Maths

Year 9 Higher

Week beginning 13th July

Complete the summary question booklet and use the hints and tips booklet to help. Answers for all are provided.

Lockdown summary questions - Higher

Section A – Averages and quartiles from lists

Q1. A company makes bags of toffees.

The company checks that the bags contain 50 toffees.

(a) The number of toffees in a sample of 11 bags is

<div align="center">51   50   51   51   52   43   50   50   51   51   50</div>

(i) Write down the mode.

Answer _____

(ii) Work out the median.
You **must** show your working.

_____

_____

Answer _____

(iii) Work out the mean.

_____

_____

Answer _____

(b) The company claims there are 50 toffees in a bag.

(i) Give a reason why this claim seems fair.

_____

_____

(ii) Give a reason why this claim seems unfair.

_____

_____

(c) The company uses the first 11 bags produced each Monday to check the contents.

State **two** ways this method of sampling can be improved.

1. _____

_____

2. _____

_____

Q2. Four numbers have a mean of 10

The median is 8

Two of the numbers are 1 and 5

Work out the other two numbers.

_____

_____

_____

_____

_____

_____

Answer _____ and _____

Q3. Five **whole** numbers are written in order.

4   7 x y 11

The mean and median of the five numbers are the same.

Work out the values of x and y.

_____

_____

_____

x = _____ y = _____

Section B – Averages from and ungrouped frequency tables

Q4. (a)   Write down four **different** numbers that have

a **median** of 5
and   a **range** of 7

Put the numbers in order.

_____

_____

Answer _____ , _____ , _____ , _____

(b)   The table shows the scores of 20 students in a test.

Score	Frequency
7	6
8	9
9	4
10	1
Total	20

Work out the mean score.

_____

_____

Answer _____

Q5. The table shows information about the marks of 30 students in a test.

Mark	Frequency
14	2
15	10
16	2
17	3
18	13
	Total = 30

Students who scored less than the mean mark have to retake the test.

How many students have to retake the test?

You **must** show your working.

_____

_____

_____

Answer _____

Section C – Averages from grouped frequency tables

Q6. 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.**   True   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.   ☐   ☐

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

_____

_____

_____

Answer _____grams

(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

Complete the table with:
- tallies for these 10 rabbits
- the frequencies for all 210 rabbits.

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

(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

Q7. The mean mass of a squad of 19 hockey players is 82 kg

A player of mass 93 kg joins the squad.

Work out the mean mass of the squad now.

_____

_____

_____

_____

_____

_____

Answer _____ kg

Q8. 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	☐	☐

Section D – Scatter graphs

Q9. Amina asks 50 people,

"What is your favourite pet?
Choose from cat, dog, rabbit or other."

(a)   Which **two** words describe the type of data she collects from each person?
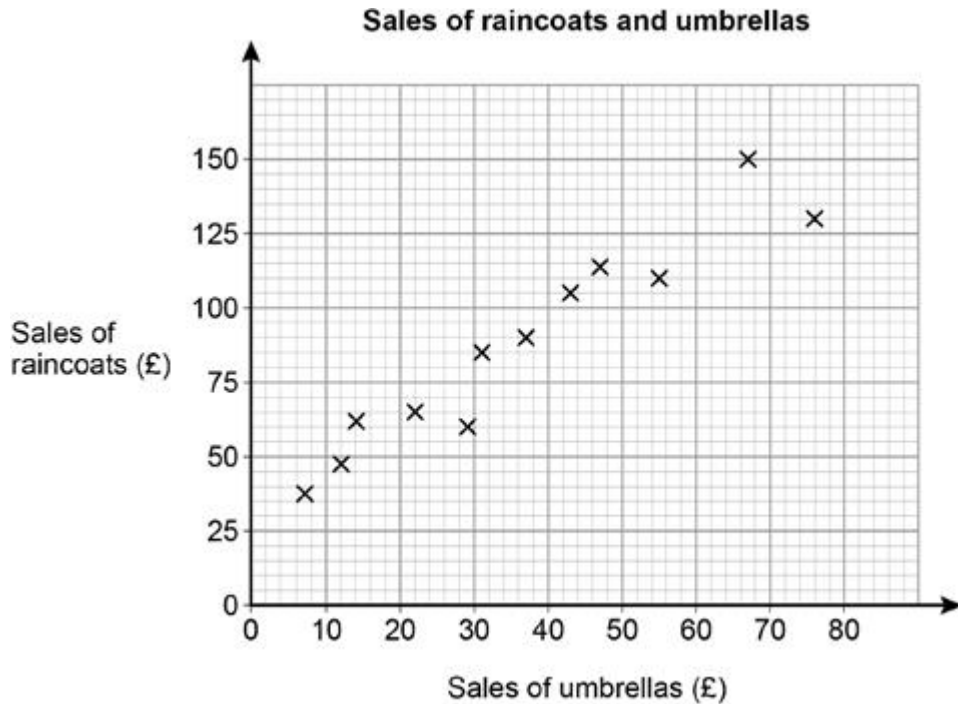Circle your answers.

qualitative   continuous   primary   secondary

(b)   Which **two** diagrams could she use to represent the data?
Circle your answers.

scatter graph   pie chart   bar chart   stem-and-leaf

Q10. A shop sells raincoats and umbrellas.

The scatter graph shows the monthly sales for 12 months.

Sales of raincoats and umbrellas

Sales of raincoats (£) vs Sales of umbrellas (£)

(a)   Write down the type of correlation shown by the graph.

Answer _____ °

(b)   The manager expects the sales of umbrellas next month to be £60

Draw a line of best fit to estimate the sales of raincoats next month.

Answer £ _____

Q11. The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.
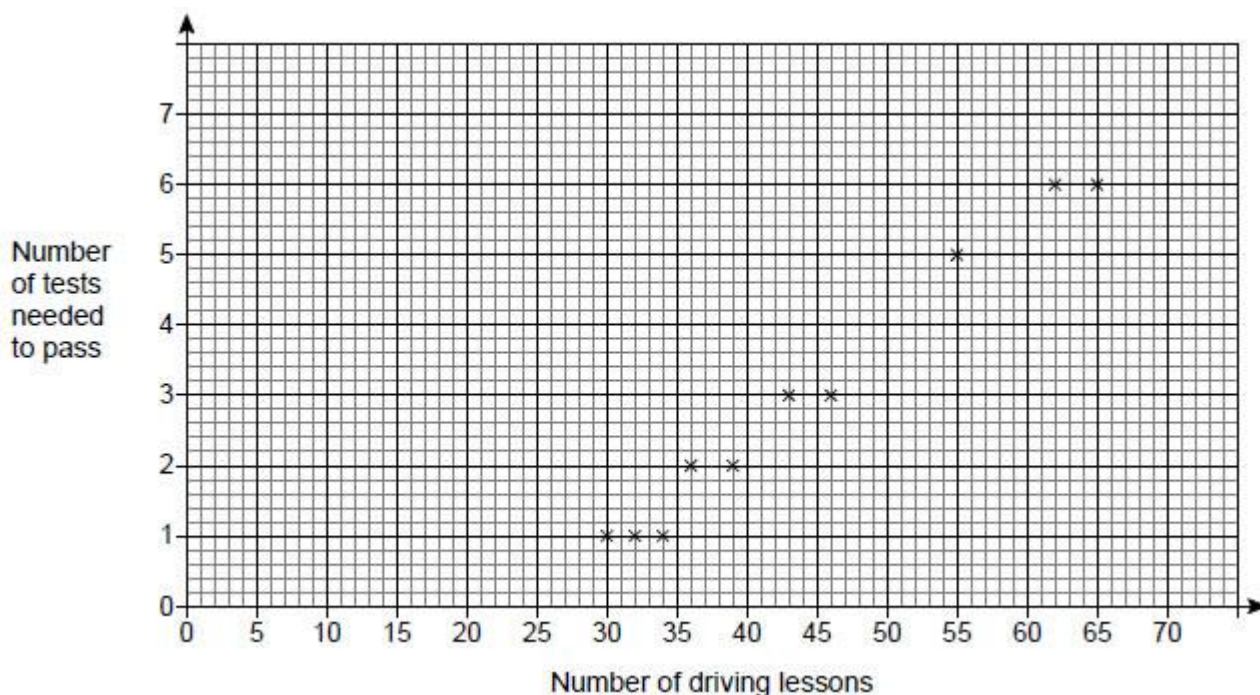
(a) What proportion of the 10 people passed on their first test?

_____

Answer _____

(b) Describe the correlation.

Circle your answer.

strong positive   weak positive   weak negative   strong negative

(c) Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons.

_____

Answer _____

(d) Meera says,

"I can use the trend to predict the number of driving tests needed to pass for any number of driving lessons."

Comment on her statement.

_____

_____

_____

Q12. A company sells ice cream.
The average midday temperature and the sales for each month in 2011 are shown.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average midday temperature (°C)	8	6	11	14	17	21	22	29	20	14	10	4
Sales (tonnes)	23	24	23	30	33	37	39	47	36	28	22	23

(a)   Complete the scatter diagram by plotting the values for July to December.
The values for January to June have been done for you.

Average midday temperature (°C)

(b)   In July 2012, the average midday temperature is predicted to be 25 °C.

Use the graph to estimate the sales of ice cream in July 2012.
Show clearly how you obtain your answer.

_____

_____

Answer _____ tonnes

(c)   In December 2012, the average midday temperature is predicted to be 5 °C higher than in December 2011.

Should the company increase its production of ice cream for December 2012? Tick a box.

Yes ☐   No ☐

Give a reason for your answer.

_____

_____

_____

Section E – Cumulative frequency graphs

Q13. 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		

(a)   on the grid, draw a cumulative frequency graph.
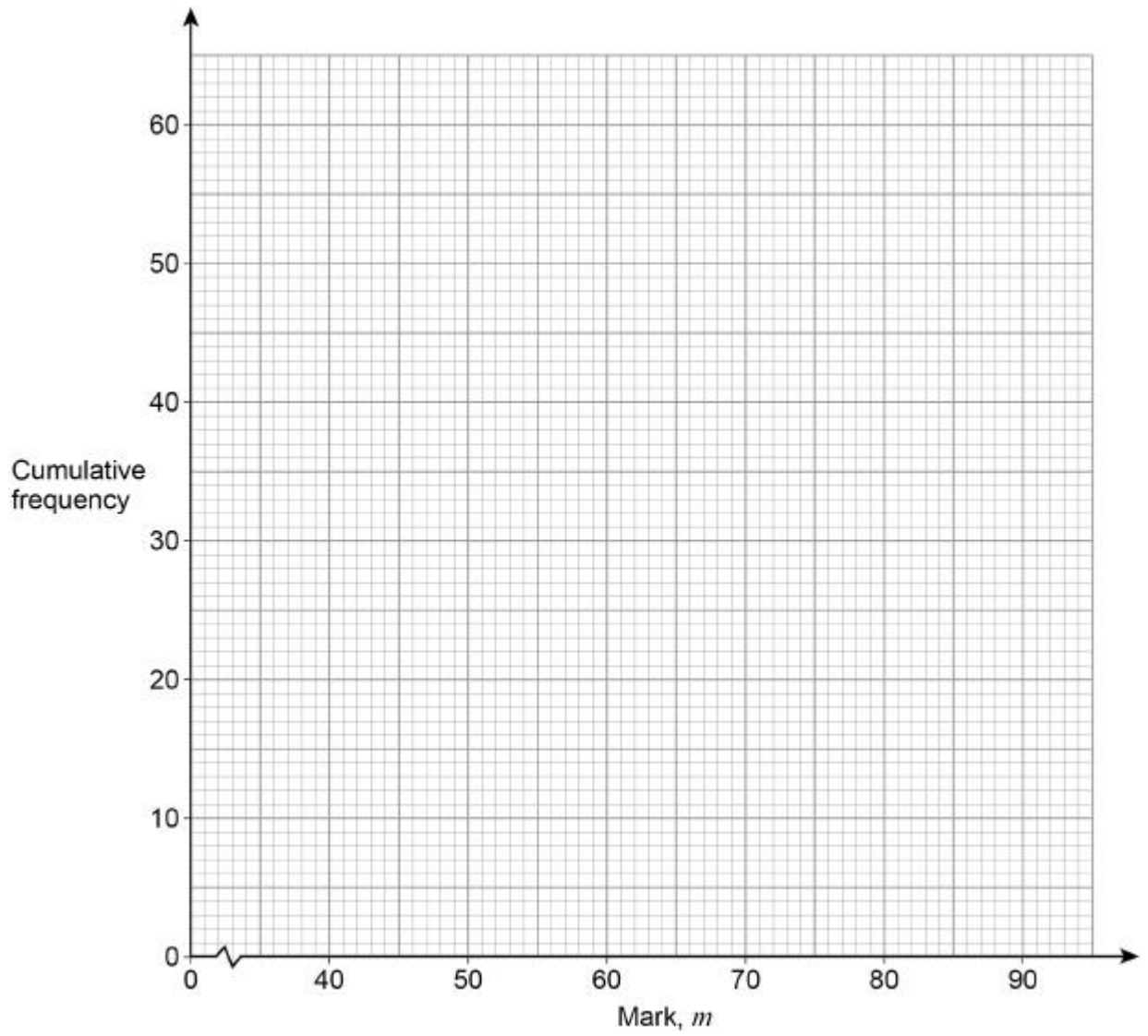
(b) Use your graph to estimate the lowest mark of the top 20% of students.

_____

_____

_____

Answer _____

Q14.

