

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Statistics

Finding averages from grouped data

v1.0

Name _____

Materials

For this paper you must have:

- Mathematical instruments

Information

- The marks for questions are shown in brackets

Advice

- In all calculations, show clearly how you work out your answer

For questions 1 to 4 you must **NOT** use a calculator.



Q1.

Here is some information about the time spent on social media by 40 women and 40 men last week.

Time spent, t (hours)	Number of women	Number of men
$2 < t \leq 5$	12	10
$5 < t \leq 8$	11	17
$8 < t \leq 11$	14	9
$11 < t \leq 14$	2	4
$14 < t \leq 17$	1	0

Tick **one** box for each statement.

	Definitely true	Might be true	Cannot be true
Three of the women spent more than 11 hours on social media.	☐	☐	☐
The range for the men is 15 hours.	☐	☐	☐
The women have a higher median than the men.	☐	☐	☐

(Total 3 marks)

Q2.

The table shows information about the times for 100 people to complete a task.

Time, t , (minutes)	Frequency
$0 < t \leq 5$	17
$5 < t \leq 10$	28
$10 < t \leq 15$	33
$15 < t \leq 20$	22

The shortest time was 2 minutes 50 seconds.

- (a) The shortest time was 2 minutes 50 seconds.
Work out the greatest possible range of times.

(2)

- (b) Jack says,
“The median time is exactly 10 minutes.”
Give a reason why he **must** be incorrect.

(1)

(Total 3 marks)

Q3.

The table shows information about the times for 10 people to complete a task.

Time, t (minutes)	Frequency
$0 < t \leq 20$	1
$20 < t \leq 40$	6
$40 < t \leq 60$	3

These statements are about the mean and range of the actual times.

Tick the correct box for each statement.

	True	False
The mean could be less than 20 minutes	☐	☐
The mean could be more than 40 minutes	☐	☐
The mean could be less than 40 minutes	☐	☐
The range could be more than 40 minutes	☐	☐
The range could be less than 40 minutes	☐	☐
The range could be more than 60 minutes	☐	☐

(Total 4 marks)

Q4.

The table shows information about the times for 100 people to complete a task.

Time, t , (minutes)	Frequency
$0 < t \leq 5$	17
$5 < t \leq 10$	28
$10 < t \leq 15$	33
$15 < t \leq 20$	22

The shortest time was 3 minutes 40 seconds.

(a) Work out the **greatest** possible range of times.

(2)

(b) Jack says,

“The median time is exactly 10 minutes.”

Give a reason why he **must** be incorrect.

(1)

(Total 3 marks)

For the rest of the questions, you may use a calculator.



Q5.

Here is a grouped frequency table.

Value, v	Frequency	Midpoint	
$0 \leq v < 10$	16	5	
$10 \leq v < 20$	22	15	
$20 \leq v < 30$	13	25	
$30 \leq v < 40$	9	35	
Total = 60			

Work out an estimate of the mean value.

(Total 3 marks)

Q6.

The times that 80 customers waited at a supermarket checkout are shown.

Time, t (minutes)	Frequency
$0 \leq t < 2$	32
$2 \leq t < 4$	19
$4 \leq t < 6$	20
$6 \leq t < 8$	7
$8 \leq t < 10$	2

(a) In which class interval is the median?

Circle your answer.

$0 \leq t < 2$

$2 \leq t < 4$

$4 \leq t < 6$

$6 \leq t < 8$

(1)

(b) The manager of the supermarket says,

“90% of our customers wait less than 6 minutes.”

Does the data support this statement?

You **must** show your working.

(1)

(Total 2 marks)

Q7.

The table shows the waiting time, T , of people at a health centre.

Time waited, T	Number of people		
$0 < T \leq 10$	42		
$10 < T \leq 20$	30		
$20 < T \leq 30$	8		
More than 30	0		

(a) Work out an estimate of the mean time waited per person.

