

GCSE
MATHEMATICS (8300)
HIGHER
Probability and Statistics

Total number of marks: 38 per optional item

Q6a

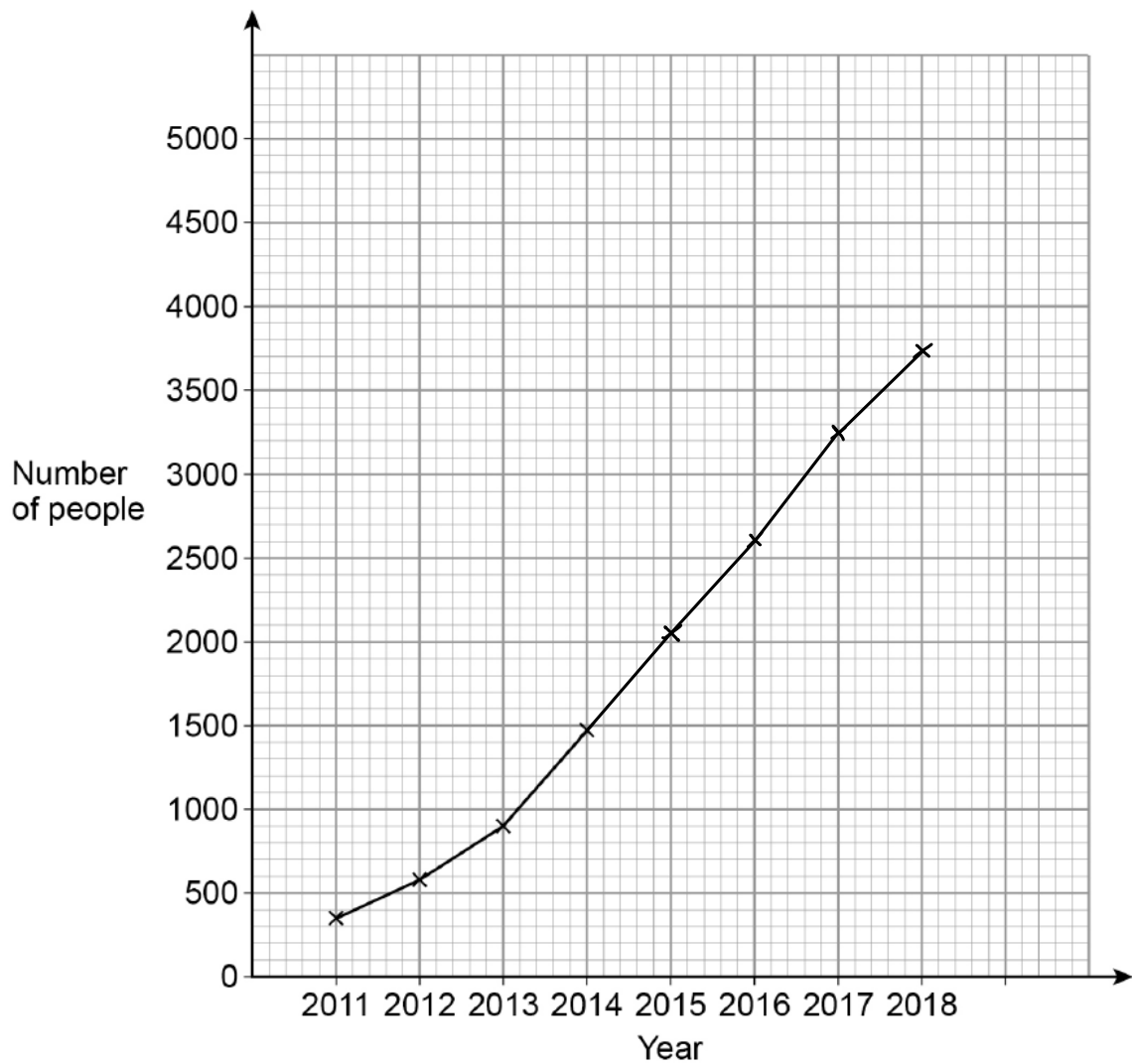
A music festival has taken place each year from 2011

The table shows the number of people who attended each year.

Year	2011	2012	2013	2014	2015	2016	2017	2018
Number of people	350	583	906	1471	2023	2612	3251	3780

The festival organisers draw a time series graph to represent the data.