Waist measurements of 40 men

Waist measurement (cm)
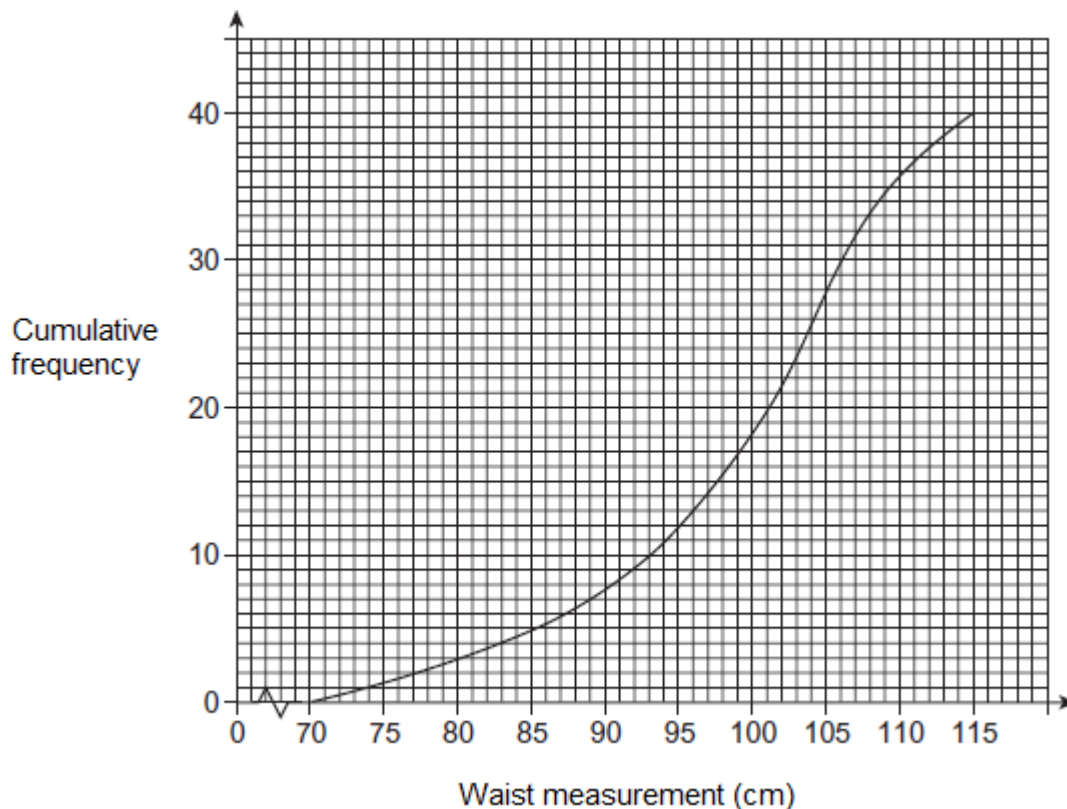
(a)   How many men have a waist measurement of 85 cm or less?

Answer _____

(b)   What is the median waist measurement?

Answer _____ cm

(c)   What is the interquartile range of the waist measurements?

_____

_____

Answer _____ cm

Q15. The table and graph show information about ticket sales.

Type of ticket	Cost
Adult (18 years and over)	£23.00
Child	£19.60

Ticket sales
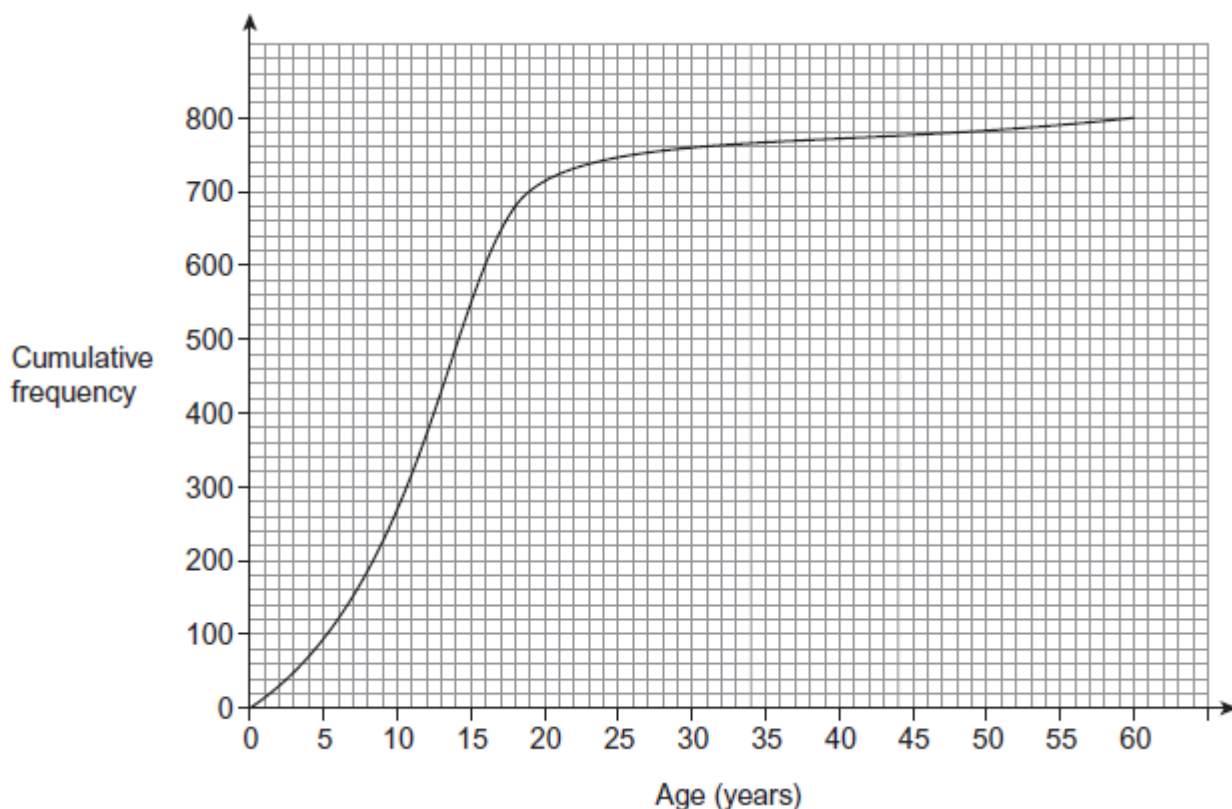
How much did the 800 tickets cost altogether?

_____

_____

_____

_____

_____

_____

_____

Answer £ _____

Section F – Box plots

Q16. Here is a box plot.

Test scores
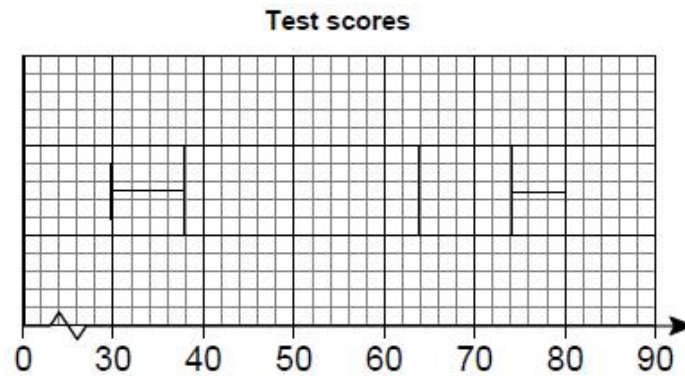
(a) Circle the value of the range.

    33   36   50   80

(b) Circle the value of the median.

    38   55   62   64

(c) Circle the value of the interquartile range.

    34   36   38   50   62

Q17. Here is some information about the length of time cars stayed in a car park.

Shortest time	30 minutes	Lower quartile	2 hours
Longest time	12 hours	Interquartile range	3 hours
		Median time	4 hours

Draw a box plot to show this information.

Time (hours)

Q18. Girls and boys are timed in a race.
The box plot shows information about the times for the girls.

Girls

Time (seconds)

- 25% of the boys take 12 seconds or less

- The interquartile range for the boys is the same as for the girls

- The ratio of median times is girls : boys = 8 : 7

Complete the box plot for boys on the grid below.
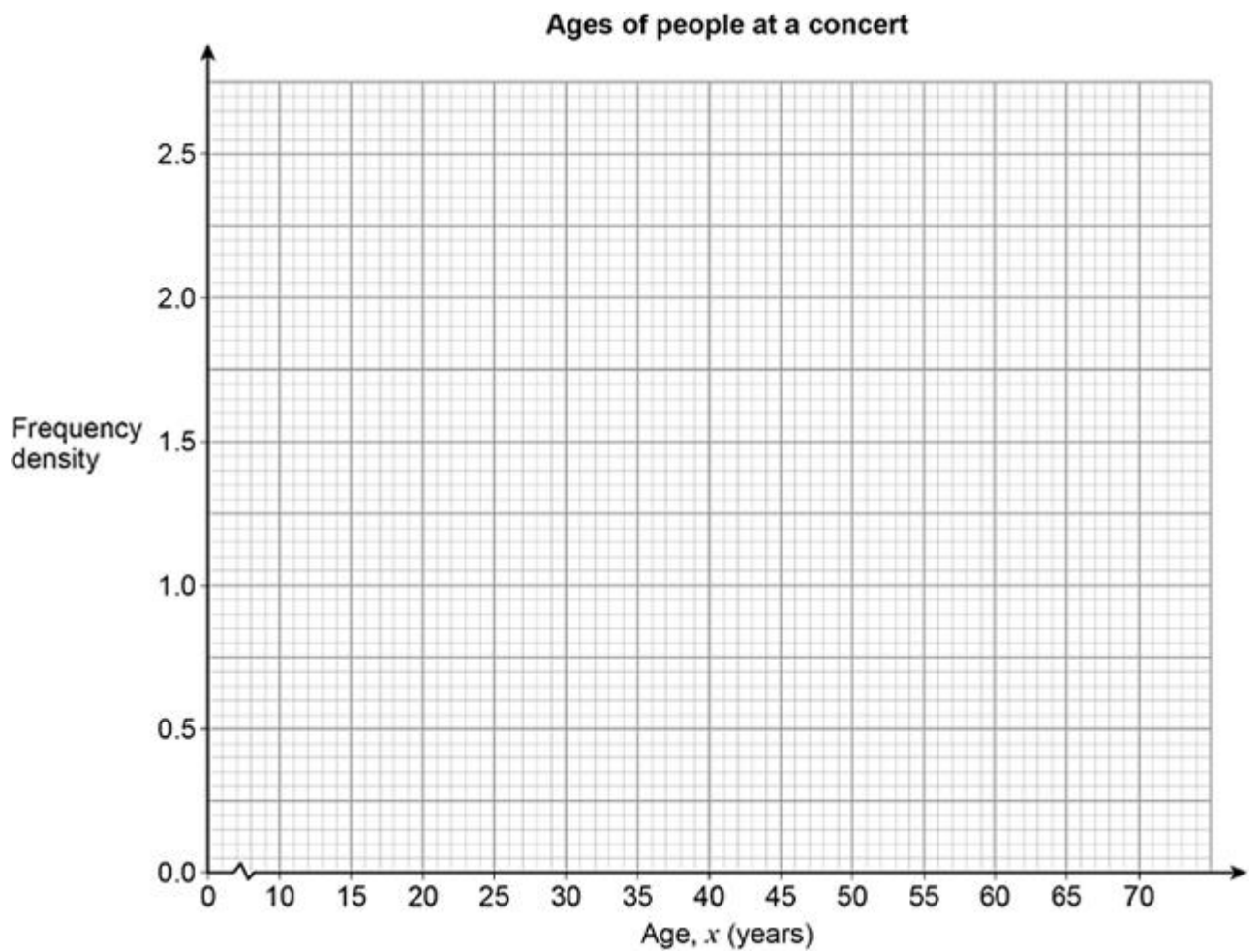The times for the fastest and slowest boys have been plotted for you.

Boys

Time (seconds)
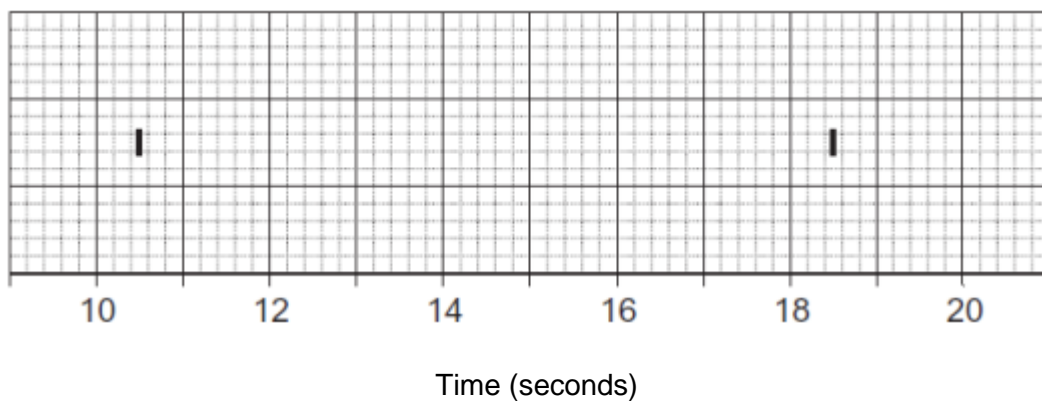
Section G – Histograms

Q19. Here is some information about the ages of people at a concert.

Age, x (years)	Frequency
$10 \leq x < 15$	8
$15 \leq x < 25$	24
$25 \leq x < 40$	30
$40 \leq x < 70$	30

Draw a histogram to represent the information.