(4)

(b) On a different day the waiting times were recorded for a different group of 80 people.

Time waited, T	Number of people
$0 < T \leq 10$	35
$10 < T \leq 20$	33
$20 < T \leq 30$	12

Without further calculation, decide whether the estimated mean for this group of people will be different from the estimated mean in part (a).

Tick a box.

☐

Higher

☐

Lower

☐

The same

Give a reason for your answer.

(2)

(Total 6 marks)

Q8.

Here is a frequency table for the times taken to solve a puzzle.

Times, t (min)	Frequency
$0 < t \leq 1$	38
$1 < t \leq 2$	16
$2 < t \leq 3$	17
$3 < t \leq 4$	15
$4 < t \leq 5$	14
Total = 100	

Which class interval contains the median?

(Total 2 marks)

Q9.

The times that 60 customers waited at a supermarket checkout are shown.

Time, t (minutes)	Frequency
$0 \leq t < 2$	18
$2 \leq t < 4$	10
$4 \leq t < 6$	16
$6 \leq t < 8$	12
$8 \leq t < 10$	4

(a) Write down the class interval that contains the median.

(1)

(b) The manager of the supermarket says,
 “Over 90% of our customers wait less than eight minutes.”
 Does the data support this statement?

Yes

☐

No

☐

You **must** show your working.

(2)

(Total 3 marks)

Q10.

The amounts spent on clothes by 40 boys and 40 girls in one month were recorded.

The table shows information about the amounts spent by the boys.

Amount, x (£)	Midpoint	Number of boys	
$0 \leq x < 20$		22	
$20 \leq x < 40$		9	
$40 \leq x < 60$		6	
$60 \leq x < 80$		3	
		Total = 40	

The mean for the girls was £35

Estimate the mean for the girls as a percentage of the mean for the boys.

(Total 5 marks)

Q11.

Here is some information about the times taken by 40 people to fill in a form.

Time, t minutes	Number of people
$0 < t \leq 5$	3
$5 < t \leq 10$	9
$10 < t \leq 15$	11
$15 < t \leq 20$	17

In which class interval is the median?

$0 < t \leq 5$

$5 < t \leq 10$

$10 < t \leq 15$

$15 < t \leq 20$

(Total 1 mark)

Q12.

Here is a frequency table for the times taken to solve a puzzle.

Times, t (min)	Frequency
$0 < t \leq 1$	38
$1 < t \leq 2$	16
$2 < t \leq 3$	17
$3 < t \leq 4$	15
$4 < t \leq 5$	14
Total = 100	

Circle the class interval that contains the median.

$0 < t \leq 1$

$1 < t \leq 2$

$2 < t \leq 3$

$3 < t \leq 4$

(Total 1 mark)

Q13.

A charity collection was made.

Information about the amounts given by men is shown in the table.

Amount, x (£)	Midpoint	Number of men	
$0 \leq x < 5$		11	
$5 \leq x < 10$		7	
$10 \leq x < 15$		2	
		Total = 20	

The mean amount given by **women** was £6.30 per person.

Compare the mean amounts given by men and women.

(Total 4 marks)

Q14.

A 10 km race took place.

Information about the times achieved by women are in the table.

Time (minutes)	Midpoint	Number of women	
$50 \leq m < 60$		1	
$60 \leq m < 80$		6	
$80 \leq m < 100$		13	
		Total = 20	

The mean time achieved by **men** was 81 minutes.

Compare the mean times achieved by men and women.

(Total 4 marks)

Q15.

The table shows information about the distances walked by 120 students on their way to school one week.

Distance, x (miles)	Frequency		
$0 < x \leq 5$	20		
$5 < x \leq 10$	48		
$10 < x \leq 15$	30		
$15 < x \leq 20$	22		
Total = 120			

Work out an estimate for the mean distance.

(Total 3 marks)

Q16.

Here is some information about 20 trains leaving a station.