The first four years have been plotted.



(a) Complete the graph.

(Total 2 marks)

Q6b

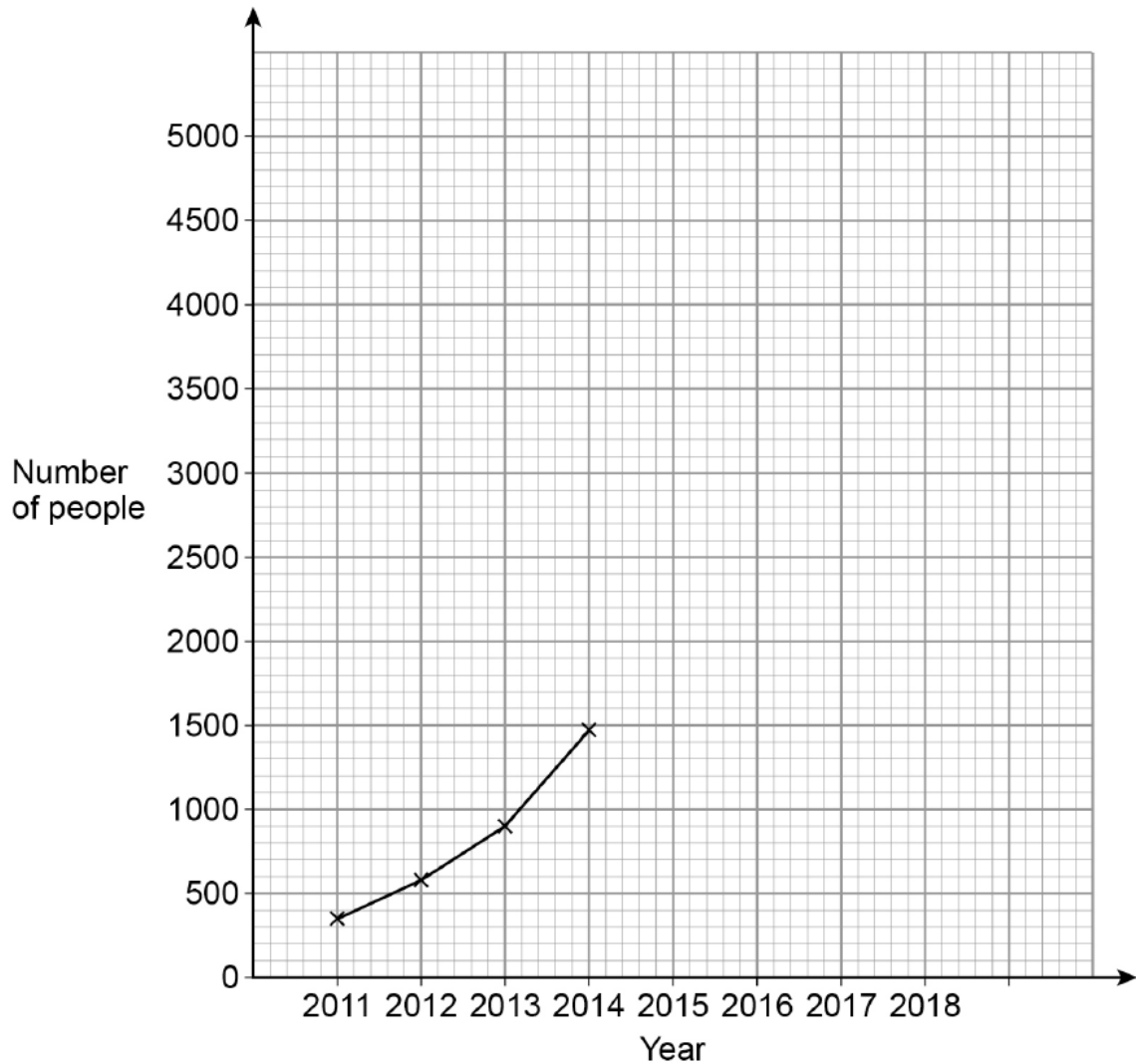
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The table shows the number of people who attended each year.

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Number of people	350	583	906	1471	2023	2612	3251	3780

The festival organisers draw a time series graph to represent the data.

The first four years have been plotted.



