150$	8
$150 < p \leqslant 200$	12
$200 < p \leqslant 250$	9
$250 < p \leqslant 300$	5
$300 < p \leqslant 350$	1

Calculate an estimate for the mean house price on the street. [4]

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3. The diagram shows a square inside a circle.
Each corner of the square lies on the circumference of the circle.
The length of each side of the square is 13 cm.

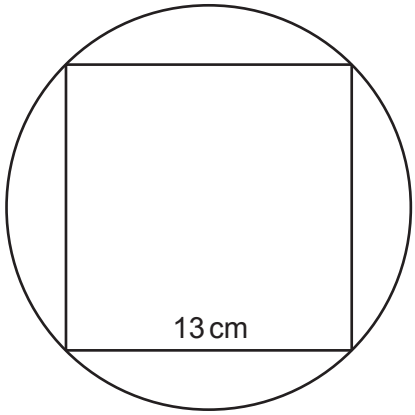


Diagram not drawn to scale

Calculate the area of the circle.
Give your answer correct to 1 decimal place.
You must show all your working. [5]

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Area of the circle = ... cm^2

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4. Yasmin has two bags, Bag *A* and Bag *B*.
Each bag contains some red counters and some blue counters.

Bag *A* contains 2 red counters and 3 blue counters.
In Bag *B* the number of red counters is three times the number of blue counters.

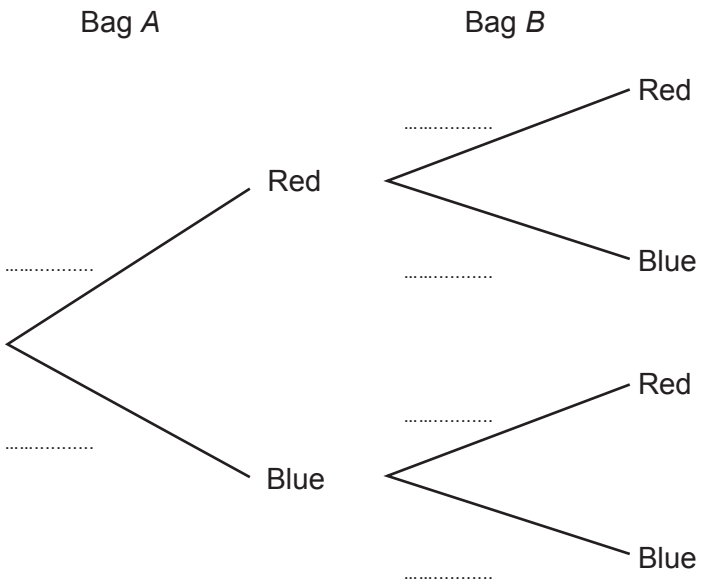
Yasmin randomly chooses one counter from Bag *A* and then one counter from Bag *B*.

(a) Complete the probability tree diagram. [3]

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(b) Calculate the probability that Yasmin chooses at least one blue counter. [3]