Number of minutes late, t	Number of trains	Midpoint	
$0 \leq t < 5$	12		
$5 \leq t < 10$	7		
$10 \leq t < 15$	1		
$t \geq 15$	0		

- (a) Work out an estimate of the mean number of minutes late.

(3)

- (b) The station manager looks at the information in more detail.

Number of minutes late, t	Number of trains
$0 \leq t < 2$	12
$2 \leq t < 4$	0
$4 \leq t < 6$	7
$6 \leq t < 8$	0
$8 \leq t < 10$	0
$10 \leq t < 12$	1

He works out an estimate of the mean using this information.

How does his estimate compare with the answer to part (a)?

Tick **one** box.

☐

Higher than part (a)

☐

Same as part (a)

☐

Lower than part (a)

☐

Not possible to tell

(1)

(Total 4 marks)

Q17.

Here is information about the scores, t , of class A in a test.

Score	Frequency		
$0 < t \leq 10$	4		
$10 < t \leq 20$	8		
$20 < t \leq 30$	9		
$30 < t \leq 40$	3		
$40 < t \leq 50$	1		

The mean score for class B in the same test is 22

Dan says,

“On average, class A did better than class B.”

Is he correct?

You **must** show your working.

(Total 4 marks)

Q18.

The table shows information about the pay per hour of 40 people.

Pay per hour, x (£)	Frequency		
$5 < x \leq 15$	14		
$15 < x \leq 25$	12		
$25 < x \leq 35$	11		
$35 < x \leq 45$	2		
$45 < x \leq 55$	1		
Total = 40			

- (a) Which group contains the median pay per hour?

Circle your answer.

$5 < x \leq 15$ $15 < x \leq 25$ $25 < x \leq 35$ $35 < x \leq 45$ $45 < x \leq 55$

(1)

- (b) Work out an estimate of the mean pay per hour.

(4)

(Total 5 marks)

Q19.

An athlete runs in 10 000 metre races.

The table shows the times for his last 20 races.

Time, t (minutes)	Frequency		
$30 < t \leq 32$	3		
$32 < t \leq 34$	9		
$34 < t \leq 36$	6		
$36 < t \leq 38$	2		

Calculate an estimate of his mean time.

(Total 4 marks)

Q20.

80 patients gave information about how long they waited to see the doctor.

Time, T , (minutes)	Frequency		
$0 \leq T < 10$	5		
$10 \leq T < 20$	22		
$20 \leq T < 30$	28		
$30 \leq T < 40$	21		
$40 \leq T < 50$	4		

- (a) Work out an estimate of the mean time that the patients waited.

(4)

- (b) The doctor says, “70% of our patients wait less than 30 minutes to be seen.”

Is she correct?

You **must** show your working.

(3)

(Total 7 marks)

Q21.

The pay of 100 students with Saturday jobs was recorded.

Pay (£ x)	Number of students
$0 < x \leq 10$	2
$10 < x \leq 20$	44
$20 < x \leq 30$	41
$30 < x \leq 40$	1
$40 < x \leq 50$	2
$50 < x \leq 60$	4
$60 < x \leq 100$	6
Total = 100	

- (a) How many were paid more than £30?

(1)

- (b) How many were paid £5 or less?

Circle your answer.

0

1

2

Cannot tell

(1)

- (c) Work out the class interval that contains the median.

(1)

(Total 3 marks)

Q22.

Paula records the times she takes to run 30 marathons.

Time, t (minutes)	Frequency	Midpoint	
$200 < t \leq 240$	16		
$240 < t \leq 280$	4		
$280 < t \leq 320$	4		
$320 < t \leq 360$	0		
$360 < t \leq 400$	2		
$400 < t \leq 440$	0		
$440 < t \leq 480$	2		
$480 < t \leq 520$	2		

- (a) Write down the modal class.

(1)

- (b) Use midpoints to calculate an estimate of the mean time Paula takes.