Ages of people at a concert

Q20. The histogram shows information about the times some students revised for a test.
The first bar represents students who revised for less than 10 minutes.
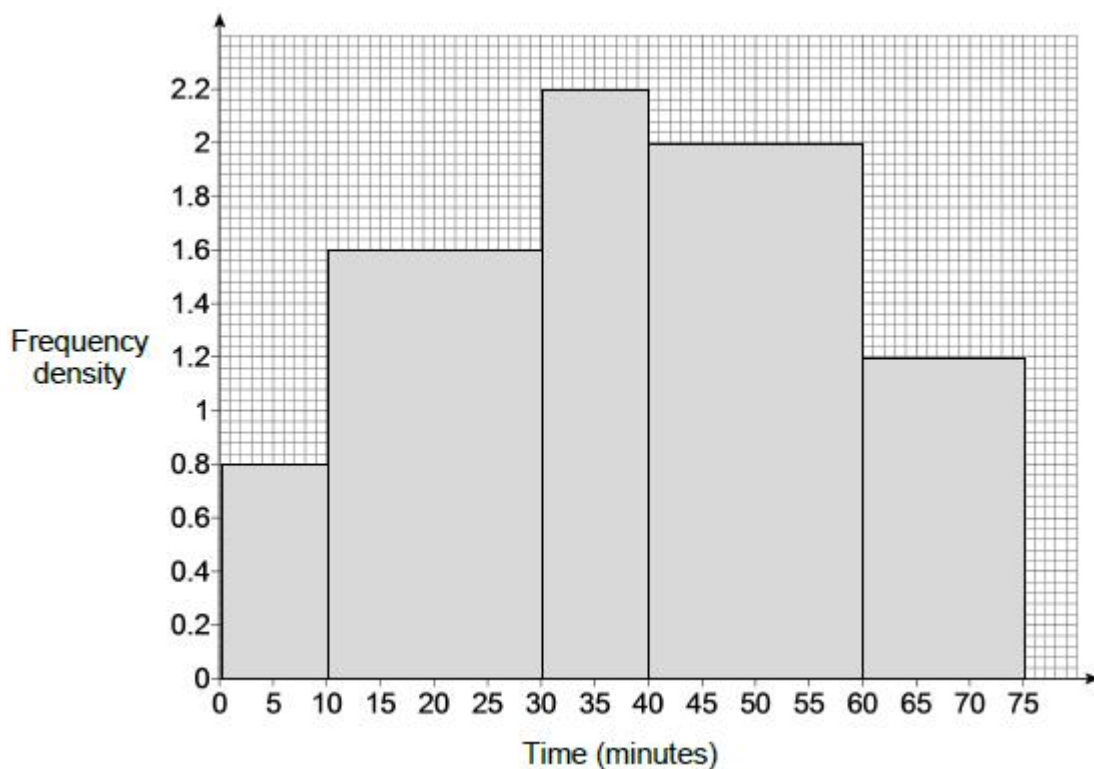
Estimate the number of students who revised for less than 45 minutes.

_____

_____

_____

_____

Answer _____

Q21. The histogram shows the ages, in years, of members of a chess club.
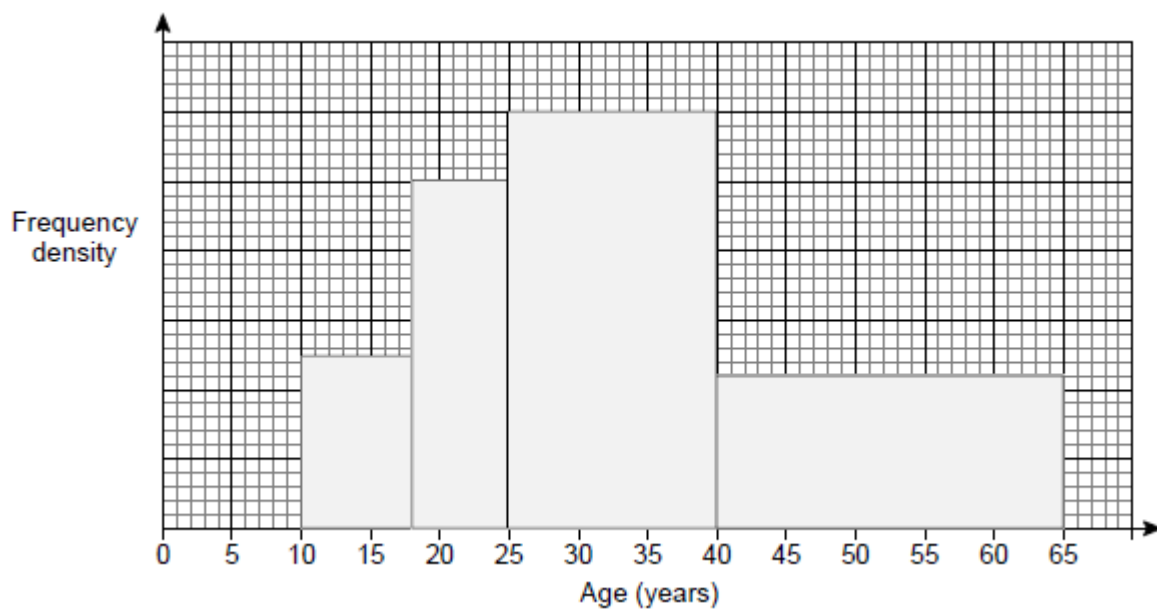
Age (years)

Frequency density

There are 22 members with ages in the range 40 ≤ age < 65

Work out the number of members with ages in the range 25 ≤ age < 40
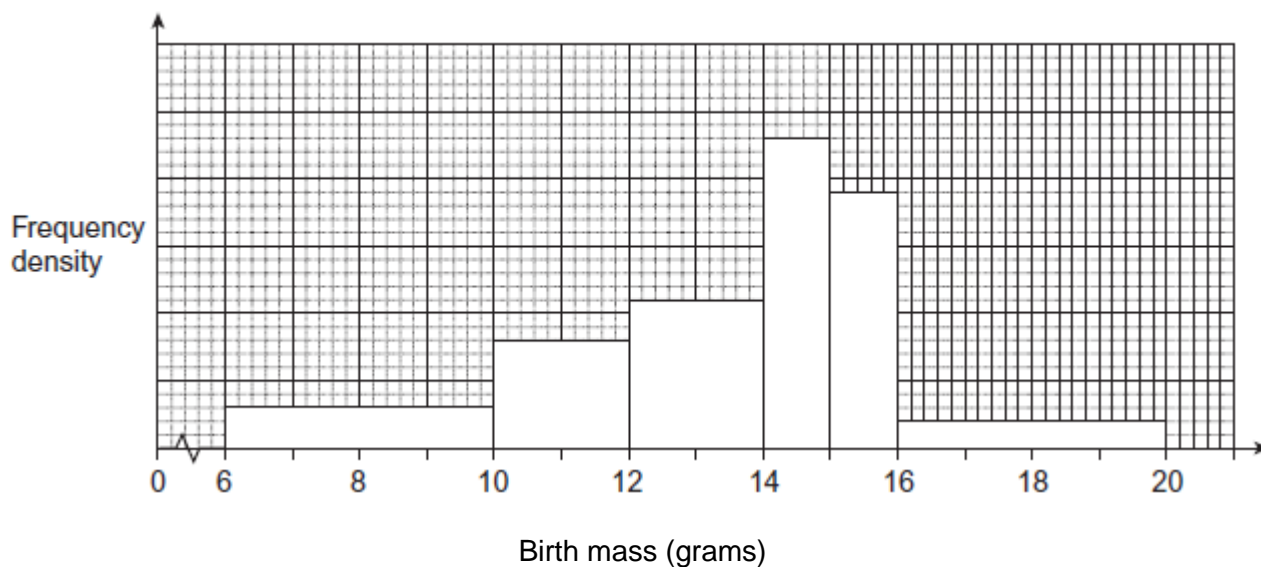
_____

_____

_____

_____

_____

Answer _____

Q22. The table and histogram show some information about the cholesterol level in the blood of 100 hospital patients.

Cholesterol level, c	Frequency
$0 < c \leq 2$	8
$2 < c \leq 3$	13
$3 < c \leq 4$	
$4 < c \leq 5$	19
$5 < c \leq 7$	
$7 < c \leq 10$	15

Cholesterol level, c

(a)   Use the table to complete the histogram.

(b)   Use the histogram to complete the table.

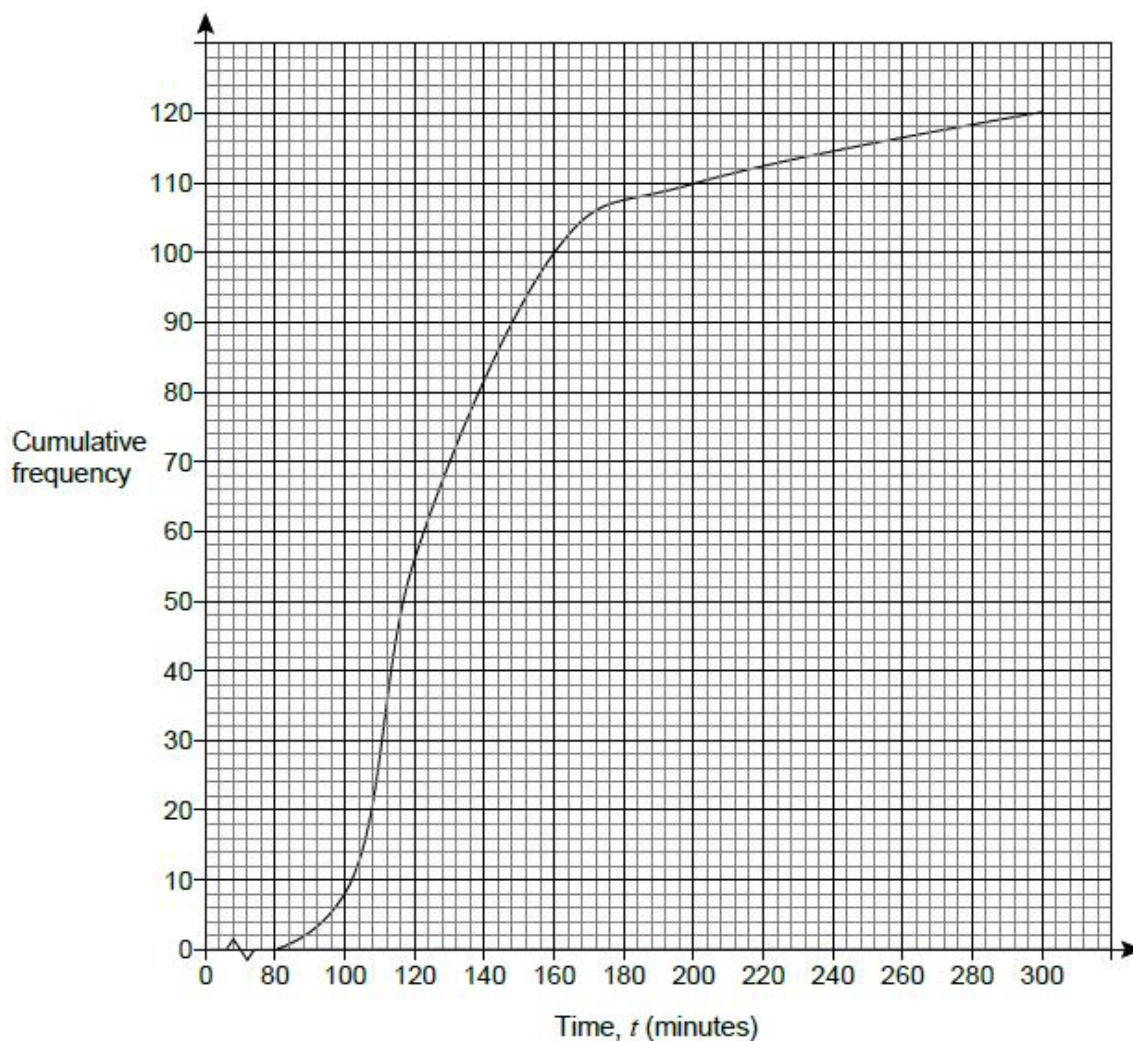**Q23.** The histogram represents the birth masses of 500 mice.

Birth mass (grams)

Work out the number of mice with birth masses below 10 grams.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Answer _____

Q24. The cumulative frequency diagram shows the times taken by runners to complete a half-marathon.
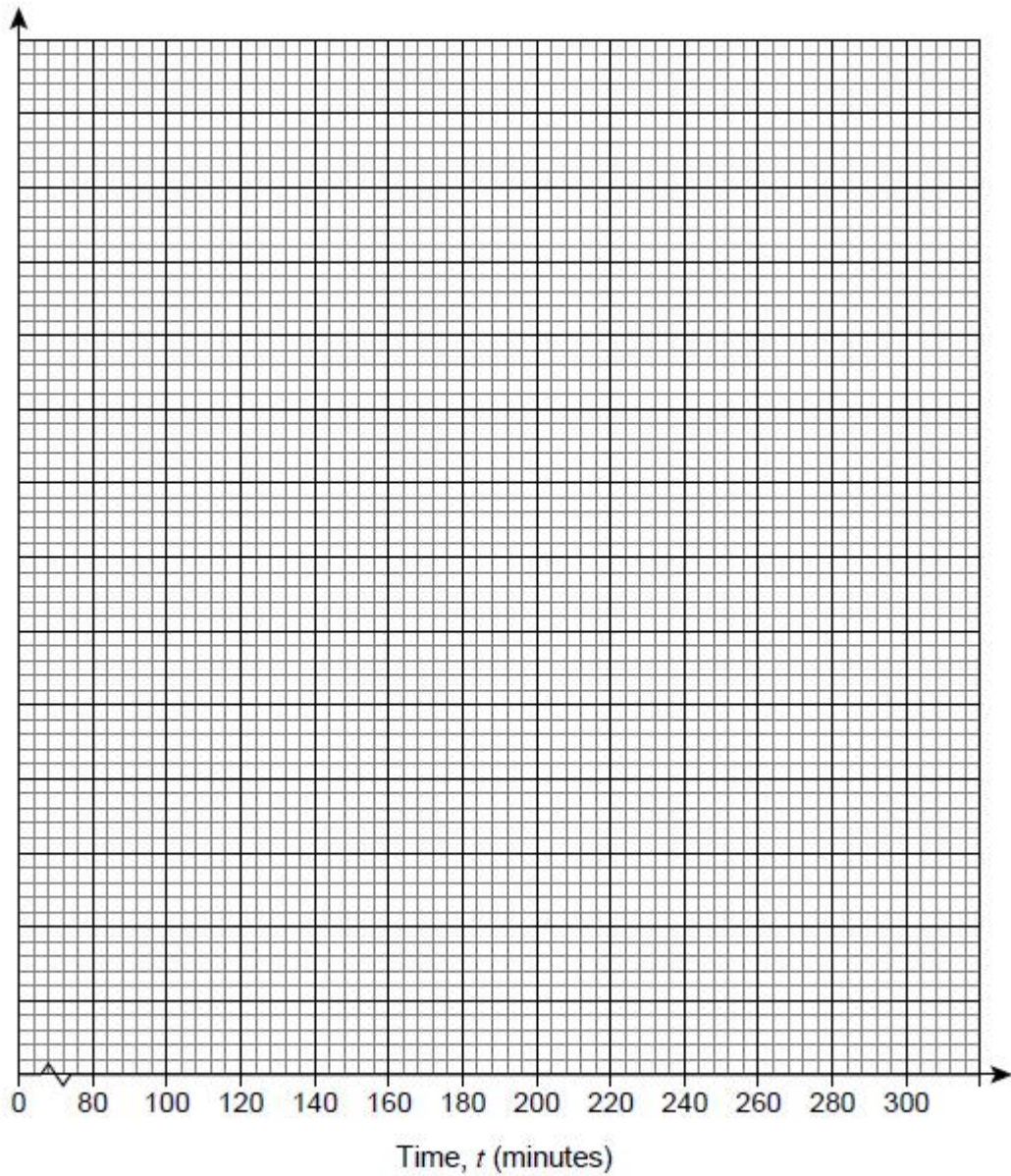

Time, t (minutes)

On the grid, draw a histogram to represent the data.