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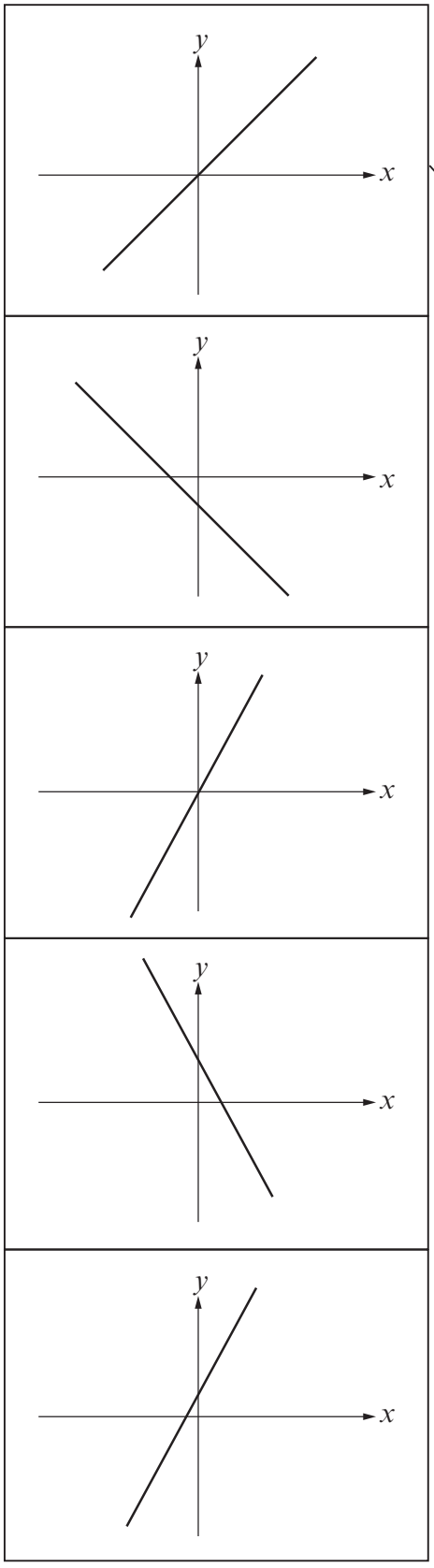
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5. (a) Five straight-line graphs and their equations are shown below.
Draw a line to connect each graph to its equation.
One has been completed for you. [2]



$y = 2x + 1$

$y = x$

$y = -x - 1$

$y = 2x$

$y = -2x + 1$

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(b) Circle the equation of the straight line that is parallel to $y = 3x + 5$. [1]

$3y = x + 5$ $\quad y = -3x$ $\quad 2y = 6x + 8$ $\quad y = \frac{1}{3}x + 5$ $\quad y + 3x = 7$

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(c) Make y the subject of the following formula. [2]

$$\frac{y}{a} + b = x$$

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6. (a)

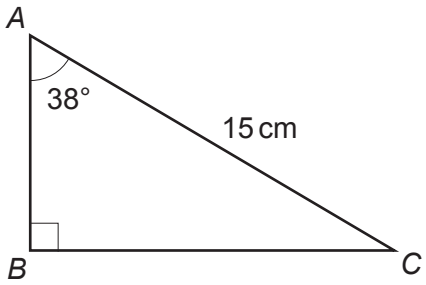


Diagram not drawn to scale

Calculate the length of *AB*. [3]

(b)

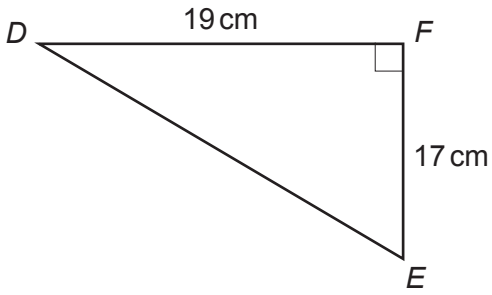


Diagram not drawn to scale

Calculate the size of $D\hat{E}F$. [3]

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7. Greg has been saving 10p and 20p coins in a money jar.

The ratio of the number of 10p coins to the number of 20p coins in Greg's money jar is 2:7.

Greg gives all the 20p coins to his children, Rona and Jamie, in the ratio 3:4.
The 20p coins that Rona was given have a total value of £3.60.

What was the total value of the coins in Greg's money jar? [6]
You must show all your working.

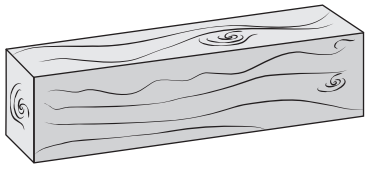
The total value of the coins in Greg's money jar was .....

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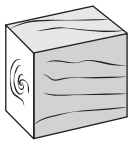
Turn over.

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8. A wooden block is shown below.



Zachary saws off a small block that is 30% of the original wooden block.