(3)

- (c) Paula runs each marathon in a faster time.

Which average better represents her current performance?

Tick a box.

Modal class

☐

Mean

☐

Explain your answer.

(1)

(Total 5 marks)

Q23.

The table summarises the amounts spent, £A, by customers in a shop in one hour.

Amount spent, £A	Number of customers		
$0 < A \leq 10$	18		
$10 < A \leq 20$	15		
$20 < A \leq 30$	7		
More than 30	0		

- (a) Work out an estimate of the mean amount spent per customer in one hour.

(4)

- (b) Using the till receipts, the manager works out the actual mean amount spent for each group.

Amount spent, £A	Number of customers	Actual mean amount spent
$0 < A \leq 10$	18	£4.50
$10 < A \leq 20$	15	£15.00
$20 < A \leq 30$	7	£23.40

Without further calculation, decide whether the actual mean of the 40 customers will be different from the estimated mean in part (a).

Tick a box.

☐

Higher

☐

Lower

☐

The same

Give a reason for your answer.

(2)

(Total 6 marks)

Q24.

- (a) Millie records her reaction time with and without glasses.

Reaction time with glasses

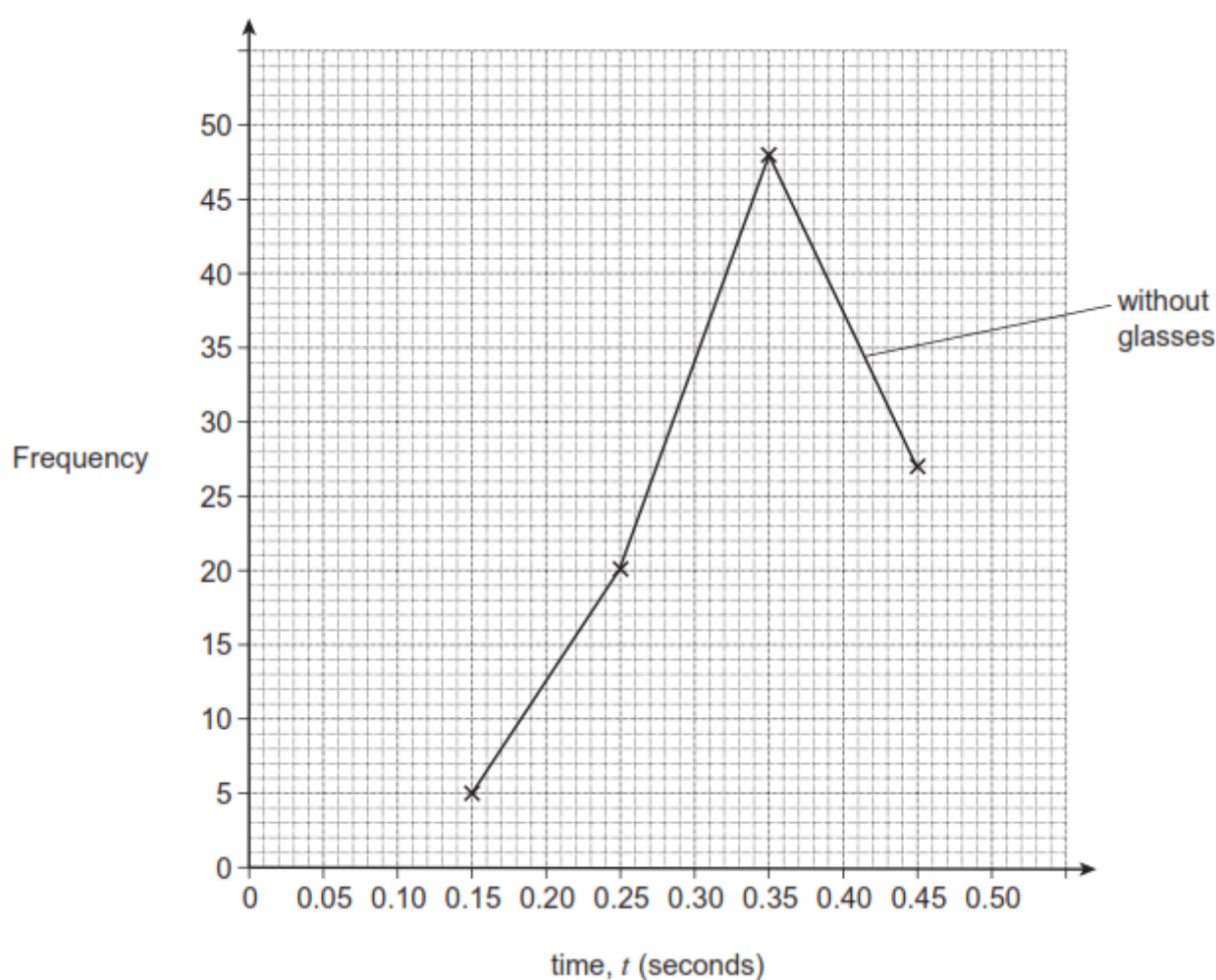
Time, t (seconds)	Frequency
$0.1 \leq t < 0.2$	31
$0.2 \leq t < 0.3$	42
$0.3 \leq t < 0.4$	19
$0.4 \leq t < 0.5$	8
Total = 100	