- (b) Use the graph to estimate the number of people who will attend the festival in 2019.

4250

(Total 2 marks)

Q8a

A coin is thrown 50 times.

It lands on heads 31 times.

Write down the relative frequency it lands on heads.

$$\frac{31}{50} = \underline{\underline{0.62}}$$

(Total 1 mark)

Q8b

Raj says,

“The coin is biased towards heads.”

Use the data to give a reason why he might be correct.

it lands on heads more than half of
the time

(Total 1 mark)

Q16a

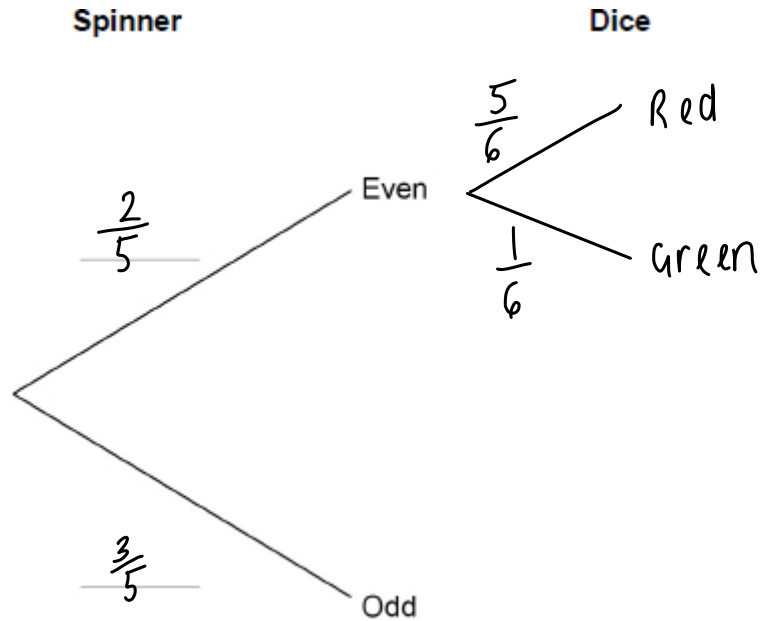
A fair spinner has five equal sections numbered 1, 2, 3, 4 and 5

A fair six-sided dice has five red faces and one green face.

The spinner is spun.

If the spinner shows an even number, the dice is thrown.

- (a) Complete the tree diagram for the spinner and the dice.



(Total 2 marks)

Q16b

A fair spinner has five equal sections numbered 1, 2, 3, 4 and 5

A fair six-sided dice has five red faces and one green face.

The spinner is spun.

If the spinner shows an even number, the dice is thrown.

- (b) Work out the probability of getting an even number and the colour green.