Diagrams not drawn to scale

The mass of Zachary's small block is 5·4 kg.
The density of the wood is 0·75 g/cm^3.

(a) Calculate the volume of the **original** wooden block. [5]

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(b) Zachary converts the volume of the wooden block from cubic centimetres (cm^3) to cubic inches (in^3).
He uses the conversion 2·5 cm ≈ 1 inch.

Zachary says,

"To convert the volume from cm^3 into in^3 I must divide the volume by 2·5."

Explain why Zachary's method is incorrect. [1]

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9. (a) Circle the expression that is equivalent to $\left(b\times10^{x}\right)\div\left(c\times10^{-y}\right)$. [1]

$bc\times10^{x-y}$ $\quad$ $\frac{b}{c}\times10^{x-y}$ $\quad$ $\frac{b}{c}\times10^{x+y}$ $\quad$ $\frac{b}{c}\times10^{\frac{x}{-y}}$ $\quad$ $(b-c)\times10^{x+y}$

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(b) Circle the expression that is equivalent to $\left(\sqrt{a}\right)^5$. [1]

a^5 $\quad$ $5\sqrt{a}$ $\quad$ $\frac{1}{a^5}$ $\quad$ $a^2\sqrt{a}$ $\quad$ $a^4\sqrt{a}$

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(c) Circle the expression that is equivalent to $\left(\frac{f}{g}\right)^{-\frac{1}{3}}$. [1]

$\sqrt[3]{\frac{g}{f}}$ $\quad$ $\sqrt[3]{\frac{f}{g}}$ $\quad$ $\frac{g}{\sqrt[3]{f}}$ $\quad$ $\frac{f}{\sqrt[3]{g}}$ $\quad$ $\left(\frac{f}{g}\right)^3$

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10. *ABC* is a triangle.
The lines *AC* and *DE* are parallel.
D is a point on the line *AB* such that *AD* : *DB* is in the ratio 5 : 2.
The length of *AC* is 23·8 cm.

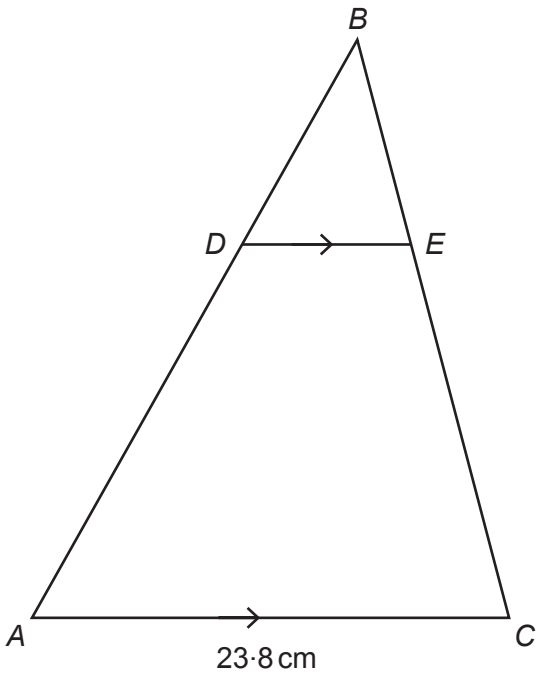


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Calculate the length of *DE*. [2]

