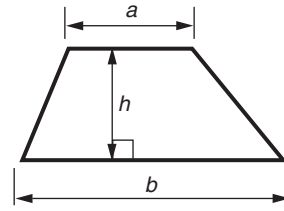
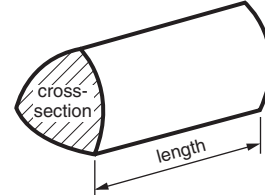


Formulae Sheet: Higher Tier

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



Volume of prism = (area of cross-section) \times length

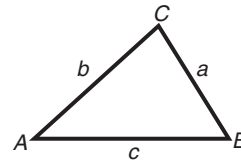


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

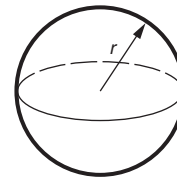
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$



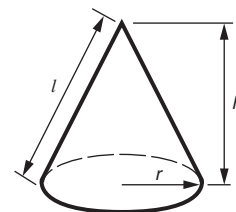
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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Answer **all** the questions.

1 (a) Express the ratio 5 : 7 in the form 1 : n .

(a) [1]

(b) Express this ratio in its simplest form.

56 minutes : 2 hours

(b) [3]

- 2 (a) Calculate.

$$\sqrt{\frac{12.75}{9.6 \times 0.54}}$$

Give your answer correct to 2 decimal places.

(a) [2]

- (b) Insert **one pair** of brackets to make this calculation correct.

$$12 - 1 + 4 \times 3 = -3 \quad [1]$$

- 3 Colin takes 40 strokes to swim 50 m.
Des takes 32 strokes to swim 50 m.

On average, how much further does Des swim in one stroke than Colin?

..... m [2]

4 Here are the first four patterns in a sequence.

Pattern 1



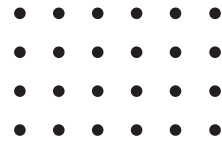
Pattern 2



Pattern 3



Pattern 4



(a) How many dots are there in Pattern 10?

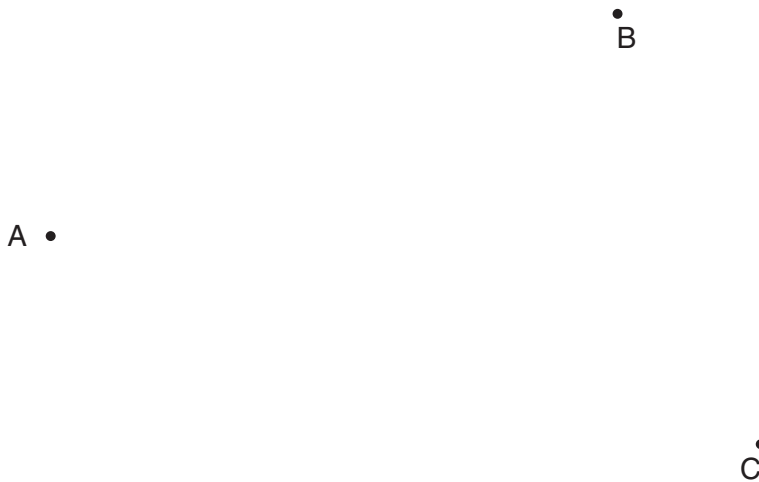
(a) [1]

(b) Write an expression for the number of dots in Pattern n .

(b) [2]

- 5 *In this question, you should use a ruler and a pair of compasses.
Do not rub out your construction lines.*

The scale drawing shows two warning posts, A and B, on rocks at sea.
It also shows the position of a buoy, C.



Scale: 1 cm represents 50 m

For safety, boats should follow a course that keeps the same distance from A as from B.
The buoy at C makes a sound which can be heard up to 250 m away.

Construct the safe course for boats. Indicate clearly the part of the safe course where the sound from buoy C can be heard.

[4]

- 6 Two numbers have a least common multiple (LCM) of 750.
One of the numbers is 150.
The other number is between 100 and 140.

Find this number.