$$\frac{2}{5} \times \frac{1}{6} = \frac{2}{30} = \frac{1}{15}$$

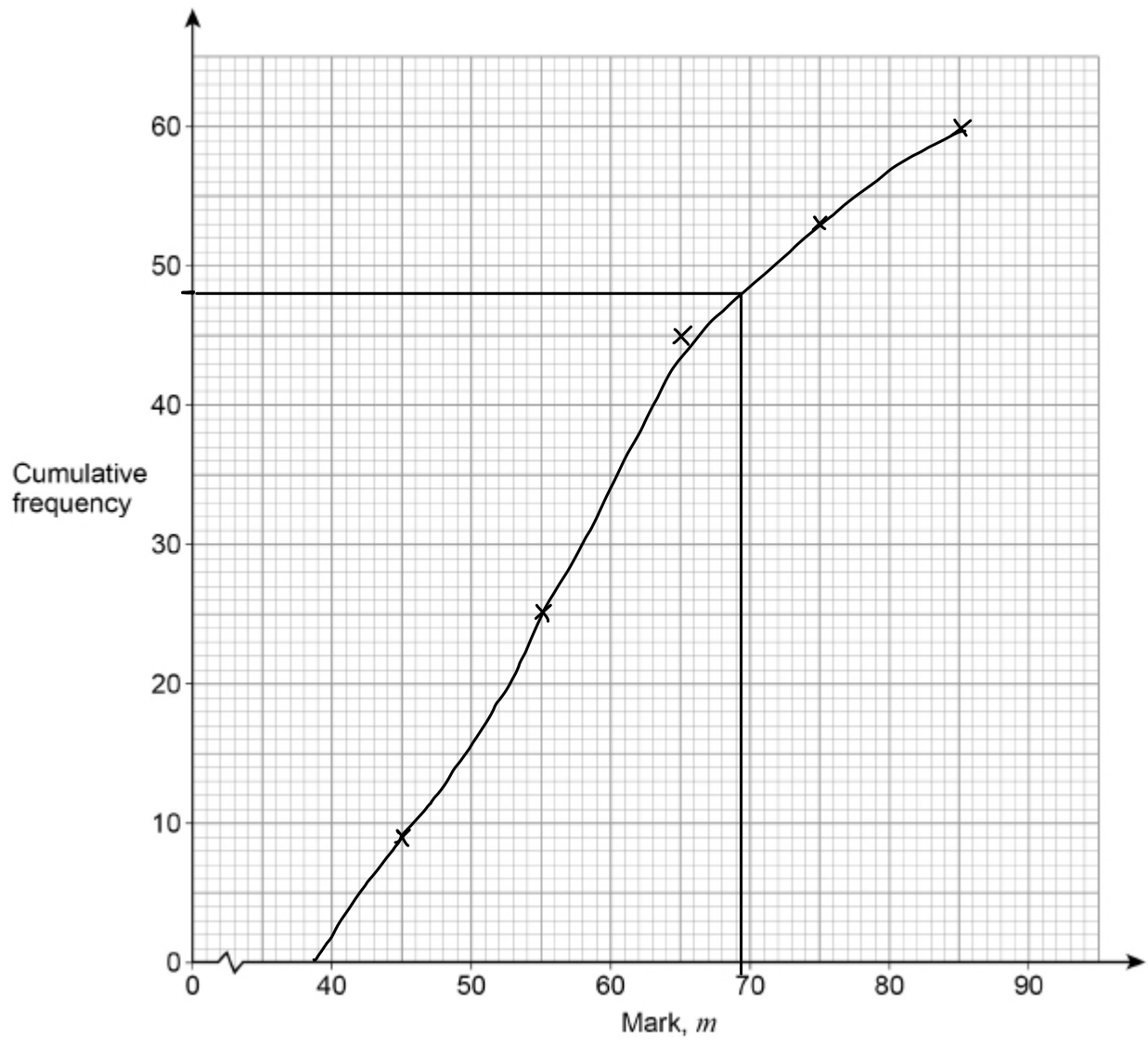
(Total 2 marks)

Q19a

Here is some information about the marks of 60 students in a test.

Mark, m	Frequency	mid point	cumulative frequency
$40 < m \leq 50$	9	45	9
$50 < m \leq 60$	16	55	25
$60 < m \leq 70$	20	65	45
$70 < m \leq 80$	8	75	53
$80 < m \leq 90$	7	85	60

(a) on the grid, draw a cumulative frequency graph.