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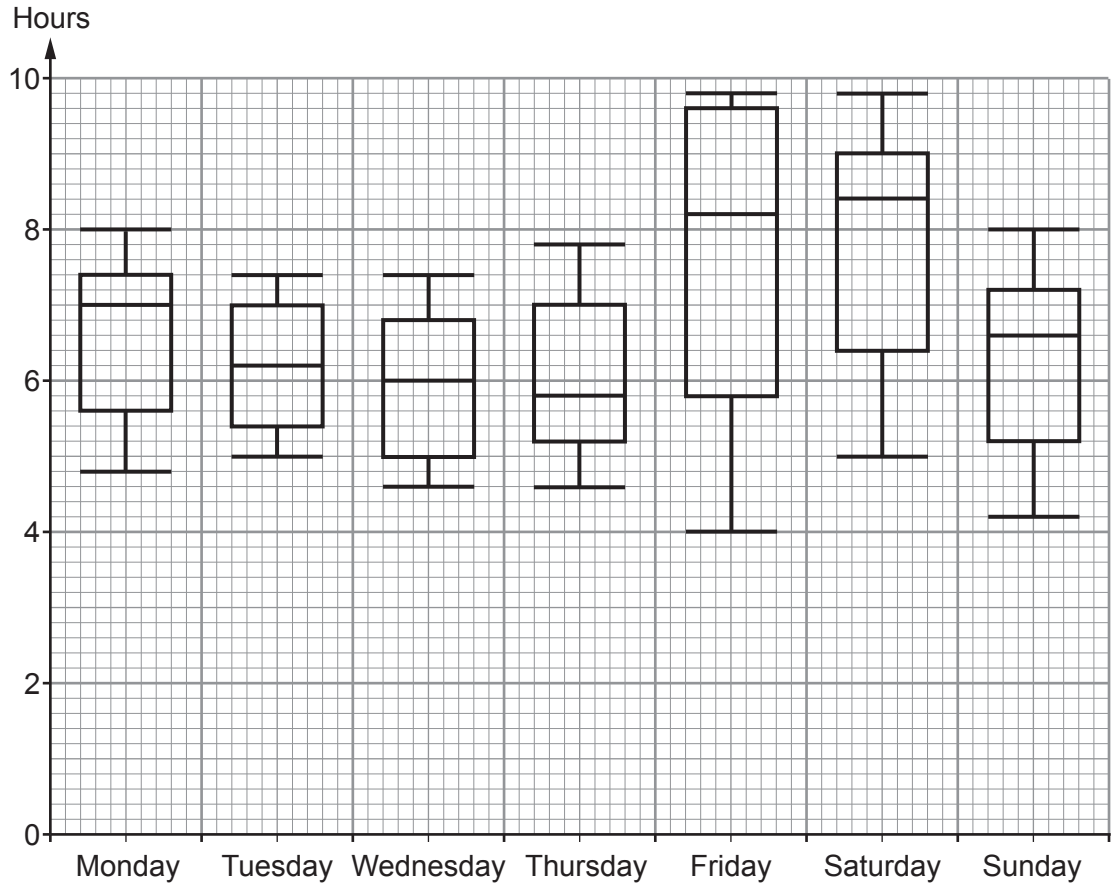
11. Prove that $(n + 4)^2 - (n - 1)^2$ is a multiple of 5 for all integer values of n. [3]

You must use an algebraic method (not trial and improvement).

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12. Isaias recorded the number of hours of sleep he had each night last year.
The box plots below show the results.



(a) On which day was the median number of hours of sleep the greatest? [1]

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(b) Calculate the range of the number of hours of sleep on Fridays. [1]

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(c) Complete the following sentence.
On 25% of Mondays Isaias slept longer than

..... hours ..... minutes. [1]

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(d) Isaias recorded the number of hours of sleep he had on the 52 Thursdays last year. On how many Thursdays last year did Isaias sleep for 7 hours or less? [2]

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(e) Which day of the week is Isaias's sleep pattern the most consistent? Give a reason for your answer. [1]

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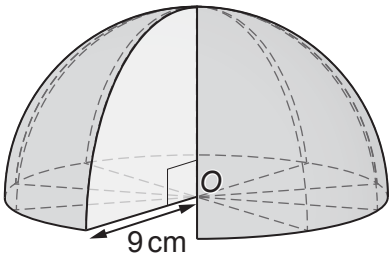
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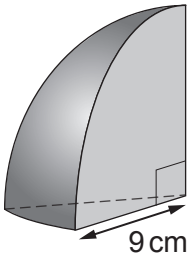
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13. A hemisphere, centre *O*, with radius 9 cm is cut into 10 equal pieces.
One piece has been removed.