Use this table to help you.

| Time, t (minutes)	Cumulative frequency	Time, t (minutes)	Frequency	Class width	Frequency density
$t < 100$		$80 \leq t < 100$			
$t < 120$		$100 \leq t < 120$			
$t < 160$		$120 \leq t < 160$			
$t < 200$		$160 \leq t < 200$			
$t < 300$		$200 \leq t < 300$			

Time, t (minutes)

Q25. Here are the histograms for four different sets of data.
Each set of data has the same number of values.

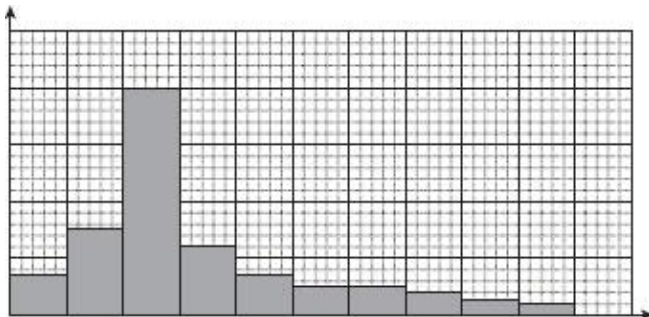Complete the table to match each box plot to a histogram.
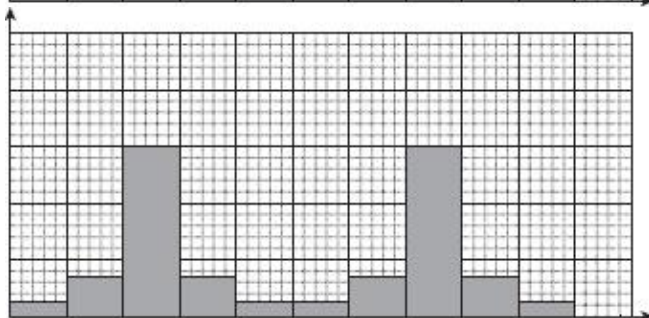
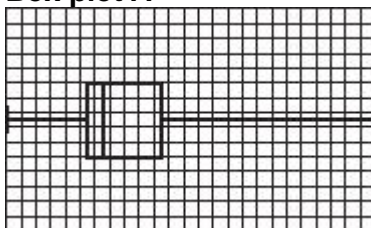| Histogram	Box plot
1	
2	
3	
4	
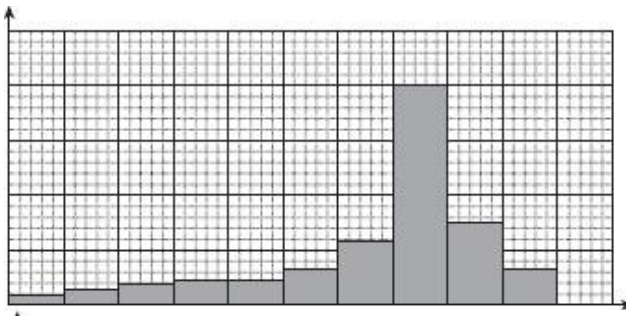
Histogram 1
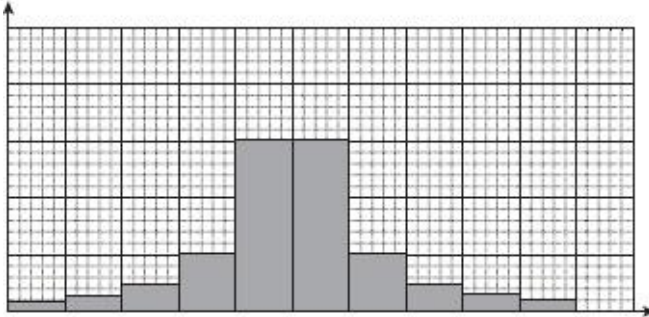
Histogram 2

Histogram 3

Histogram 4

Here are the box plots for the same four sets of data.
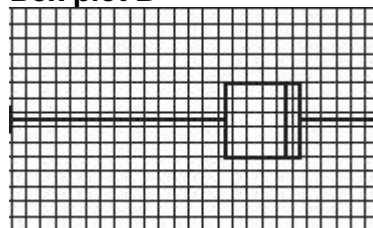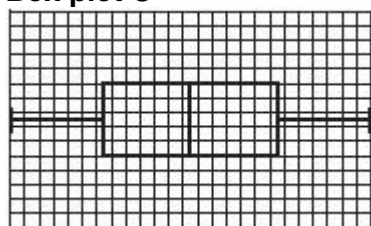
Box plot A

Box plot B

Box plot C

Box plot D
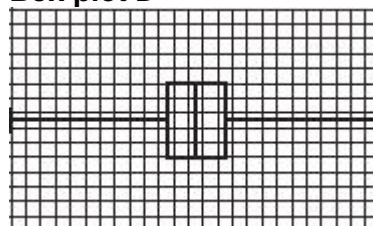
Q1. (a)   (i)   51
           (ii)   51
           (iii) 50

    (b)   (i)   Mean/mode/median are 50 or above
          (ii)   One bag is 43

    (c)   Take a larger sample
        Spread the sample out over days

Q2. 23

Q3. 8 and 10

Q4. (a)   Four different numbers in any order with median 5 and range 7 eg
        1, 4, 6, 8   or   9, 6, 4, 2   etc.

    (b)   8

Q5. 14

Q6. (a)

	✓
	✓

    (b)   72.2

    (c)

₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ I	101
₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩ ₩₩-₩₩ I	66
₩₩ ₩₩ ₩₩ ₩₩ ₩₩ IIII	29
₩₩ ₩₩ IIII	14

    (d)   frequency polygon and histogram

Q7. 82.55 or 82.6

Q8. False
    True
    True
    True
    True
    False

Q9. (a)   qualitative and primary
    (b)   pie chart and bar chart

Q10. (a)   Positive
      (b)   Between 125 and 130

Q11. (a) $\frac{3}{10}$ or 0.3 or 30%
    (b)   strong positive
    (c)   4
    (d)   Refers to danger when extrapolating outside the range of the data given
        or
        Refers to difficulty of interpolation at certain points

Q12. (a)   Points plotted correctly
    (b)   40 − 44
        40 − 44
    (c)   No as the sales at low temperatures are constant
        No as at 9° sales are (about) same

Q13. (a)   (9) 25 45 53 60

       Points plotted with upper class boundaries and cf values
       (±0.5 square)
       Smooth curve or polygon starting at correct point for their points and going through
       all their points (±0.5 square)

    (b)   Between 73 and 75

Q14. (a)   5

   (b)   Between 100.5 and 101.5
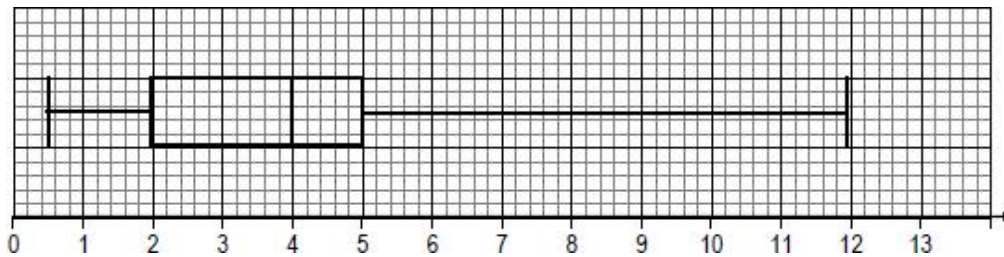   (c)   Between 12 and 14
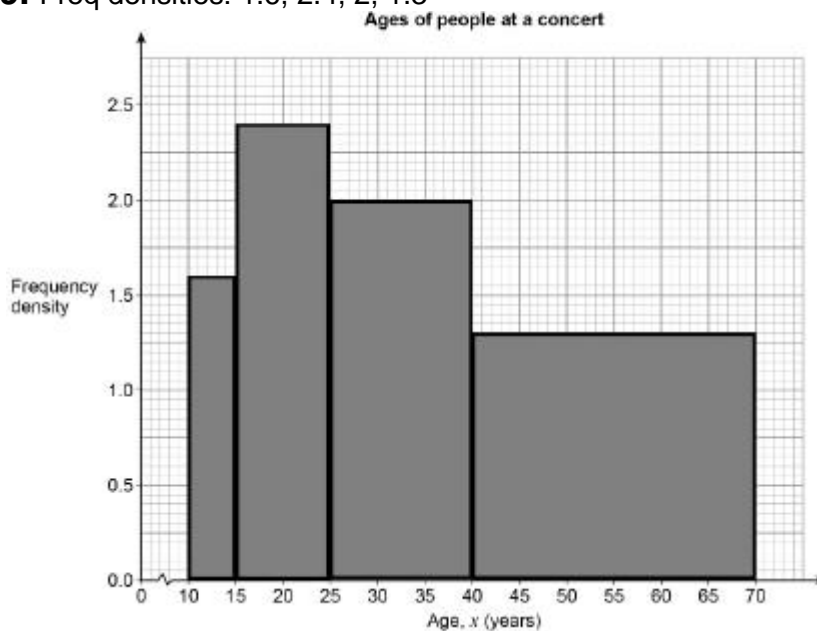
Q15. 16 088

Q16. (a)   50

    (b)   64
    (c)   36

Q17.

Q18. Lower quartile at 12

     Median at 14

Q19. Freq densities: 1.6, 2.4, 2, 1.3

Ages of people at a concert

Q20. 72

Q21. 36

Q22. (a)   Bar between 2 and 3 to a height of 13

         Bar between 4 and 5 to a height of 19
         Bar between 7 and 10 to a height of 5

  (b)   17 and 28

Q23. 60

Q24. (cf values) 8, 56, 100, 110 and 120

   (frequency densities) 0.4 and 2.4 and 1.1 and 0.25 and 0.1

Q25. 1 – B, 2 – D, 3 – A, 4 - C

Lockdown summary questions - Higher

Section A – Averages and quartiles from lists

Q1. A company makes bags of toffees.

The company checks that the bags contain 50 toffees.

(a) The number of toffees in a sample of 11 bags is

51   50   51   51   52   43   50   50   51   51   50

(i) Write down the mode.

appears 5 times, more than any other

Answer ___51___

(ii) Work out the median.
You **must** show your working.

ORDERED LIST   43, 50, 50, 50, 50, ⑤1, 51, 51, 51, 51, 52

6th value

Answer ___51___

(iii) Work out the mean.

$$\frac{550}{11} = 50$$

Answer ___50___

(b) The company claims there are 50 toffees in a bag.

(i) Give a reason why this claim seems fair.

The mean, median and mode are all 50 or just over 50.

(ii) Give a reason why this claim seems unfair.

One bag only has 43, which is significantly below 50

(c) The company uses the first 11 bags produced each Monday to check the contents.

State **two** ways this method of sampling can be improved.

1. Take a larger sample

2. Take the sample on other days, not just Monday

Q2. Four numbers have a mean of 10
The median is 8

Two of the numbers are 1 and 5

Work out the other two numbers.

$mean = \dfrac{total}{4}$

$10 = \dfrac{total}{4}$

$40 = total.$

$40 - 1 - 5 = 34$ total of 2 missing n's.

so 1 & 5 are ealy in list.

$1, 5, \square, \square$

median is 8
so first missing number must be 11
as halfway between 5 & 11 is 8.

add to 34

so $11 + ? = 34$, last n° is 23

Answer __11__ and __23__

add to 34

Q3. Five **whole** numbers are written in order.

4   7 x y 11

Quick Hard algebra method ①

The mean and median of the five numbers are the same.

Work out the values of x and y.

$\dfrac{4+7+x+y+11}{5} = mean = median = x$.