..... [3]

- 7 (a) Solve this equation.

$$5x - 4 = 3x + 7$$

(a) [3]

- (b) Factorise fully.

$$7y^2 - 14y$$

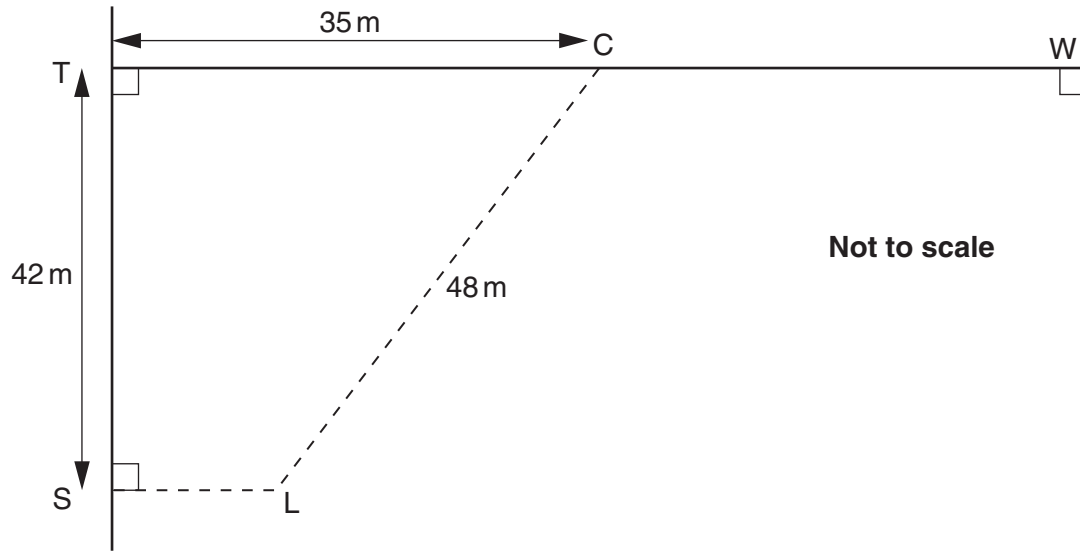
(b) [2]

8 Leigh plays rugby and is about to kick the ball towards goal.

(a) He is standing at L.

L is 48 m from the centre C of the goal, and 42 m from the line TW.

The distance TC is 35 m.



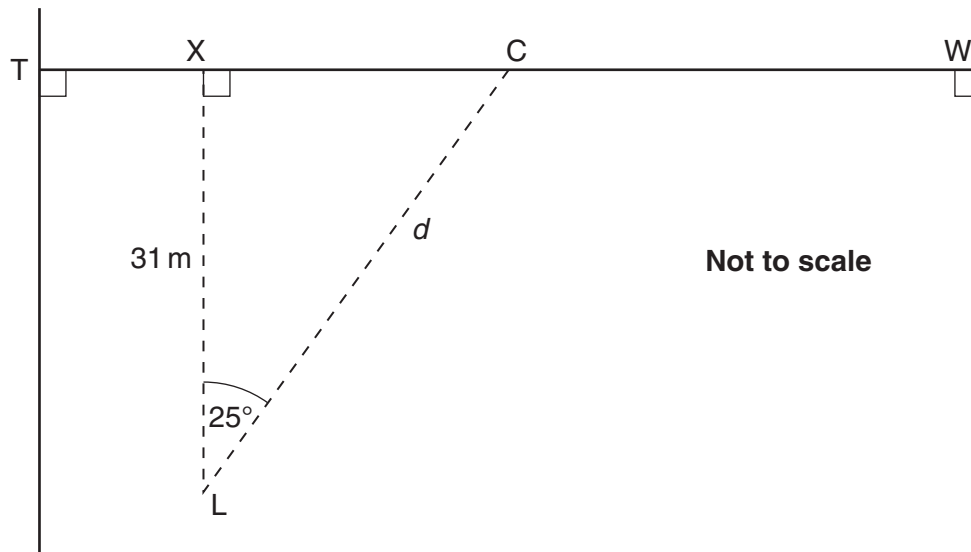
(i) Calculate LS, the shortest distance from Leigh to the line ST.

(a)(i) m [4]

(ii) Calculate angle TCL.