The removed piece is shown below.



Diagrams not drawn to scale

Calculate the total surface area of the removed piece.
You must show all your working. [5]

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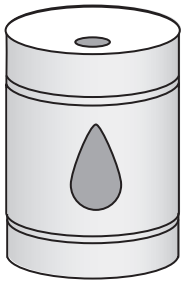
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14. Simplify $\frac{x^2+x-12}{3x+12}$. [4]

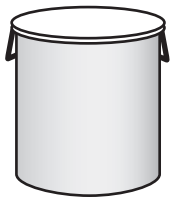
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15. Paint is stored in large tanks.
The volume of paint in each tank is 1500 litres, **correct to the nearest 20 litres**.



The paint from the tank is poured into tins.
Each tin has a capacity of 10 litres, **correct to the nearest 0·1 litre**.



Calculate the maximum number of tins that can be filled using paint from one of the tanks.

[4]

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16. The diagram below shows points *A*, *B* and *C* on the circumference of a circle with centre *O*. The line *DAE* is a tangent to the circle.

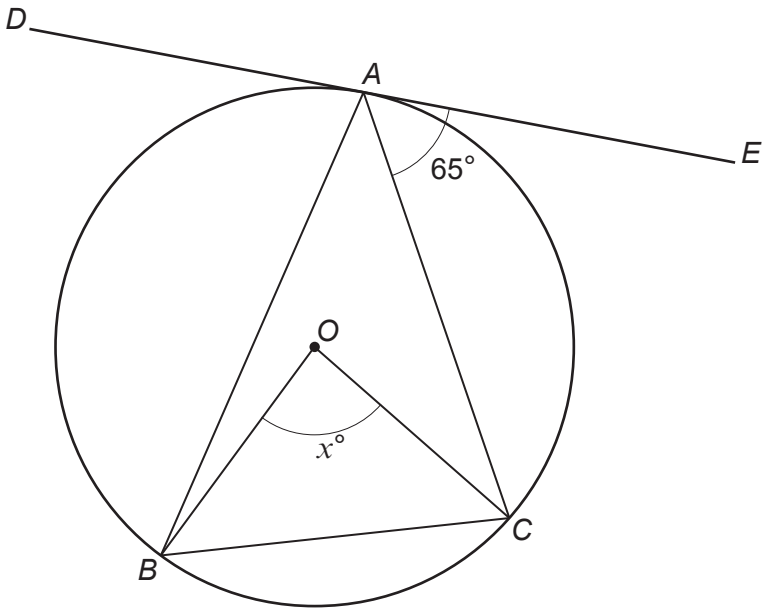


Diagram not drawn to scale

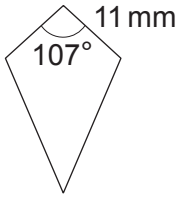
Show that $A\hat{B}O = \left(\frac{1}{2}x - 25\right)^{\circ}$.

Give a reason for each step of your answer. [4]

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17. A kite is shown.



A logo is created by arranging 8 of these kites inside an **octagon**.

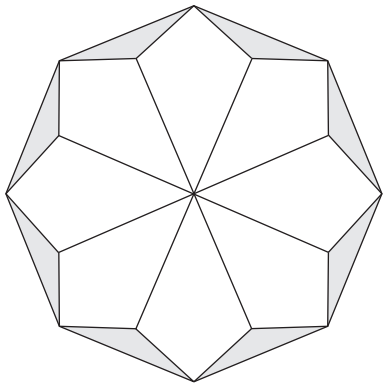


Diagram not drawn to scale

Calculate the area of one shaded triangle.
Hence, calculate the total area of the shaded region of the logo. [6]

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18. Rohan invests money in a compound interest account with interest paid annually.
The interest rate stays the same for the period of the investment.
In 4 years, his investment has increased in value from £7800 to £8950.70.

How much will his investment be worth after a further 3 years?
Give your answer correct to the nearest pound. [5]

After a further 3 years, Rohan's investment is worth ..... to the nearest pound.

