

11 The table gives information about the times taken by 90 runners to complete a 10 km race.

Time (t minutes)	Frequency
$25 < t \leq 35$	12
$35 < t \leq 45$	24
$45 < t \leq 55$	28
$55 < t \leq 65$	12
$65 < t \leq 75$	10
$75 < t \leq 85$	4

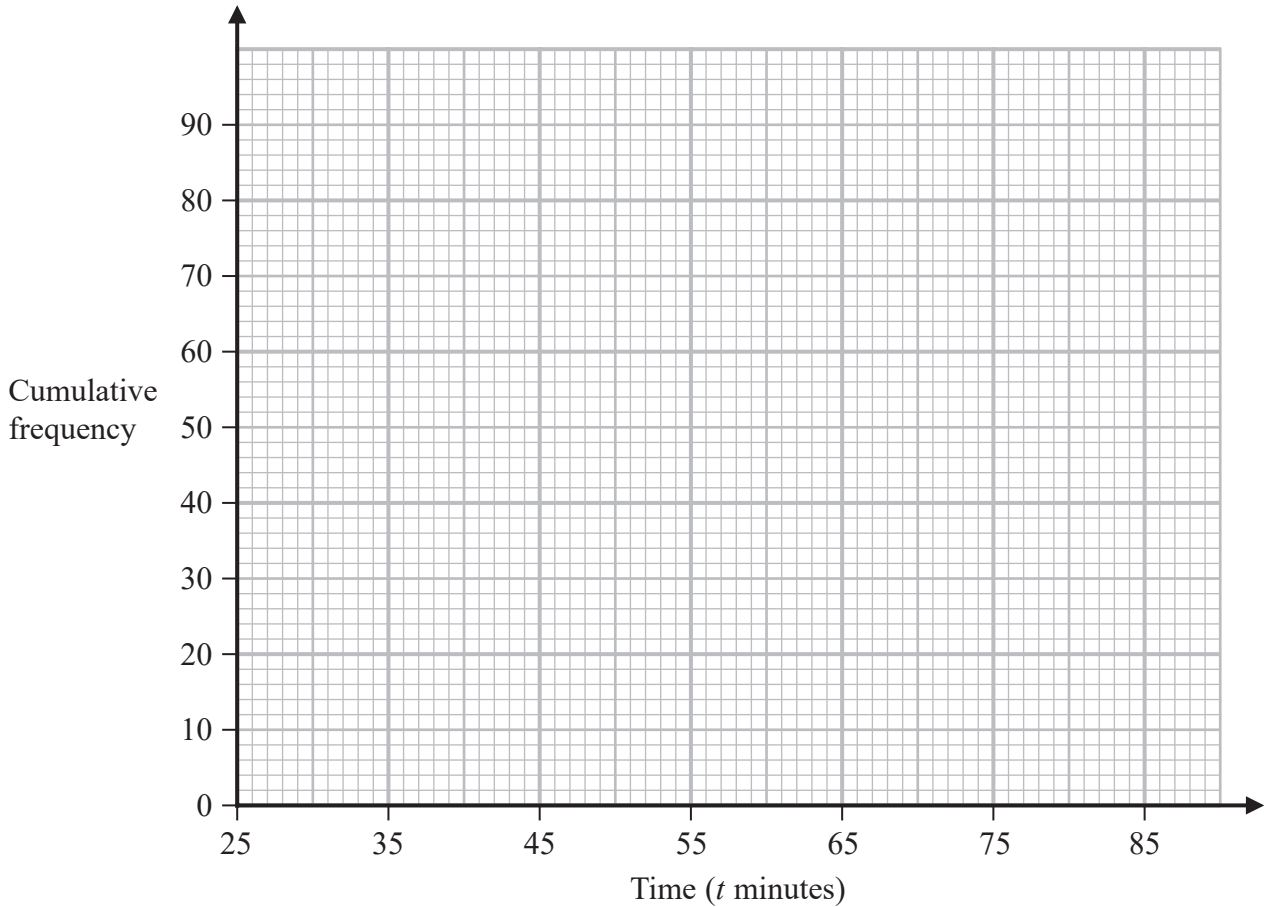
(a) Complete the cumulative frequency table.

Time (t minutes)	Cumulative frequency
$25 < t \leq 35$	12
$25 < t \leq 45$	
$25 < t \leq 55$	
$25 < t \leq 65$	
$25 < t \leq 75$	
$25 < t \leq 85$	

(1)



(b) On the grid below, draw a cumulative frequency graph for your table.



(2)

Any runner who completed the race in a time T minutes such that $42 < T \leq 52$ minutes was awarded a silver medal.

(c) Use your graph to find an estimate for the number of runners who were awarded a silver medal.