Calculate an estimate of the mean reaction time **with** glasses.

(4)

- (b) The grid shows a frequency polygon for her reaction time **without** glasses.
On the same grid draw a frequency polygon for her reaction time **with** glasses.

Reaction time



(2)

- (c) An estimate of the mean reaction time **without** glasses is 0.347 seconds.
Make **two** comparisons between reaction time with and without glasses.

(2)

(Total 8 marks)

Q25.

Liam takes part in long jump competitions.

Here is some information about 40 of his jumps.

Length of jump, d metres	Number of jumps	Midpoint	
$7.0 \leq d < 7.4$	15		
$7.4 \leq d < 7.8$	18		
$7.8 \leq d < 8.2$	7		
	Total = 40		

Work out an estimate of the mean distance of these 40 jumps.

Give your answer as a decimal.

(Total 3 marks)

Q26.

This table shows information about the weights of 200 rabbits.

Weight, w (grams)	Frequency	Midpoint	
$60 < w \leq 70$	101	65	
$70 < w \leq 80$	64	75	
$80 < w \leq 90$	25	85	
$90 < w \leq 100$	10	95	
	Total = 200		

- (a) Tick whether each statement is true or false.

You can use the table to calculate the exact median.

You can use the table to work out the weight of the heaviest rabbit.

True	False
☐	☐
☐	☐

(1)

- (b) Calculate an estimate of the mean weight of the 200 rabbits.

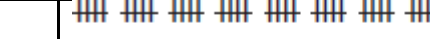
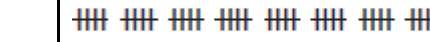
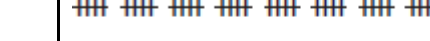
(3)

- (c) Here are the weights, in grams, of 10 more rabbits.

76.2	89.4	93.1	99.7	86.8	79.2	82.6	91.9	88.0	95.4
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Complete the table with:

- tallies for these 10 rabbits
- the frequencies for all 210 rabbits.

Weight, w (grams)	Tally	Frequency
$60 < w \leq 70$		
$70 < w \leq 80$		
$80 < w \leq 90$		
$90 < w \leq 100$		
		Total = 210

(2)

- (d) Which **two** of these diagrams could you use to represent this grouped data?

Circle your answers.

stem-and-leaf

frequency polygon

scatter graph

histogram

(1)

(Total 7 marks)

Questions 27 to 31 are **higher** tier only.

Q27.

200 people recorded the time they spent on social media one day.
The table shows the results.