$\dfrac{22+x+y}{5} = x$

$22 + x + y = 5x$

$y = 4x - 22$

$y \geqslant x$

$4x - 22 \geqslant x$

$3x \geqslant 22$

$x \geqslant 7\frac{1}{3}$

$x =$ __8__ $y =$ __10__

y and x WHOLE n°s

try $x = 8$ then $y = 10$
$y = 4x - 22$

4, 7, 8, 10, 11
median = 8
mean = $\dfrac{40}{5} = 8$.
Correct.

Section B – Averages from and ungrouped frequency tables

Q4. (a)   Write down four **different** numbers that have

a **median** of 5
and   a range of 7

Put the numbers in order.

Need 4 different numbers with median of 5, range of 7

Answer ____.____.____.____

Example

1, 4, 6, 8   4, 4, 6, 11
2, 4, 6, 9, 4   1, 4, 6, 8
1, 5, 5, 8   etc. etc.
2, 5, 5, 9   Lots of different possible answers

(b)   The table shows the scores of 20 students in a test.

Score x	Frequency f	fx
7	6	42
8	9	72
9	4	36
10	1	10
Total	20	160

Add an extra column.

Work out the mean score.

$$mean = \frac{160}{20} = 8$$

Answer _____ 8 _____

Q5. The table shows information about the marks of 30 students in a test.

Mark	Frequency	fx
14	2	28
15	10	150
16	2	32
17	3	51
18	13	234
Total = 30		495

Students who scored less than the mean mark have to retake the test.

How many students have to retake the test?

You **must** show your working.

$$mean = \frac{495}{30} = 16.5$$

any students lower than 16.5 score.

so students who scored 16, 15 and 14

in total this is   2 + 10 + 2 =

14 students

Answer _____ 14 students _____

Section C – Averages from grouped frequency tables

Q6. This table shows information about the weights of 200 rabbits.

Weight, w (grams)	Frequency	Midpoint	fx
$60 < w \le 70$	101	65	6565
$70 < w \le 80$	64	75	4800
$80 < w \le 90$	25	85	2125
$90 < w \le 100$	10	95	950
	Total = 200		14440

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

	True	False	
You can use the table to calculate the exact median.	☐	✓	you do not have the original exact weight.
You can use the table to work out the weight of the heaviest rabbit.	☐	✓	

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

$$mean = \frac{14440}{200} = 72.2$$

Answer ___72.2___ grams

(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

Complete the table with:
- tallies for these 10 rabbits
- the frequencies for all 210 rabbits.

Weight, w (grams)	Tally	Frequency
$60 < w \le 70$	|||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| 		101
$70 < w \le 80$	|||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| |||| ||||		66
$80 < w \le 90$	|||| |||| |||| |||| |||| ||||	29
$90 < w \le 100$	|||| |||| ||||	14
		Total = 210

(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

Q7. The mean mass of a squad of 19 hockey players is 82 kg

A player of mass 93 kg joins the squad.

Work out the mean mass of the squad now.

$\text{mean}_{19} = \dfrac{\text{total}_{19}}{19}$

$82 = \dfrac{\text{total}_{19}}{19}$

$82 \times 19 = \text{total } 19 \text{ Players}$

$= 1558 \text{ kg}$

20th play added on

$1558 + 93$

$= 1651 \text{ kg total weight } 20 \text{ players}$

$\text{mean}_{20} = \dfrac{1651}{20} = 82 \cdot 55$

Answer ___82·55 or 82·6___ kg

Q8. The table shows information about the times for 10 people to complete a task.

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

Section D – Scatter graphs

Q9. Amina asks 50 people,

> "What is your favourite pet?
> Choose from cat, dog, rabbit or other."

(a)   Which **two** words describe the type of data she collects from each person?
Circle your answers.

(qualitative)   continuous   (primary)   secondary

(b)   Which **two** diagrams could she use to represent the data?
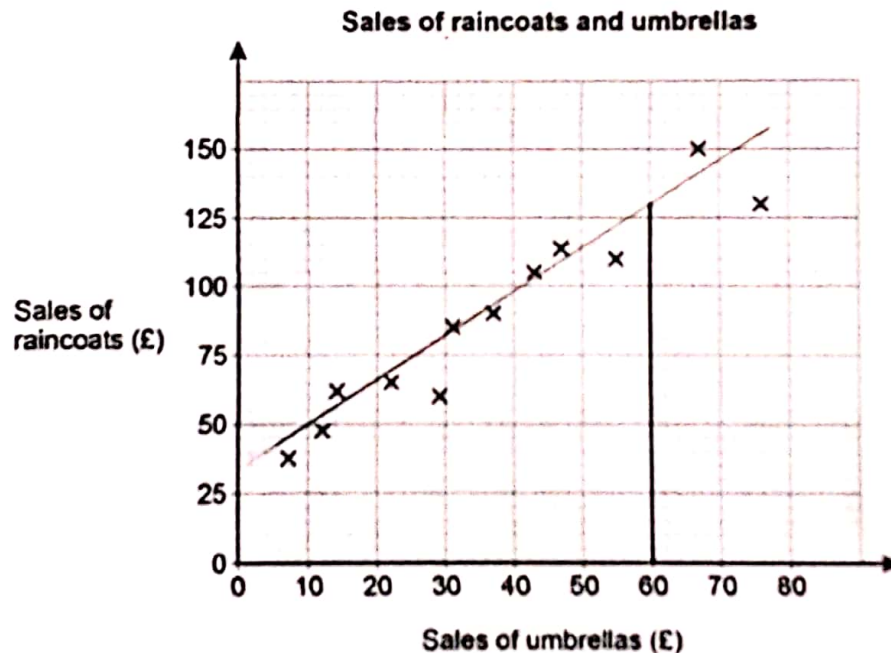Circle your answers.

scatter graph   (pie chart)   (bar chart)   stem-and-leaf

Q10. A shop sells raincoats and umbrellas.

The scatter graph shows the monthly sales for 12 months.

Sales of raincoats and umbrellas

(a)   Write down the type of correlation shown by the graph.

Answer ___Positive___ .

(b)   The manager expects the sales of umbrellas next month to be £60

Draw a line of best fit to estimate the sales of raincoats next month.

Answer £ ___130___

Between 125 and 130 ish

Q11. The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.

Number of tests needed to pass

Number of driving lessons
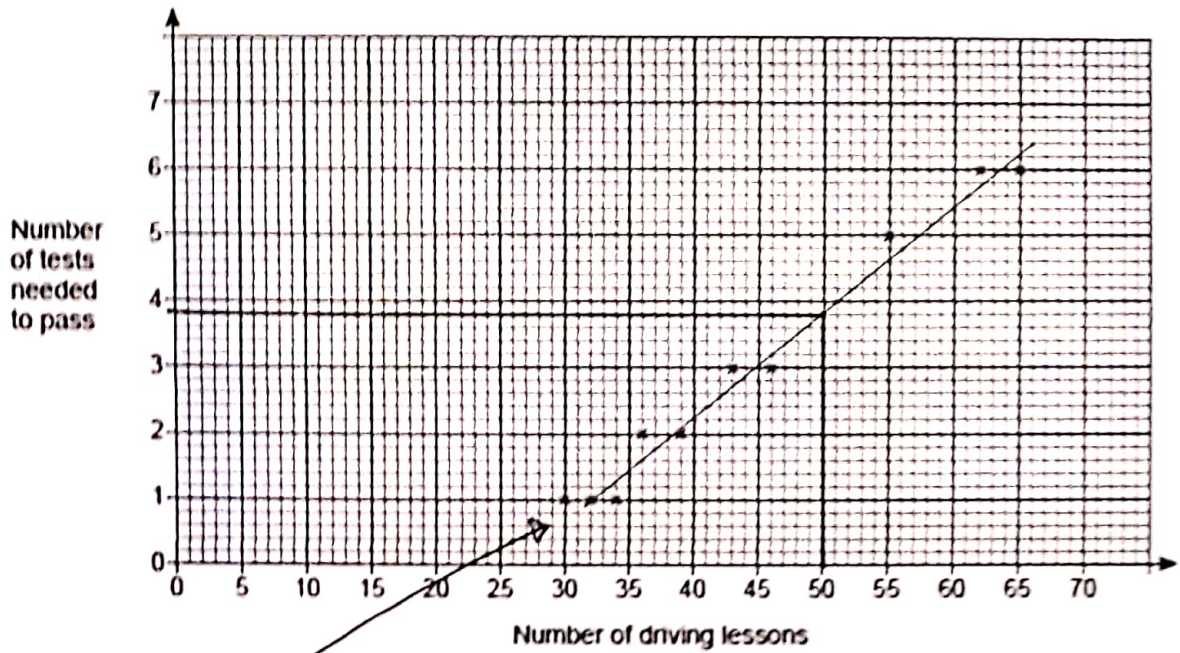
(a) What proportion of the 10 people passed on their first test?

3 Students Passed out of 10

Answer $\dfrac{3}{10}$ (or 0·3 or 30%)

(b) Describe the correlation.

Circle your answer.

(strong positive)   weak positive   weak negative   strong negative

(c) Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons.

Line of best fit reads about 3·8 lessons, does not make sense so

round to

Answer   4   lessons

(d) Meera says,

"I can use the trend to predict the number of driving tests needed to pass for any number of driving lessons."

Comment on her statement.

If you extend the line of best fit beyond the data on the graph, and use the extended bit then those predictions will be unreliable — extrapolation

Q12. A company sells ice cream.
The average midday temperature and the sales for each month in 2011 are shown.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average midday temperature (°C)	8	6	11	14	17	21	22	29	20	14	10	4
Sales (tonnes)	23	24	23	30	33	37	39	47	36	28	22	23

(a)   Complete the scatter diagram by plotting the values for July to December.
The values for January to June have been done for you.

Average midday temperature (°C)
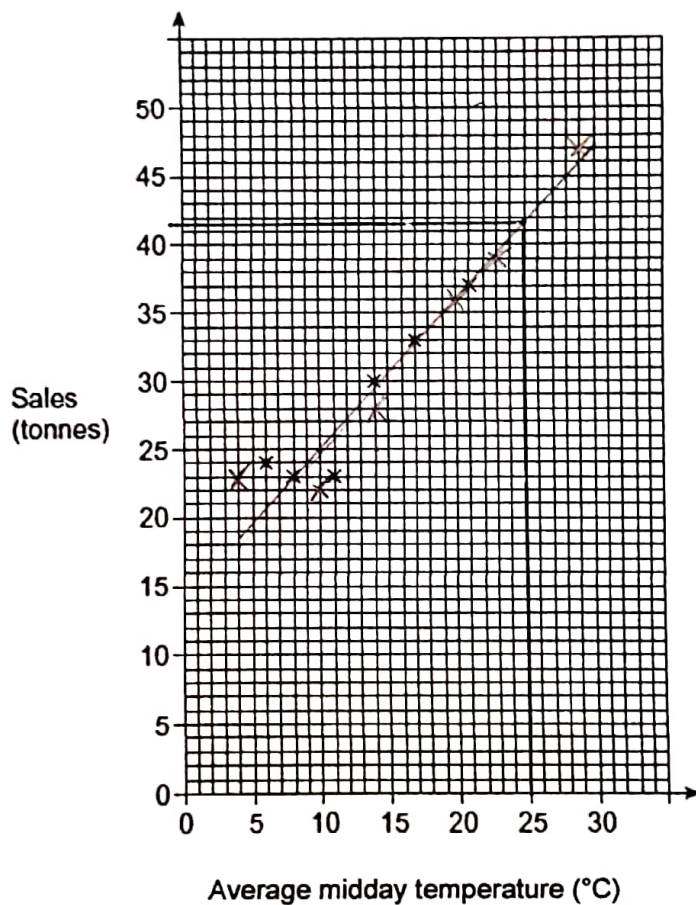
(b)   In July 2012, the average midday temperature is predicted to be 25 °C.

Use the graph to estimate the sales of ice cream in July 2012.
Show clearly how you obtain your answer.

My Line & best fit reads 41.5
So round to 42

Answer _____ 42 _____ tonnes

40 to 44 acceptable.

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(c)   In December 2012, the average midday temperature is predicted to be 5 °C higher than in December 2011.

Should the company increase its production of ice cream for December 2012? Tick a box.

Yes ☐   No ☑

Give a reason for your answer.

Dec 11 4° + 5° = 9°

At lower temperatures sales are roughly the same.