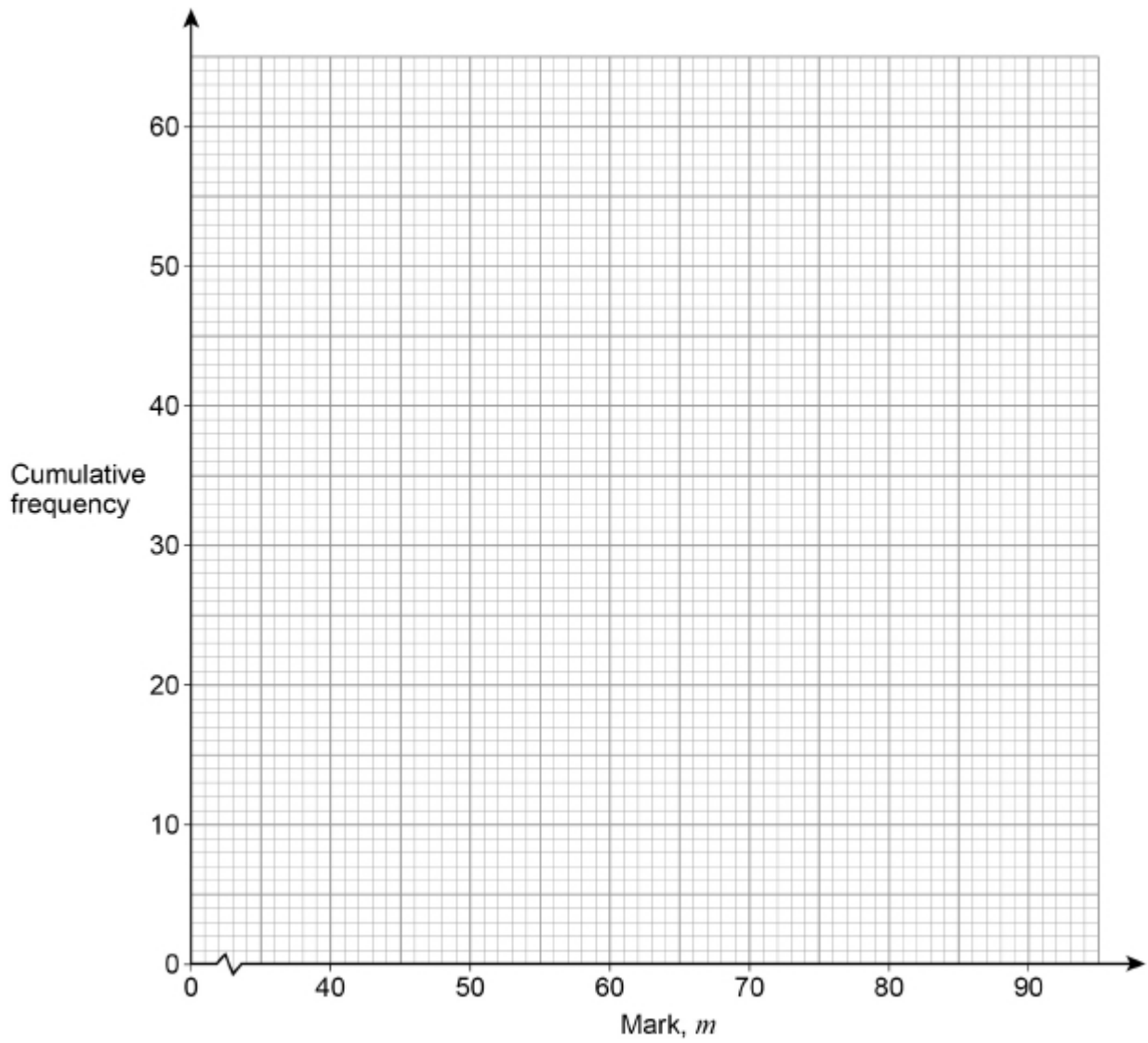
(Total 3 marks)

Q19b

Here is some information about the marks of 60 students in a test.

Mark, m	Frequency		
$40 < m \leq 50$	9		
$50 < m \leq 60$	16		
$60 < m \leq 70$	20		
$70 < m \leq 80$	8		
$80 < m \leq 90$	7		

Draw a cumulative frequency graph on the grid.



- (b) Use your graph to estimate the lowest mark of the top 20% of students.

lowest mark = 69

(Total 2 marks)

Q8a

In a choir there are 35 men and 48 women.

The probability that a man chosen at random wears glasses is $\frac{2}{5}$

The probability that a woman chosen at random wears glasses is $\frac{3}{8}$

Work out the number of people in the choir who wear glasses.

$$\begin{array}{l} \frac{2}{5} \times 35 = 14 \\ \frac{3}{8} \times 48 = 18 \end{array} \quad \begin{array}{l} 14 + 18 = 32 \text{ people} \\ \text{wear glasses} \end{array} \quad \text{[3 marks]}$$

Q8b

In a choir there are 35 men and 48 women.

The probability that a man chosen at random wears glasses is $\frac{2}{5}$

The probability that a woman chosen at random wears glasses is $\frac{3}{8}$

A person is chosen at random from the choir.

Work out the probability that the person does **not** wear glasses.