19. y is directly proportional to the square root of x.
$y = 0{\cdot}14$ when $x = 0{\cdot}49$.

(a) Find the formula for y in terms of x. [3]

(b) Calculate the value of y when $x = 5{\cdot}29$. [1]

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20. A large pyramid is shown below.
The base of the large pyramid is a square with sides of length 40 cm.

A small pyramid is **removed** from the top of the large pyramid.
The base of the small pyramid is a square with sides of length 16 cm.

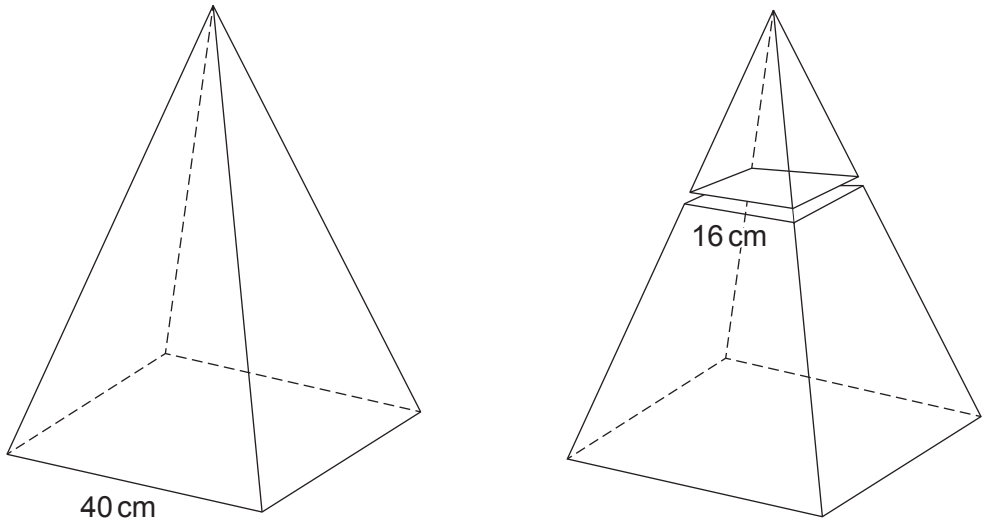


Diagram not drawn to scale

What percentage of the large pyramid's volume has been removed? [3]

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21. A boat makes the following journey from Port *A* to Port *C*.

- It sails 30 km on a bearing of 108° from Port *A* to Port *B*.
- It then sails 42 km on a bearing of 065° from Port *B* to Port *C*.

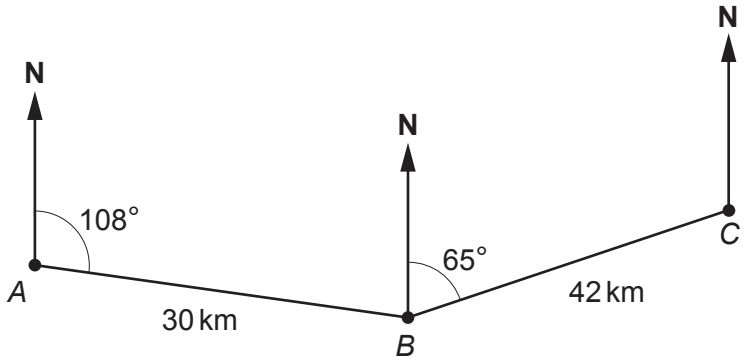


Diagram not drawn to scale

On its return journey, the boat travels directly from Port *C* to Port *A*.
This journey takes 1 hour and 45 minutes.

Calculate the average speed of the boat on its return journey. [6]

The average speed of the boat is ..... km/h

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22. The diagram below shows Circle *A* and Circle *B*.
Circle *A* has its centre at the origin.
Circle *B* has its centre at (7,0) and passes through the origin.
Circle *A* and Circle *B* touch at the same point on the x axis.