Section E – Cumulative frequency graphs

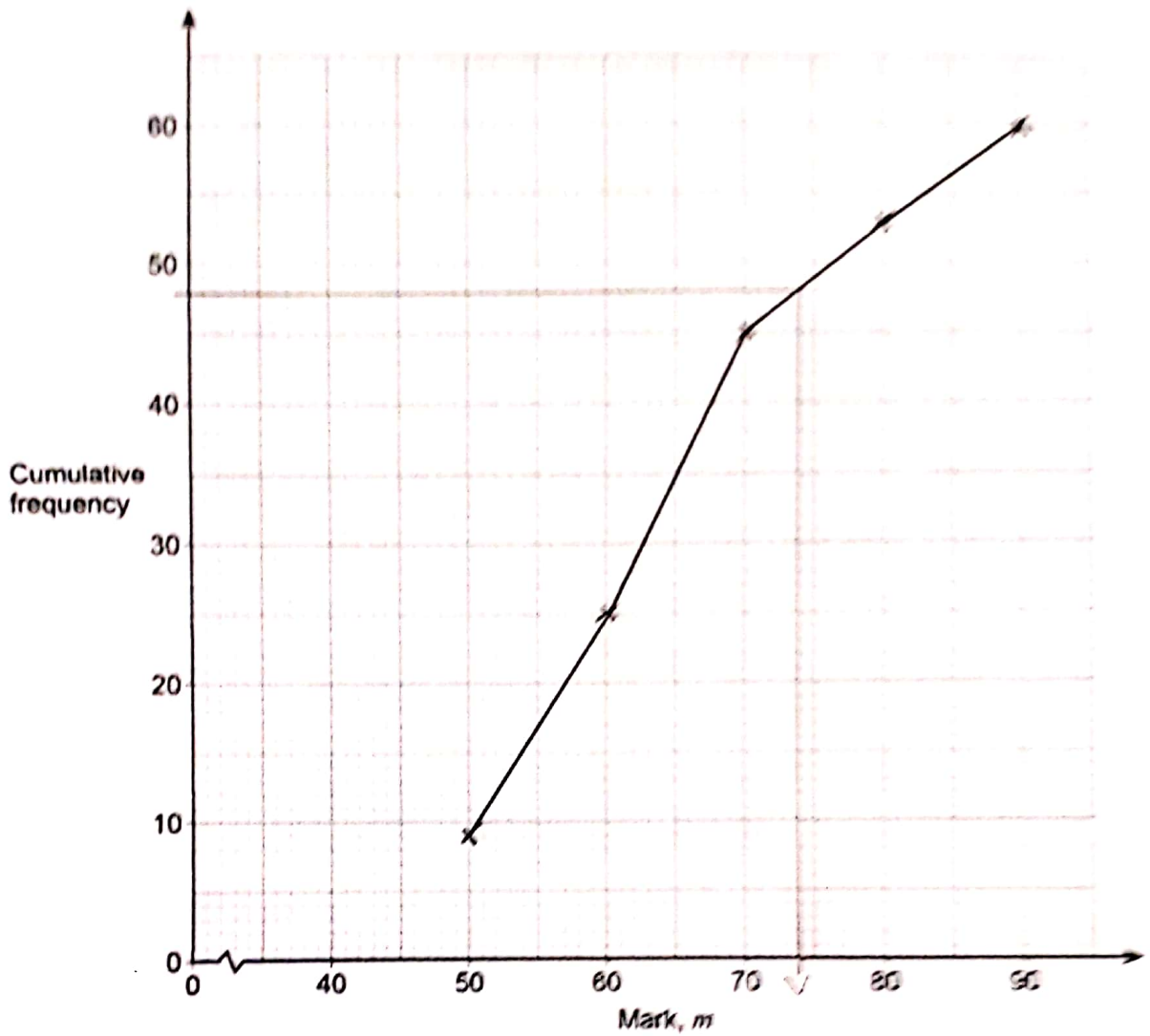Q13. Here is some information about the marks of 60 students in a test.

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

End interval	C.F.
50	9
60	25
70	45
80	53
90	60

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

Plot the following points

(50, 9) (60, 25) (70, 45) (80, 53) (90, 60)

Join the points with a smooth curve, or straight lines

Cumulative frequency vs Mark, m

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

20% of 60 = 12   top 12 students.

60 − 12 = 48 ∴ Read 48 on c.f.

Answer _____74_____

accept   73 to 75

Q14.

Waist measurements of 40 men

UQ ... 30
Cumulative frequency
Med 20
LQ 10

Waist measurement (cm)
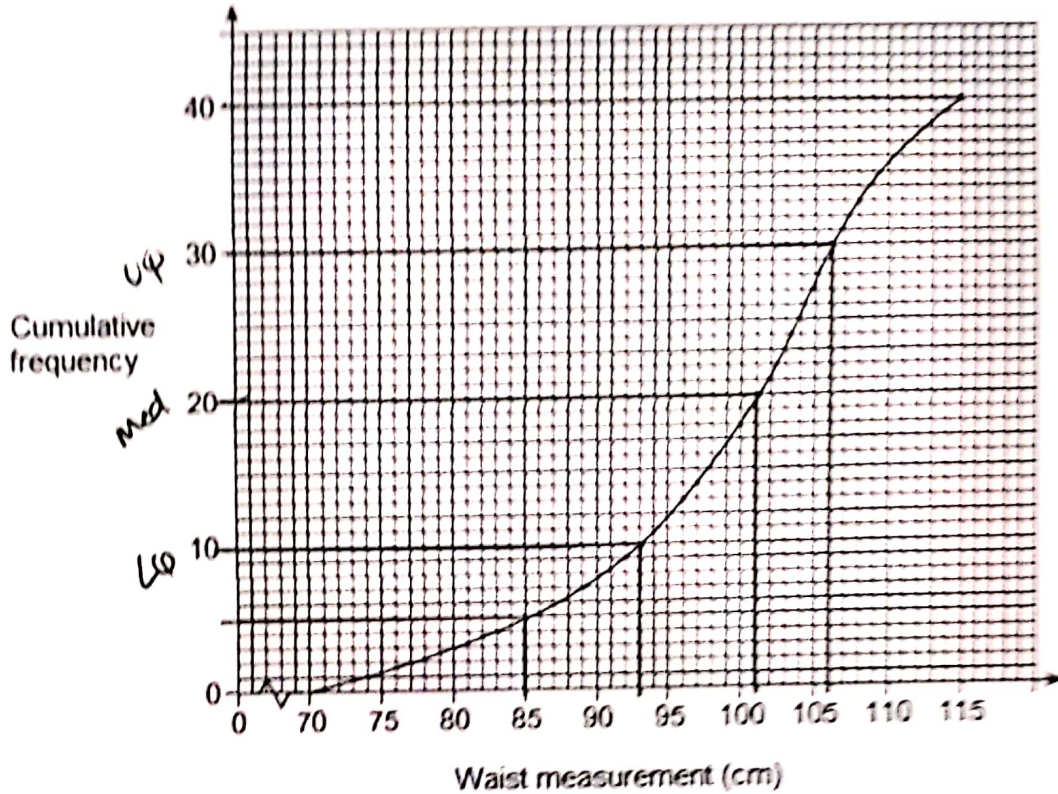
(a) How many men have a waist measurement of 85 cm or less?

Answer ___5___

(b) What is the median waist measurement?

$40 \div 2 = 20$ Answer ___101___ cm
read

(c) What is the interquartile range of the waist measurements?

$40 \div 4 = 10$ LQ at 10 ≐ 93   IQR = 106 − 93

$\frac{3}{4}$ of 40 = 30   UQ at 30 = 106   = 13

Answer ___13___ cm

accept between 12 and 14

Q15. The table and graph show information about ticket sales.

Type of ticket	Cost
Adult (18 years and over)	£23.00
Child	£19.60

Ticket sales

Cumulative frequency

Age (years)
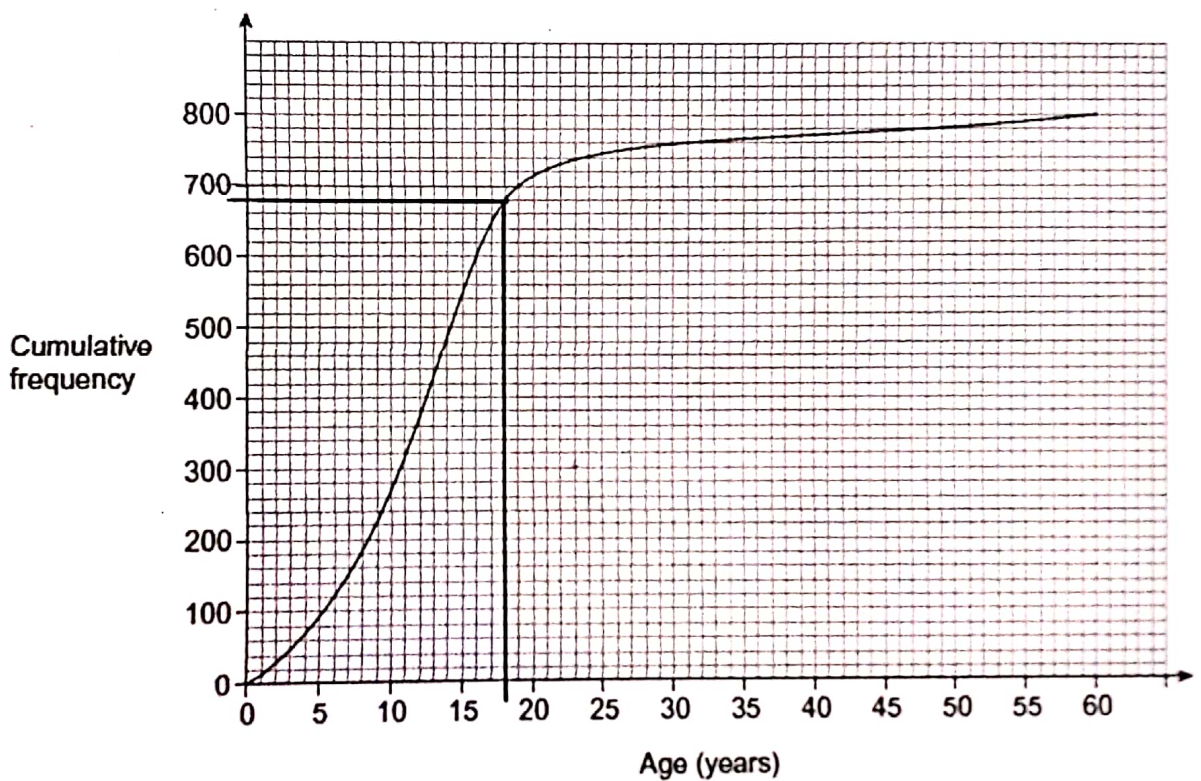
How much did the 800 tickets cost altogether?

18 years & under : 680 tickets.
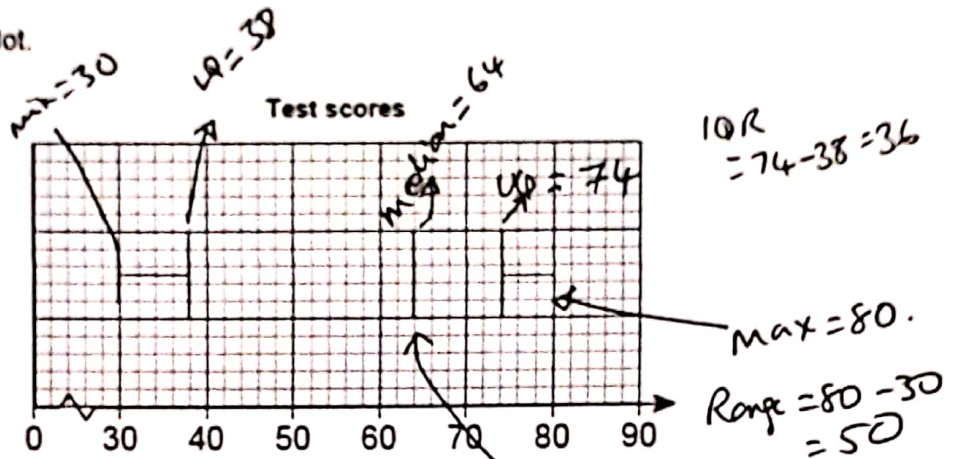out of 800

so   800 - 680 = 120 must be
adult tickets.

680 × 19·60 + 120 × 23
        = £16088

Answer £ 16088

Section F – Box plots

Q16. Here is a box plot.

min = 30   LQ = 38   Test scores   median = 64   UQ = 74

IQR = 74 - 38 = 36

Max = 80.

Range = 80 - 30 = 50

(a) Circle the value of the range. 80 - 30

33   36   (50)   80

(b) Circle the value of the median.

38   55   62   (64)

(c) Circle the value of the interquartile range.

34   (36)   38   50   62

Q17. Here is some information about the length of time cars stayed in a car park.

Shortest time	30 minutes	Lower quartile	2 hours
Longest time	12 hours	Interquartile range	3 hours
		Median time	4 hours

Draw a box plot to show this information.

Time (hours)

Q18. Girls and boys are timed in a race.
The box plot shows information about the times for the girls.

Girls

10   12   LQ=13 14   16   UQ   18   20
                                          =17
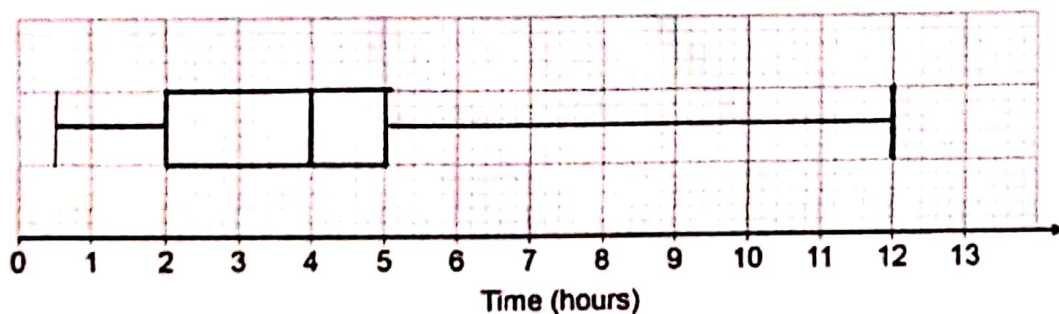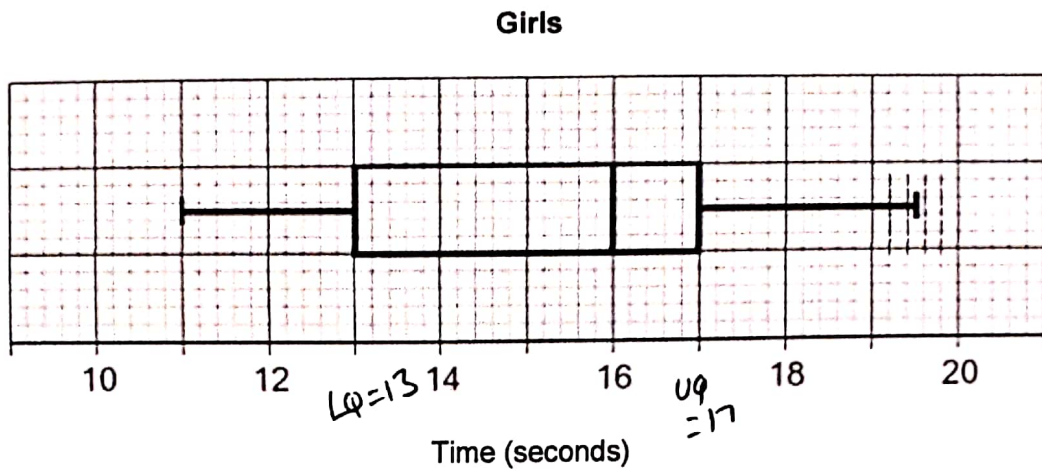
Time (seconds)

- 25% of the boys take 12 seconds or less   mean LQ = 12

- The interquartile range for the boys is the same as for the girls   IQR Boys = IQR Girls
                                                                       = 17 − 13 = 4

- The ratio of median times is   girls : boys = 8 : 7

                                          LQ Boys + 4 = 16
                                          12

Complete the box plot for boys on the grid below.
The times for the fastest and slowest boys have been plotted for you.