Time, t (mins)	Frequency	Midpoint	
$0 \leq t < 30$	24		
$30 \leq t < 50$	76		
$50 \leq t < 60$	52		
$60 \leq t < 90$	48		
Total = 200			

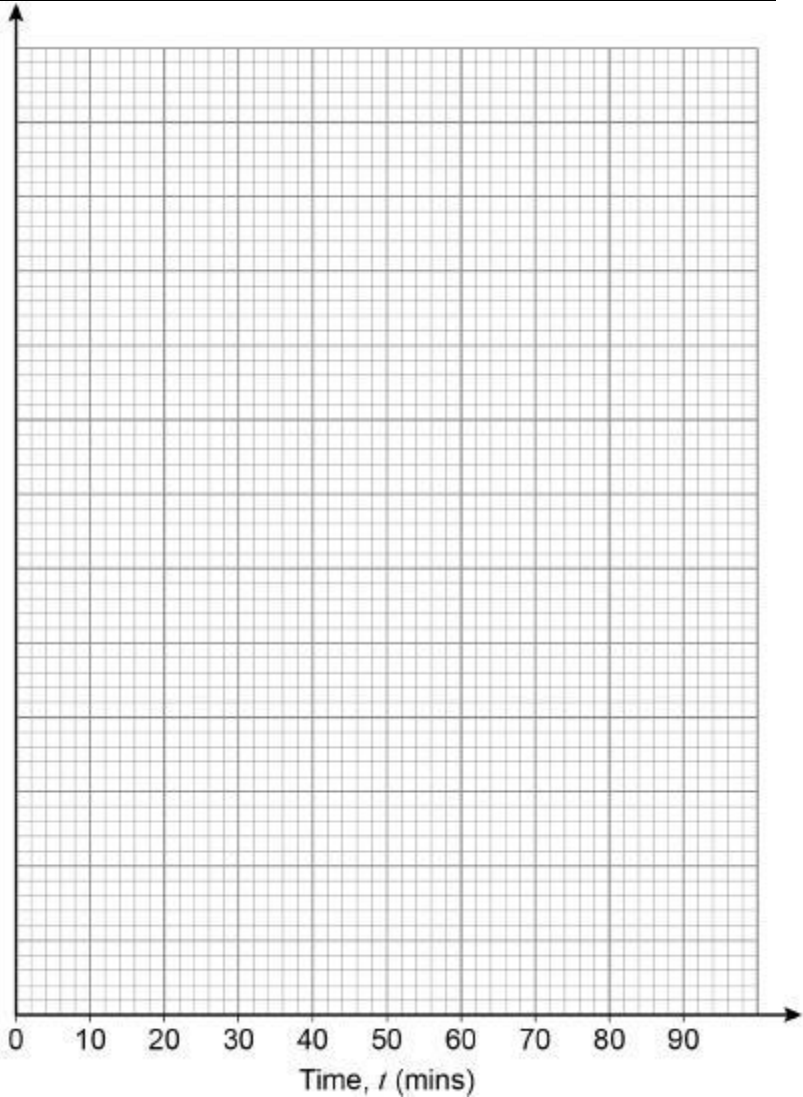
(a) Work out an estimate of the mean time.

(3)

(b) Draw a histogram to represent the results.

Time, t (mins)	Frequency	Class width	
$0 \leq t < 30$	24		
$30 \leq t < 50$	76		
$50 \leq t < 60$	52		
$60 \leq t < 90$	48		

Frequency
density



(4)

(Total 7 marks)

Q28.

The number of goals scored by 20 players in a season is shown.

Number of goals	Frequency	Midpoint	
0 to 4	6		
5 to 9	11		
10 to 14	3		
Total = 20			

Work out an estimate of the mean number of goals per player.

Give your answer as a decimal.

(Total 3 marks)

Q29.

The ages of 100 people who entered a theme park one day were recorded.