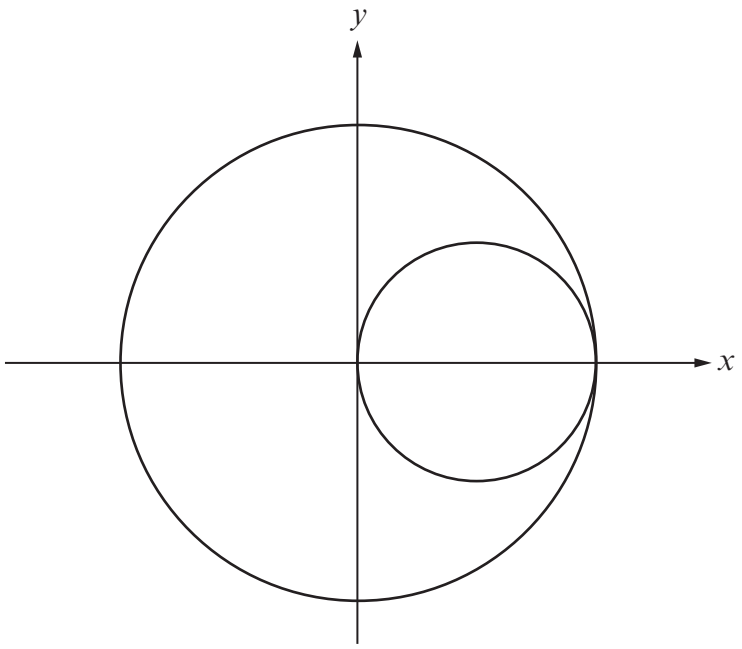


Diagram not drawn to scale

Write down the equation of Circle *A*. [2]

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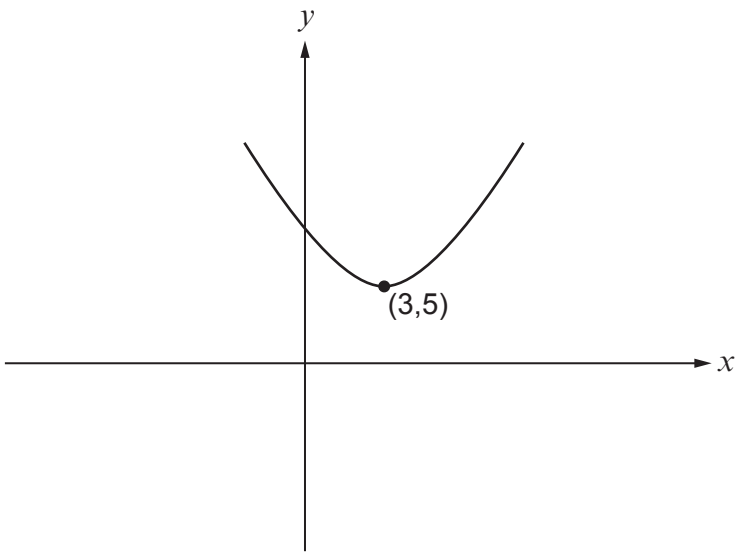
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23. The diagram shows a sketch of $y = f(x)$.
It has a stationary point at (3,5).



On the same diagram, sketch $y = f(x+4)$.
Mark clearly the coordinates of the stationary point. [2]