Boys

10   12   14   16   18   20

Time (seconds)

median girls = 16.

    G : B
    8 : 7   median Boy := 14
   16 : 14

Scanned with CamScanner
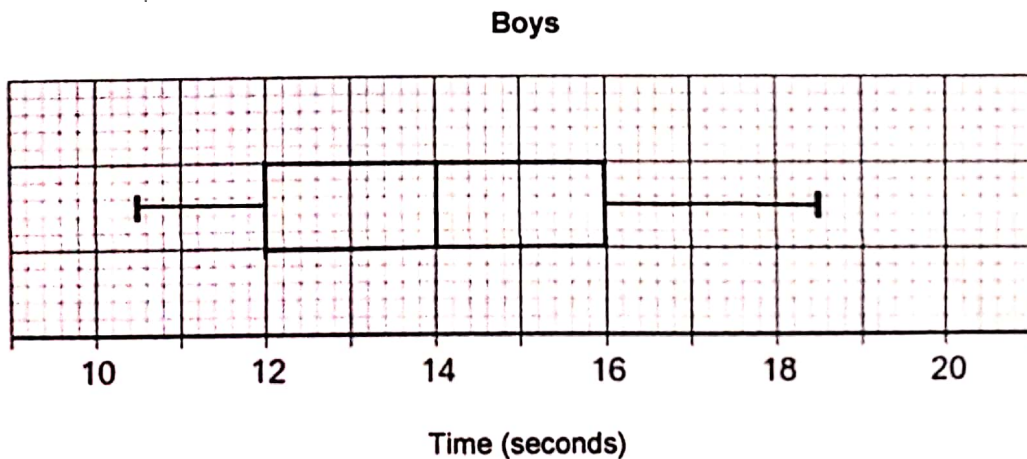
Section G – Histograms

Q19. Here is some information about the ages of people at a concert.

Age, x (years)	Frequency	class width	freq. density
$10 \le x < 15$	8	5	1.6
$15 \le x < 25$	24	10	2.4
$25 \le x < 40$	30	15	2
$40 \le x < 70$	30	30	1

$$f.d = \frac{freq}{class\ width}$$

Draw a histogram to represent the information.
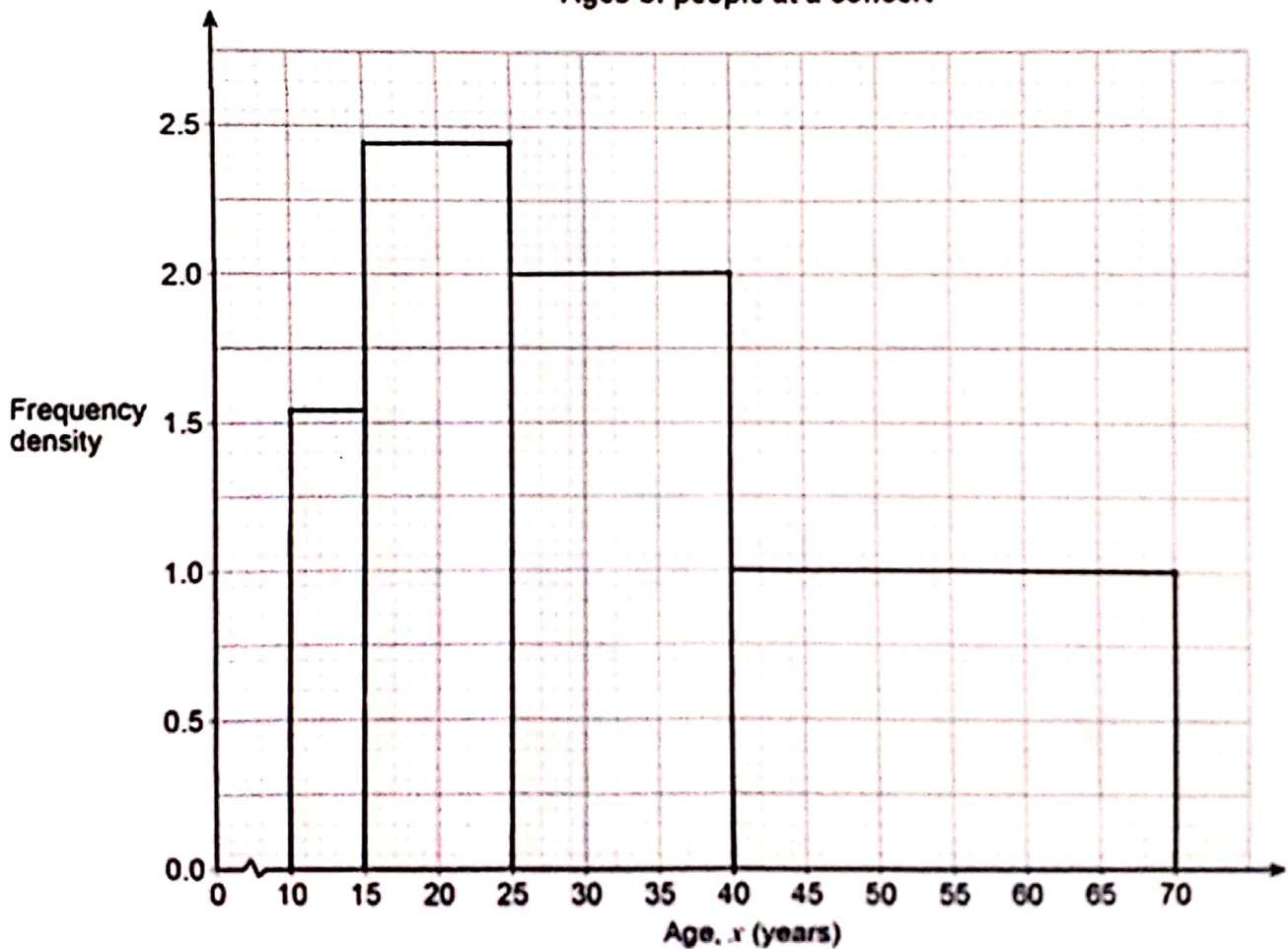
Ages of people at a concert

Frequency density (vertical axis), Age, x (years) (horizontal axis)

Q20. The histogram shows information about the times some students revised for a test. The first bar represents students who revised for less than 10 minutes.

$FD = \dfrac{freq}{c.w.}$

$freq = $ area of bar

Frequency density

Time (minutes)
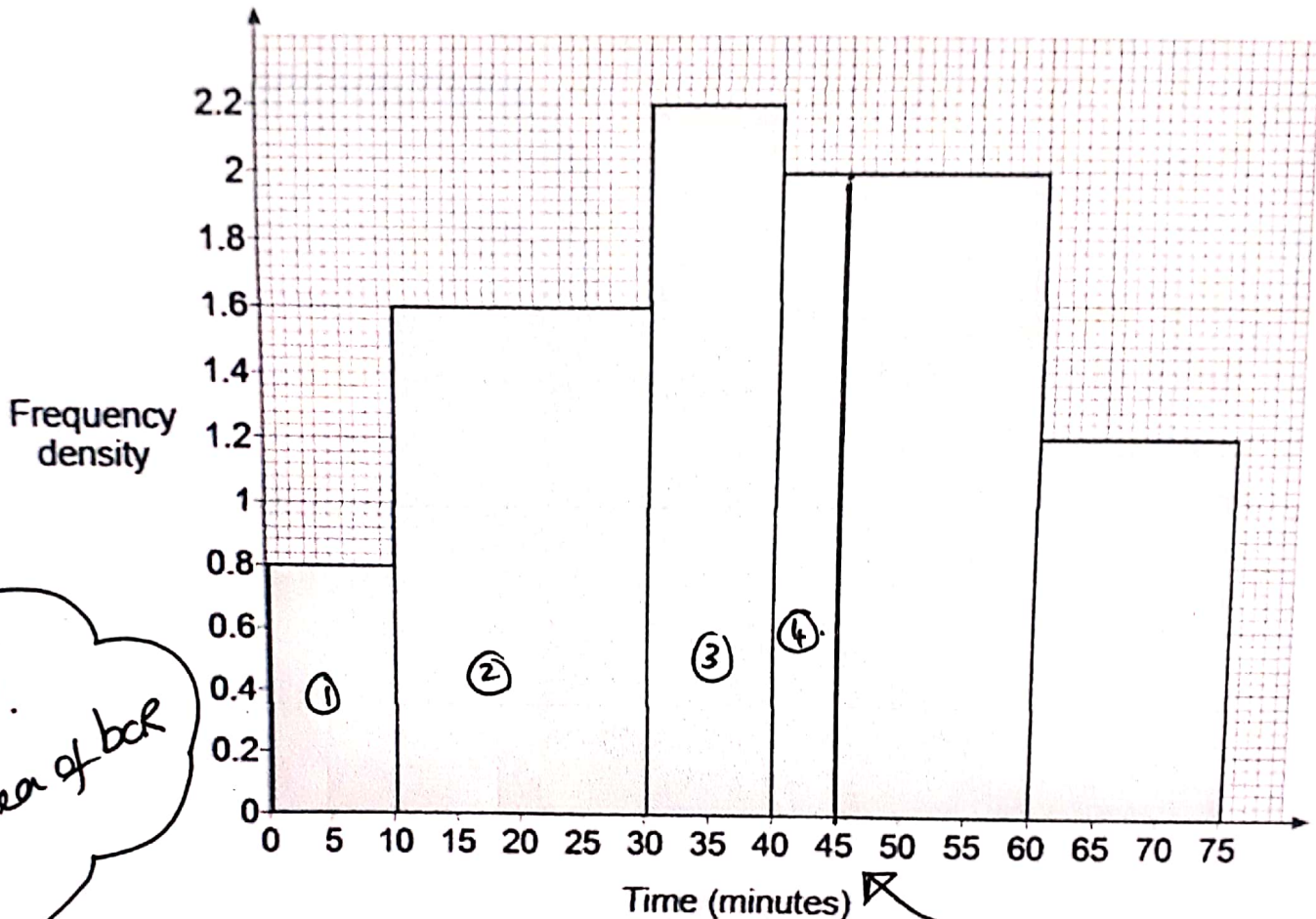
Estimate the number of students who revised for less than 45 minutes.

Need area to the left of the vertical line at 45.

4 rectangle areas.

① 10×0.8 + ② 20×1.6 + ③ 10×2.2 + ④ 5×2 = 72

Answer _____ 72

Q21. The histogram shows the ages, in years, of members of a chess club.
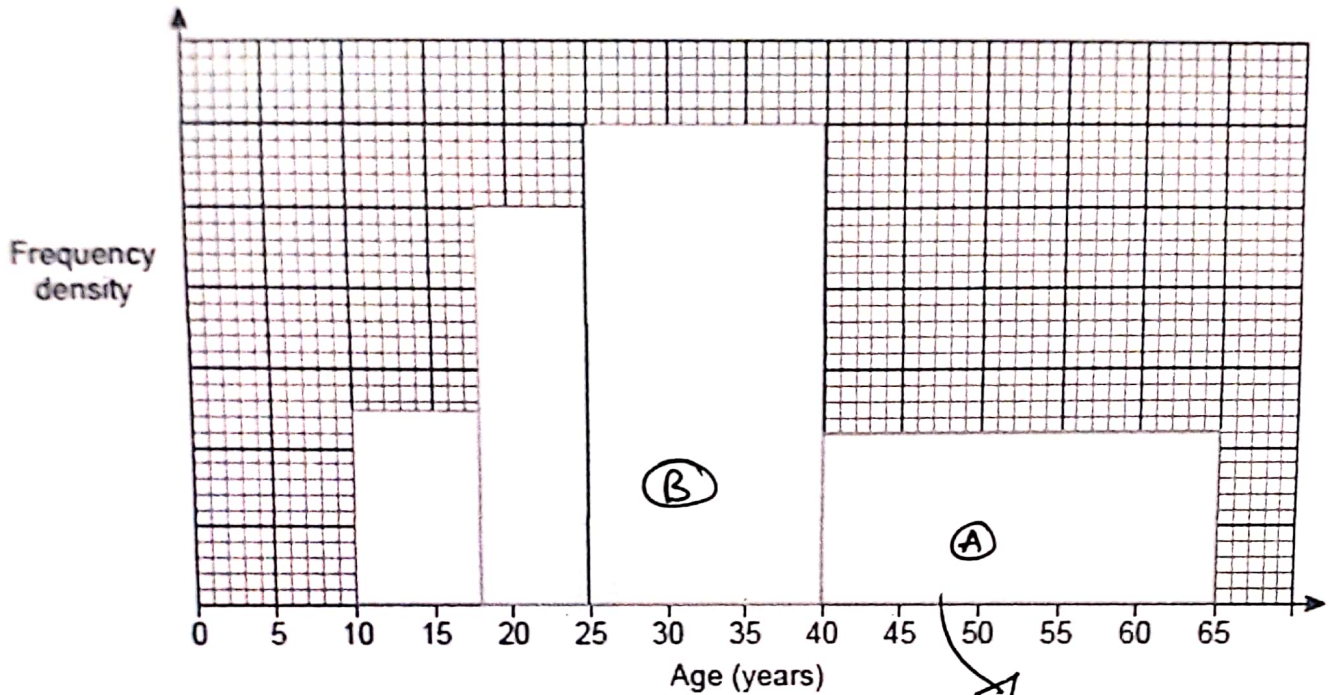
Frequency density