(ii) ° [3]

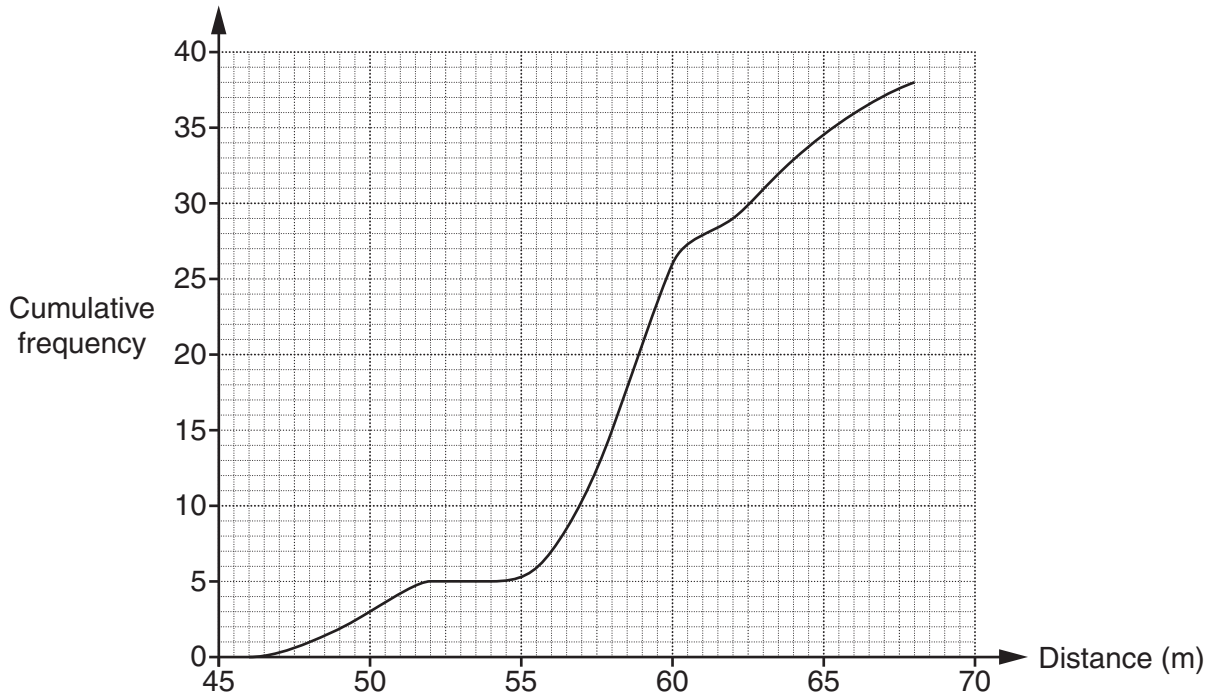
- (b) Later in the game, Leigh has another kick towards goal.
This time, he is standing 31 m from the line TW and the angle XLC is 25° .



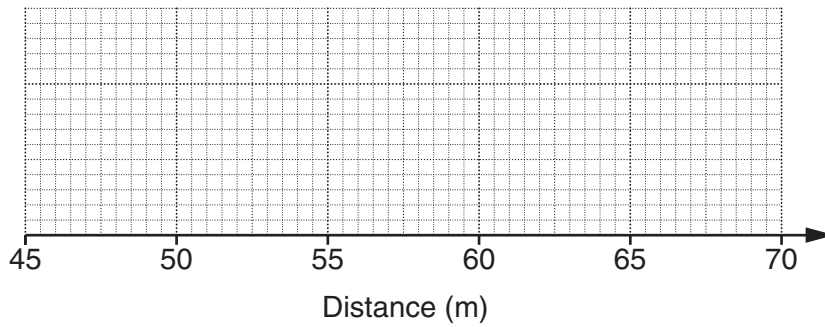
Calculate the distance, d , between Leigh and the centre of the goal.

(b) m [3]

- 9 (a) This cumulative frequency graph represents the distances thrown by the 38 women in the qualifying round of the javelin at the 2012 Olympics.



(i)



On the grid above, construct a box plot to represent the distribution of the distances thrown by the 38 women. [3]

(ii) Here are some statistics for the distances thrown by the men in the qualifying round of the javelin at these Olympics.

median	78.7 m
interquartile range	7.0 m
range	17.2 m

Jodie says:

“The distances thrown by the men were more consistent than the distances thrown by the women.”

Is Jodie correct?

State the values of the statistics that you use to support your decision.

..... because
..... [2]

(b) In the 50 km walking race for men, the winner finished in a time of 3 h 35 m 59 s.
The slowest man who finished had a time of 4 h 15 m 05 s.

How many seconds slower was he than the winner?