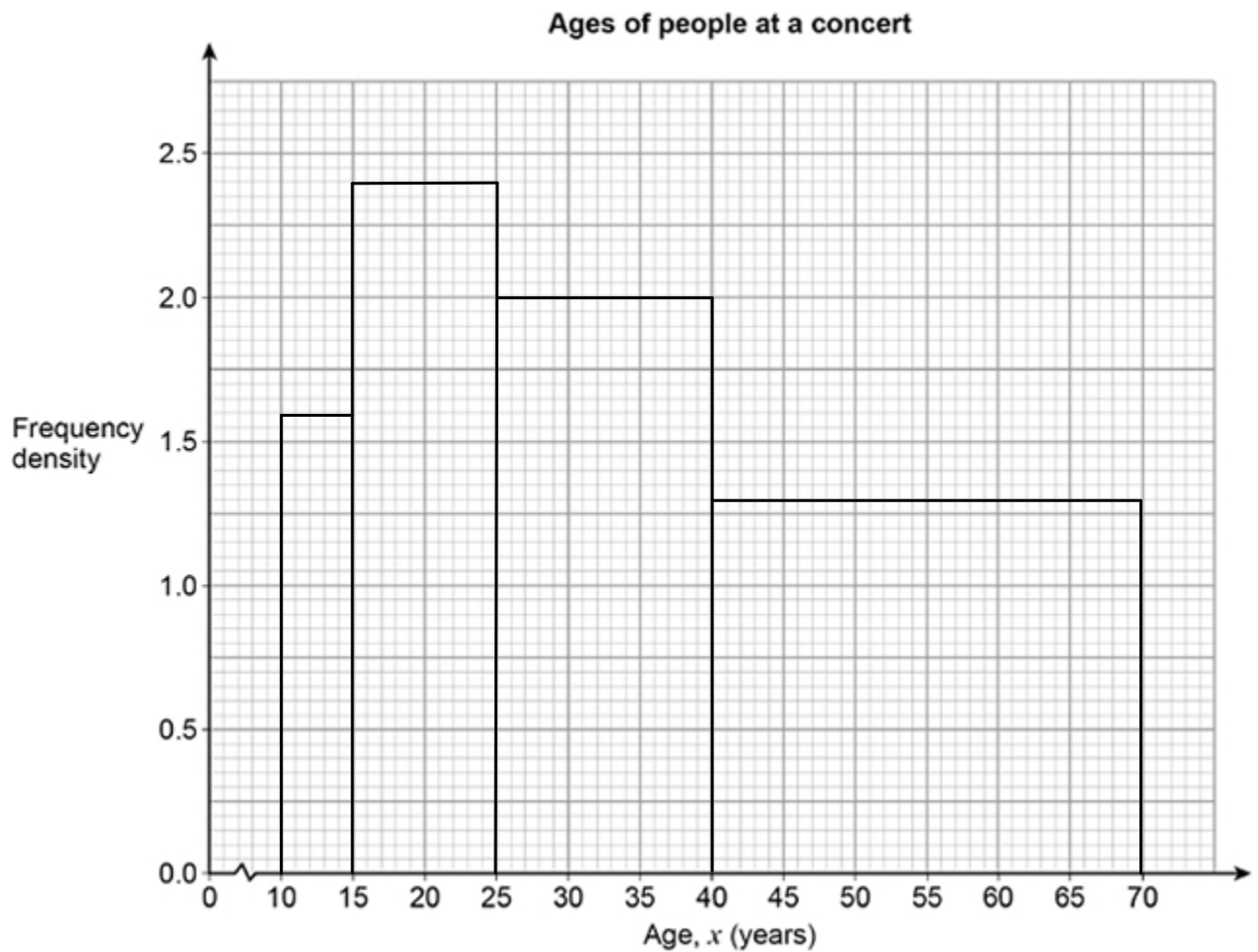
$$\begin{array}{l} 35 + 48 = 83 \\ 83 - 32 = 51 \\ \frac{51}{83} = \underline{\underline{0.614}} \end{array} \quad \text{[2 marks]}$$

Q18

Here is some information about the ages of people at a concert.

Age, x (years)	Frequency	frequency density
$10 \leq x < 15$	8	1.6
$15 \leq x < 25$	24	2.4
$25 \leq x < 40$	30	2
$40 \leq x < 70$	39	1.3

Draw a histogram to represent the information.



(Total 3 marks)

Q13a

Naga states a hypothesis.

“Most people read more than 100 books a year.”

She asks a sample of five people in a book club how many books they read last month.

The table shows the results.

	Lynn	Ali	Paul	Chen	Ruth
Number of books	10	11	8	10	13

(a) Show how Naga could use the data to support her hypothesis.