Age (years)	Number of people
$0 < a \leq 15$	12
$15 < a \leq 30$	35
$30 < a \leq 45$	28
$45 < a \leq 70$	21
$70 < a$	4

(a) There is a special offer:

18 years and under are free

Over 18s pay £36

On average 8000 people visit the theme park each day.

Estimate the total amount of money taken each day.

(3)

(b) Jane says,

“12% of people entering the theme park are under 15 years of age.”

Explain why she might be wrong.

(1)

(Total 4 marks)

Q30.

Here is some information about the number of books read by a group of people in 2014

One of the frequencies is missing.

Number of books	Frequency	Midpoint	
0 – 4	16	2	
5 – 9		7	
10 – 14	20	12	
15 – 19	10	17	

Midpoints are used to work out an estimate for the mean number of books read.

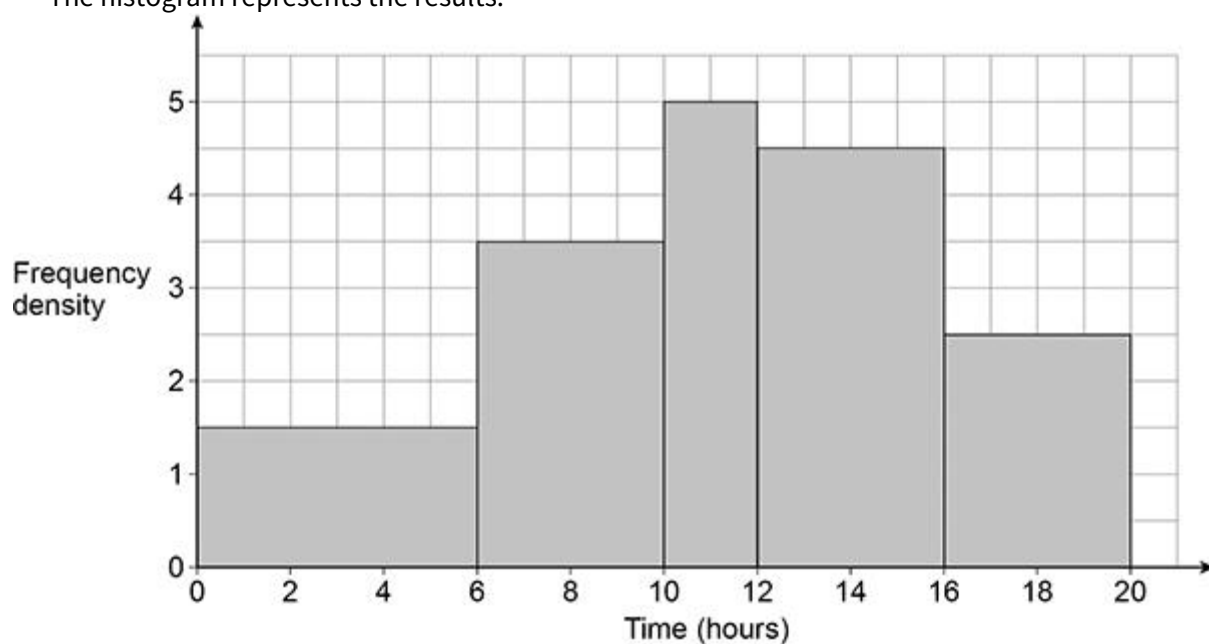
The answer is 8.5

Work out the missing frequency.

(Total 5 marks)

Q31.

61 students recorded how many hours they spent revising for a test.
The histogram represents the results.



- (a) Work out an estimate of the mean time the 61 students spent revising.
You may use the table to help you.

Time, x (hours)	Frequency	Midpoint	
$0 \leq x < 6$			
$6 \leq x < 10$			
$10 \leq x < 12$			
$12 \leq x < 16$			
$16 \leq x < 20$			

(4)

- (b) Give a reason why the answer to part (a) is an estimate.

(1)

(Total 5 marks)