..... runners

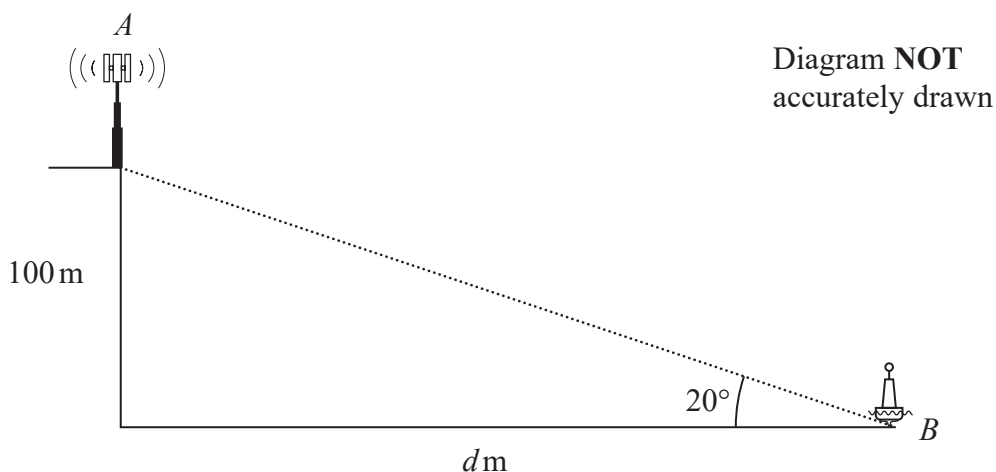
(2)

(Total for Question 11 is 5 marks)

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- 12 The diagram shows a vertical cliff with a vertical radio mast on top of the cliff and a buoy in the sea.



The height of the cliff is 100 metres.

The buoy is at the point B that is d metres from the base of the cliff.

The angle of elevation from B to the top of the cliff is 20°

- (a) Calculate the value of d .
Give your answer correct to 3 significant figures.

$$d = \dots\dots\dots (3)$$

The point A at the top of the radio mast is vertically above the top of the cliff.

The angle of elevation from B to A is 25°

- (b) Calculate the height of the radio mast.
Give your answer correct to 3 significant figures.

$$\dots\dots\dots \text{ m} (3)$$

(Total for Question 12 is 6 marks)



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13 Here is a triangle XYZ .

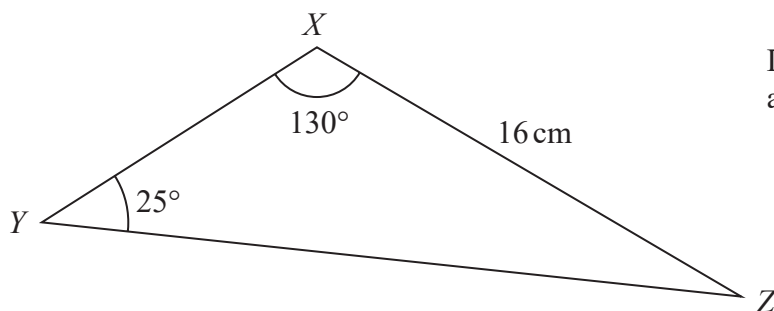


Diagram **NOT** accurately drawn

The length XZ and the angles YXZ and XYZ are each given correct to 2 significant figures.

Calculate the upper bound for the length YZ .

Give your answer correct to one decimal place.

Show your working clearly.

..... cm

(Total for Question 13 is 3 marks)



14 $ABCDEF$ and $GHIJKL$ are regular hexagons each with centre O .

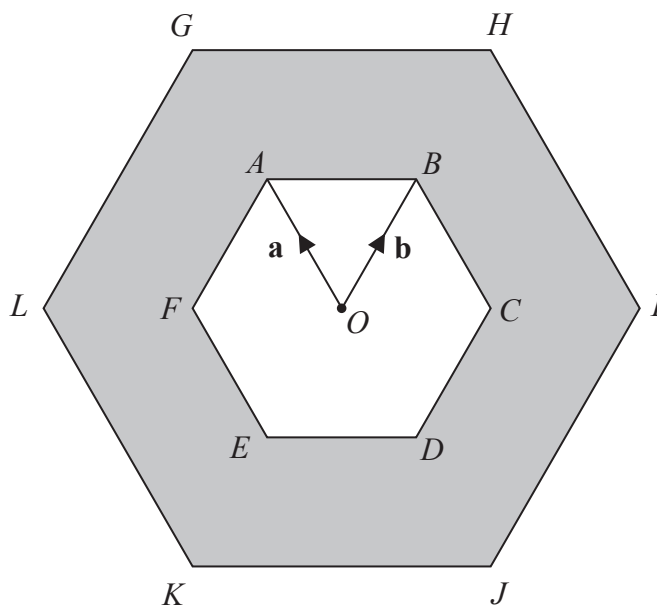


Diagram **NOT** accurately drawn

$GHIJKL$ is an enlargement of $ABCDEF$, with centre O and scale factor 2

$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

(a) Write the following vectors, in terms of \mathbf{a} and \mathbf{b} .
Simplify your answers.

(i) \vec{AB}

.....

(1)

(ii) \vec{KI}

.....

(2)

(iii) \vec{LD}

.....

(2)

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The triangle OAB has an area of 5 cm^2

(b) Calculate the area of the shaded region.

..... cm^2

(3)

(Total for Question 14 is 8 marks)



15 Magnus and Garry play 2 games of chess against each other.

The probability that Magnus beats Garry in any game is $\frac{2}{9}$

The probability that any game between Magnus and Garry is drawn is $\frac{4}{9}$

The result of any game is independent of the result of any other game.

(a) Complete the probability tree diagram.



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For each game of chess,

the winner gets 2 points and the loser gets 0 points,
when the game is drawn, each player gets 1 point.

- (b) Work out the probability that, after 2 games, Magnus and Garry have the same number of points.

.....
(3)

Magnus and Garry now play a third game of chess.

- (c) Work out the probability that, after 3 games, Magnus and Garry have the same number of points.

.....
(3)

(Total for Question 15 is 8 marks)