	Lynn	Ali	Paul	Chen	Ruth	(Total 2 marks)
number of books /year	120	132	96	120	156	

4 out of the 5 people read > 100 book a year, which supports her hypothesis.

Q13b

Naga states a hypothesis.

“Most people read more than 100 books a year.”

She asks a sample of five people in a book club how many books they read last month.

The table shows the results.

	Lynn	Ali	Paul	Chen	Ruth
Number of books	10	11	8	10	13

(b) Give two reasons why this sample should **not** be used to support her hypothesis.

(Total 2 marks)

- All of these people are in a book club, so the data is not representative of the general population.
- Only one month of reading was recorded so not enough data was collected.

Q9a

In a sport, injury time is added time played at the end of a match.
The table shows the injury time, t (minutes) played in 380 matches.

Injury time, t (minutes)	Frequency
$0 < t \leq 2$	59
$2 < t \leq 4$	158
$4 < t \leq 6$	106
$6 < t \leq 8$	45
$8 < t \leq 10$	12

Circle the **two** words that describe the data.

continuous

discrete

grouped

ungrouped

(Total 1 mark)

Q9b

In a sport, injury time is added time played at the end of a match.
The table shows the injury time, t (minutes) played in 380 matches.

Injury time, t (minutes)	Frequency
$0 < t \leq 2$	59
$2 < t \leq 4$	158
$4 < t \leq 6$	106
$6 < t \leq 8$	45
$8 < t \leq 10$	12

Which class interval contains the median?

You **must** show your working.

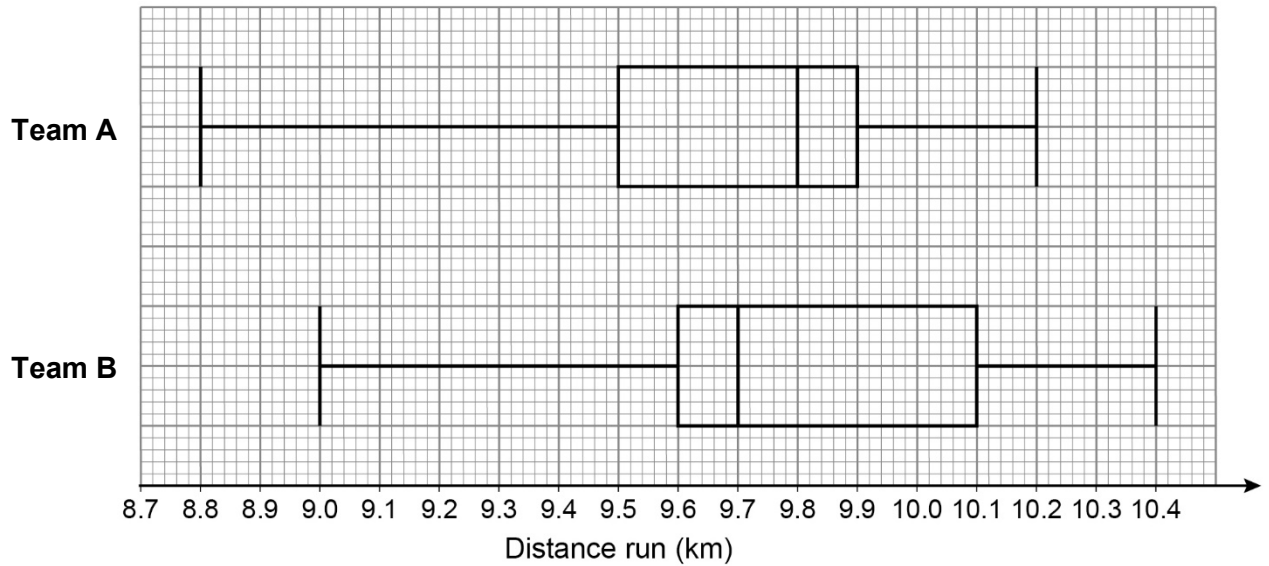
$$\frac{380}{2} = 190 \Rightarrow 190 \text{ is in the second interval}$$

Answer 2 $< t \leq$ 4

(Total 2 marks)

Q19a

The box plots represent the distances run by the players in a football match.



On average, which team's players ran further?

Tick a box.