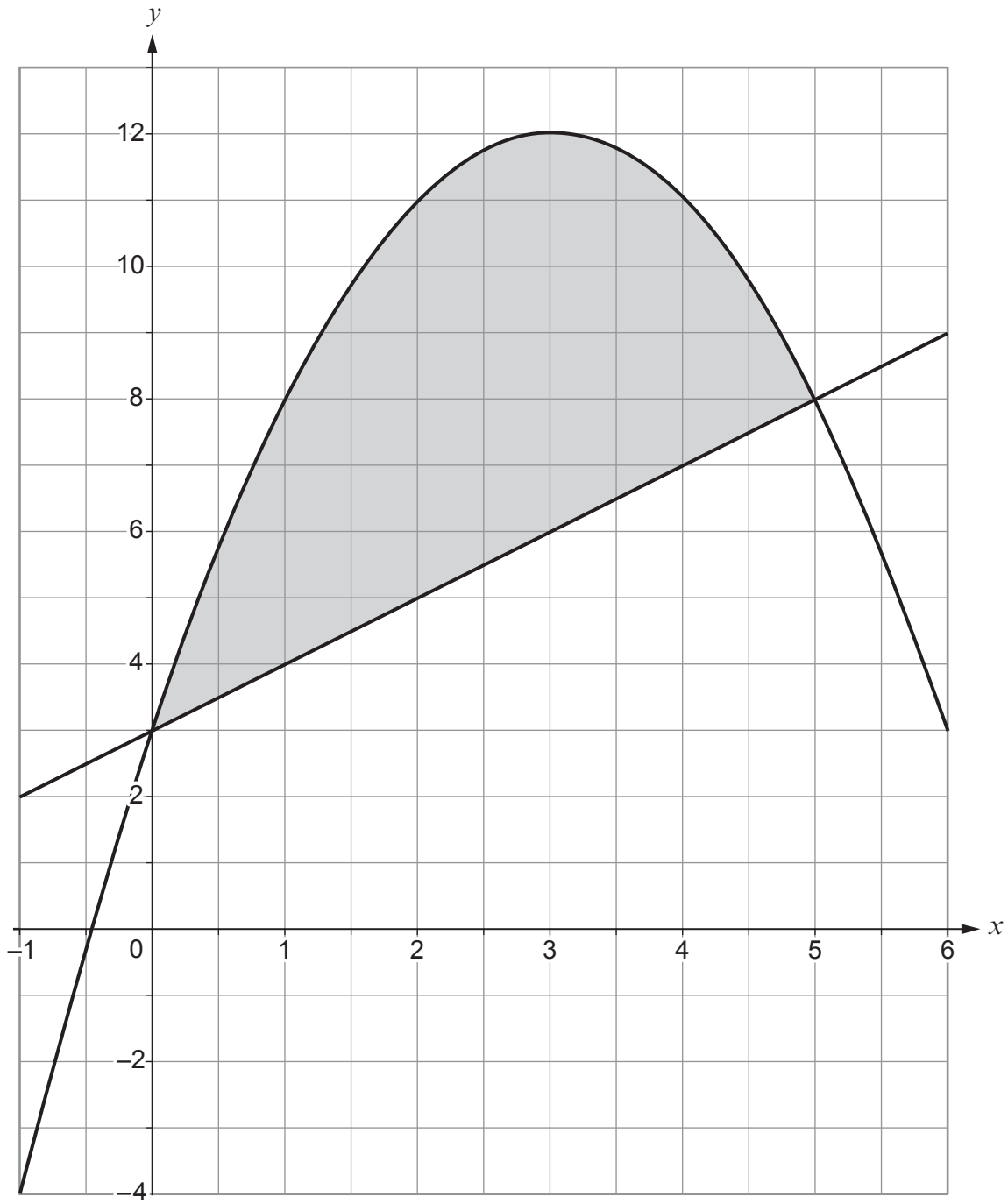
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24. The graph below shows a curve and a straight line.



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Use **five** vertical strips of equal width to calculate an estimate for the area of the shaded region. [5]
You must show all your working.

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25. A tank containing 1000 litres of water was emptied in two stages.
During the first stage, 400 litres were emptied out of the tank at a constant rate.
This took x minutes.
During the second stage, the remaining water was emptied out at a different constant rate.
This took $x - 26$ minutes.

During the second stage, the rate of flow of the water from the tank was 17 litres per minute faster than the rate of flow during the first stage.

(a) Show that $17x^2 - 642x - 10\,400 = 0$. [5]

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(b) By solving $17x^2 - 642x - 10\,400 = 0$, find the value of x.
You must show all your working. [3]

END OF PAPER

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