(b) seconds [2]

10 (a) Find the coordinates of the midpoint of the line joining the points (5, 2) and (-3, 7).

(a) (.....,) [2]

(b) (i) For $d = 6t^2 + 4$, find the value of d when $t = -3$.

(b)(i) [2]

(ii) Rearrange this formula to make t the subject.

$$d = 6t^2 + 4$$

(ii) [3]

(c) Write a **number** in each box so that the following is an identity.

$$4x - 3 + 6(x - 5) \equiv 7x - 1 + \square x - \square \quad [2]$$

(d) You are given that $f(x) = 5 - 2x$.

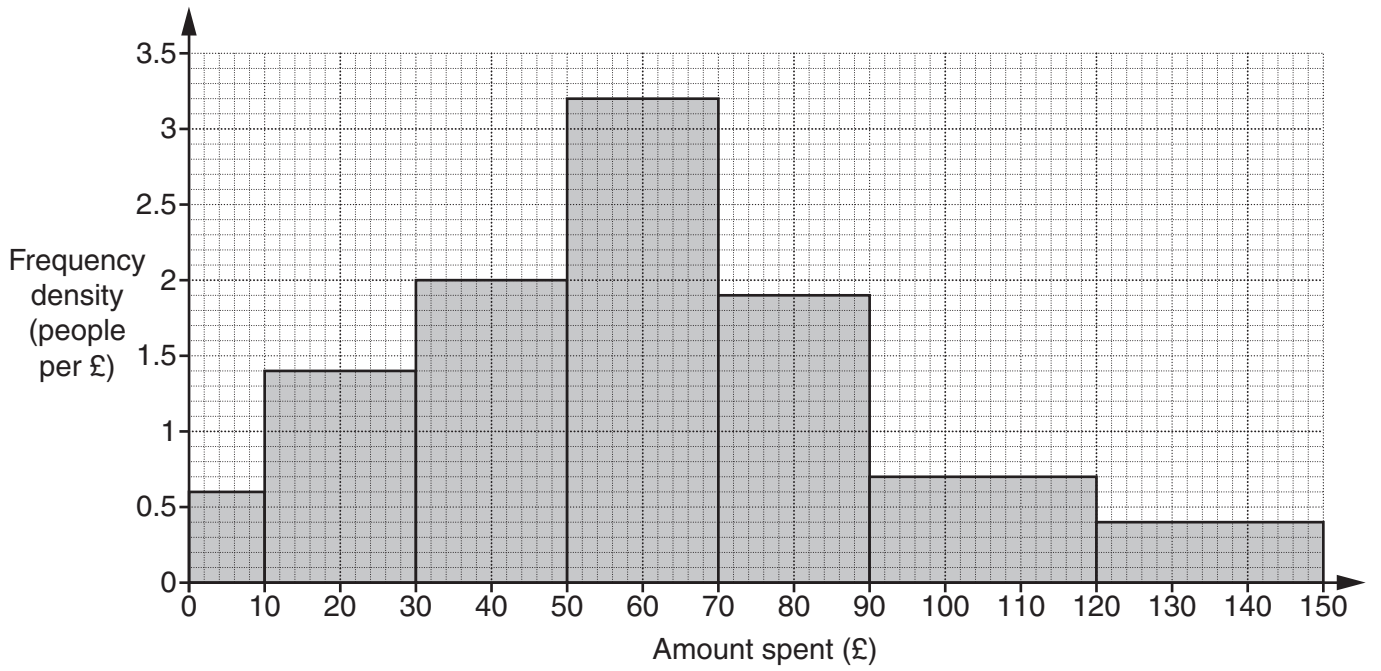
(i) Find x when $f(x) = 0$.

(d)(i) [1]

(ii) Find $f(t + 4)$.
Express your answer in the form $a + bt$.

(ii) [2]

11 This histogram shows the distribution of the amounts spent on fuel at a petrol station one day.



(a) Estimate how many people spent over £100.

(a) [2]

- (b) Complete the frequency table and use it to calculate an estimate of the mean amount spent on fuel at the petrol station that day.

Amount spent (£ a)	Frequency
$0 < a \leq 10$	6
$10 < a \leq 30$	28
$30 < a \leq 50$	
$50 < a \leq 70$	
$70 < a \leq 90$	
$90 < a \leq 120$	
$120 < a \leq 150$	

(b) £ [5]

END OF QUESTION PAPER

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