Team A

Team B

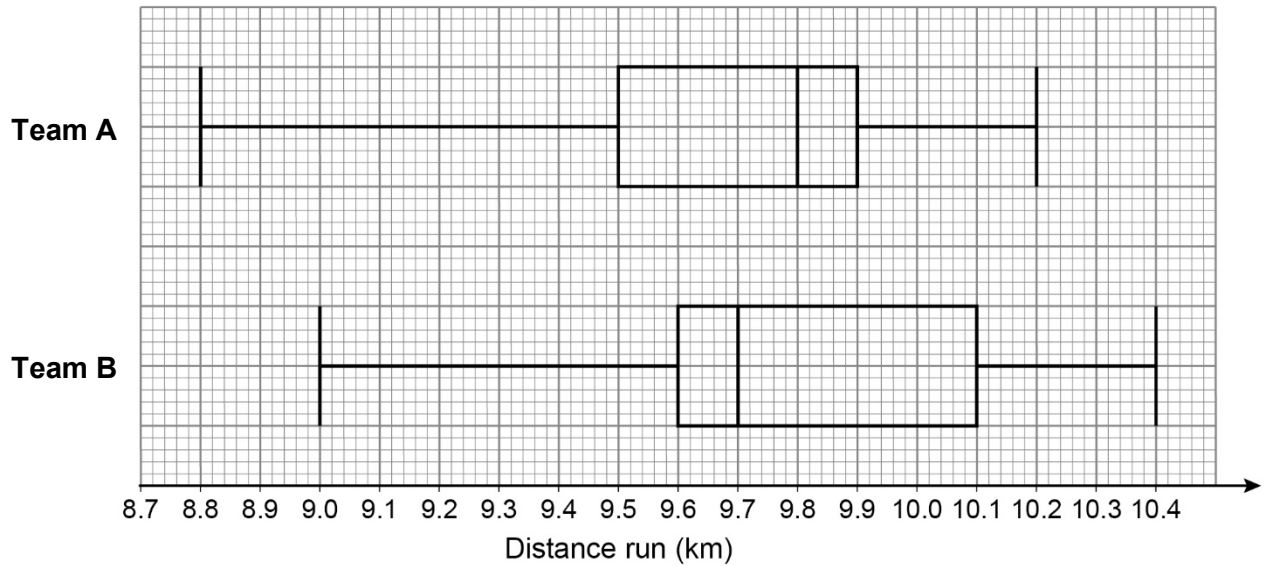
Give a reason for your answer.

The median for Team A is higher than for Team B.

(Total 1 mark)

Q19b

The box plots represent the distances run by the players in a football match.



The players in Team A ran more consistent distances.

How do the box plots show this?

(Total 1 mark)

The IQR is lower for Team A than Team B
(0.4 for A vs 0.5 for B).

Q16

In a running club there are 50 females and 80 males.

If a female is chosen at random, the probability she has blue eyes is 0.38

If a male is chosen at random, the probability he has blue eyes is 0.6

One person is chosen at random.

Show that the probability the person has blue eyes is **more than** 0.5

(Total 4 marks)

$$P(\text{blue eyes}) = (0.38 \times 50) + (0.6 \times 80)$$

$$= 67 \text{ people have blue eyes}$$

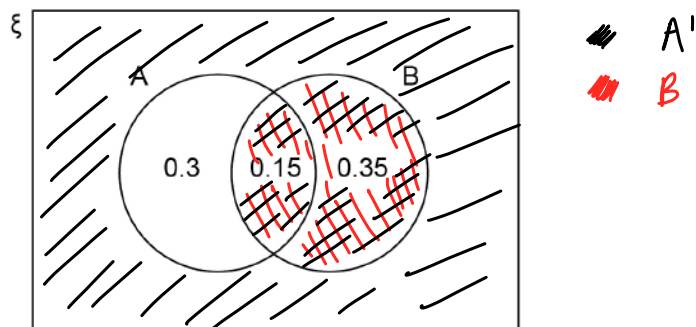
$$\therefore P(\text{blue eyes}) = \frac{67}{130} = 0.51538 > 0.5$$

Q14

14

A and B are two events.

Some probabilities are shown on the Venn diagram.



Work out $P(A' \cup B)$

[2 marks]

$$0.15 + 0.35 = 0.5$$

Answer 0.5