Age (years)

There are 22 members with ages in the range 40 ≤ age < 65

Work out the number of members with ages in the range 25 ≤ age < 40

area of rectangle A =
freq = 22

(A) number of squares = 25 × 11 = 275 squares = 22 people

1 square = $\frac{22}{275}$ = 0.08 people

rectangle
(B) need frequency. Remember 1 squa = 0.08 people
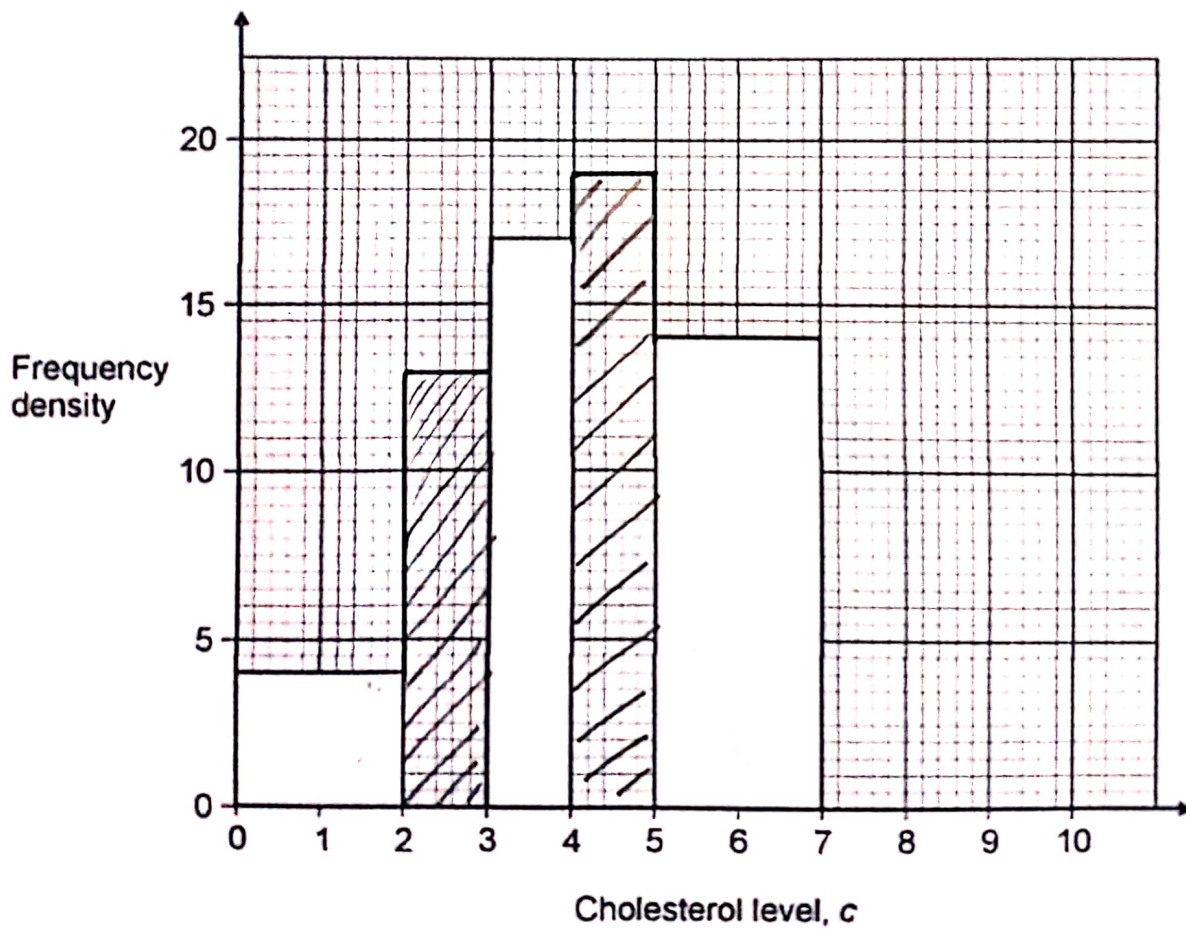
n° of squares = 15 × 30 = 450 squares × 0.08

= 36 People

Answer _____36_____

Q22. The table and histogram show some information about the cholesterol level in the blood of 100 hospital patients.
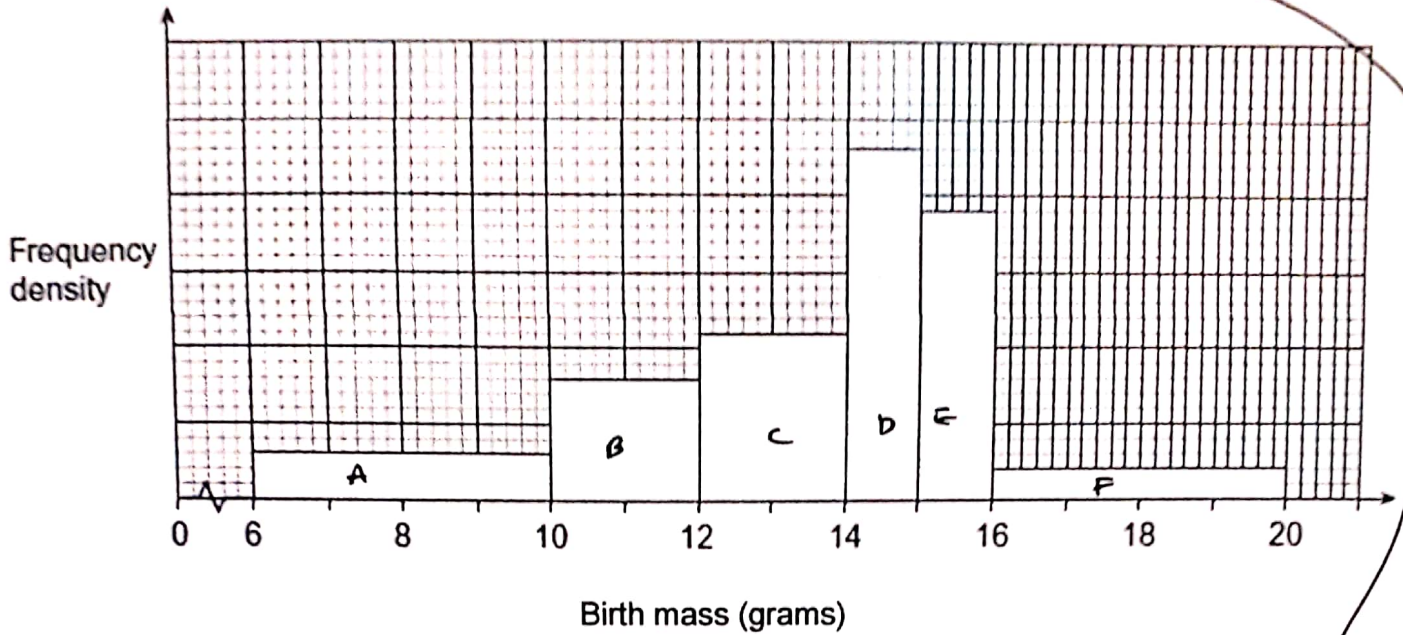
Cholesterol level, c	Frequency
$0 < c \leq 2$	8
$2 < c \leq 3$	13
$3 < c \leq 4$	17
$4 < c \leq 5$	19
$5 < c \leq 7$	28
$7 < c \leq 10$	15

$13 \div 1 = 13 = f.d.$

$\leftarrow 1 \times 17 = 17$

$19 \div 1 = 19 = f.d.$

$2 \times 14 = 28$

(a)   Use the table to complete the histogram.

(b)   Use the histogram to complete the table.

Q23. The histogram represents the birth masses of 500 mice.

Birth mass (grams)

Work out the number of mice with birth masses below 10 grams.
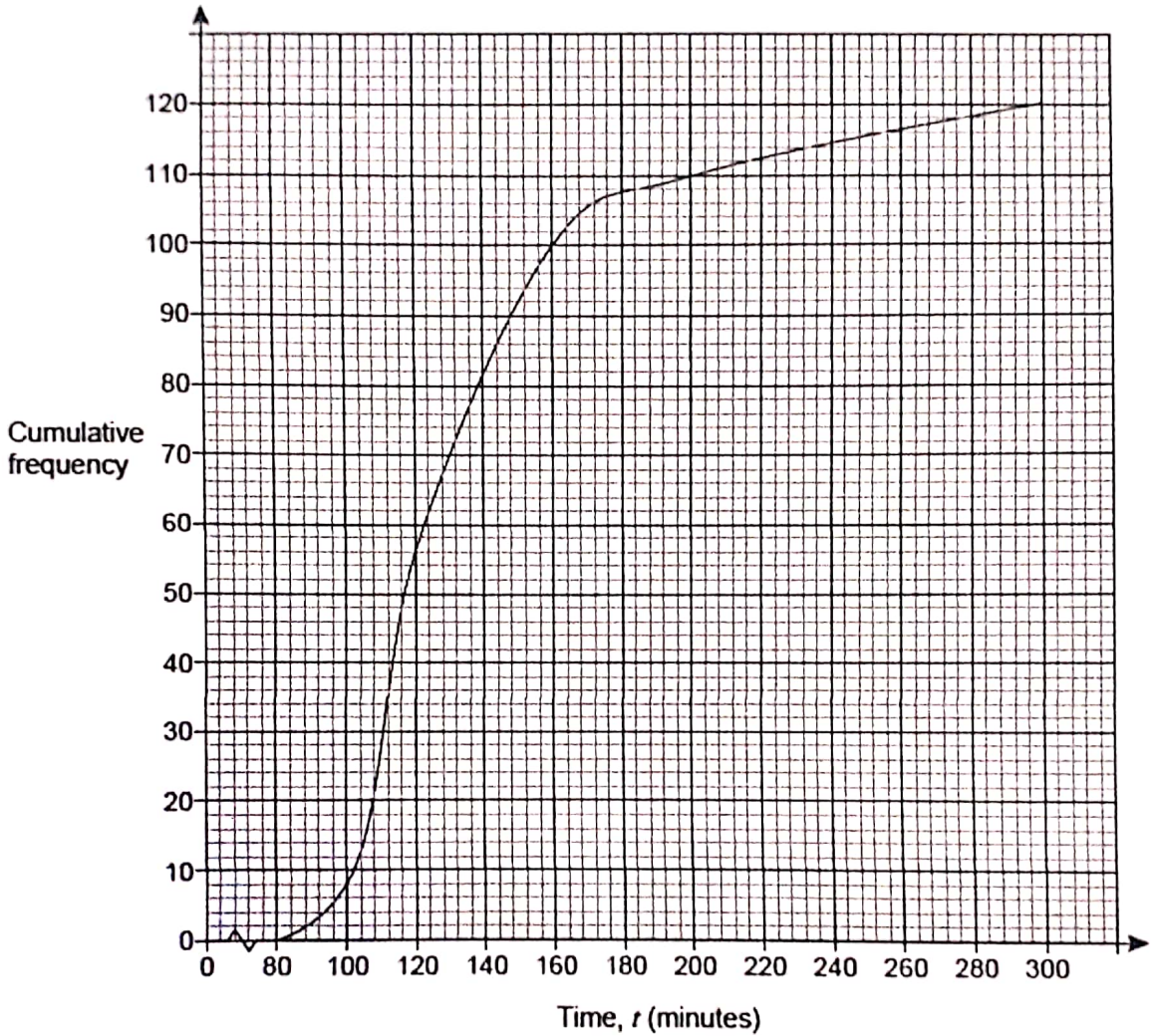
Total number of *little* squares in each bar

A   B   C   D   E   F

20×3 $+10\times8+$ 10×11 $+5\times23+$ 5×19 $+20\times2$

= 500 squares = 500 mice (total frequency)

1 square = 1 mouse

Below 10g is rectangle A.

$20\times3 = 60$ squares = 60 mice

Answer _____ 60

Section H – Challenge mixed topic questions

**Q24.** The cumulative frequency diagram shows the times taken by runners to complete a half-marathon.

Cumulative frequency

Time, *t* (minutes)

On the grid, draw a histogram to represent the data.

Use this table to help you.

$= \frac{freq}{class\ width}$

Time, *t* (minutes)	Cumulative frequency
t < 100	8
t < 120	56
t < 160	100
t < 200	110
t < 300	120

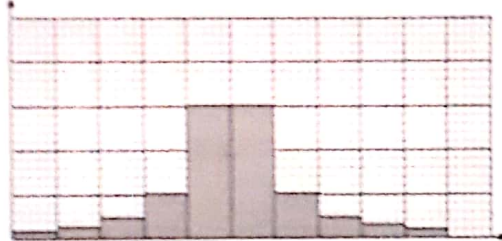| Time, *t* (minutes)	Frequency	Class width	Frequency density
80 ≤ t < 100	8	20	$\frac{8 \div 20}{} = 0.4$
100 ≤ t < 120	$\frac{56-8}{} = 48$	20	$\frac{48 \div 20}{} 2.4$
120 ≤ t < 160	$\frac{100-56}{} = 44$	40	$\frac{44 \div 40}{} 1.1$
160 ≤ t < 200	$\frac{110-100}{} 10$	40	0.25
200 ≤ t < 300	$\frac{120-110}{} 10$	100	0.1
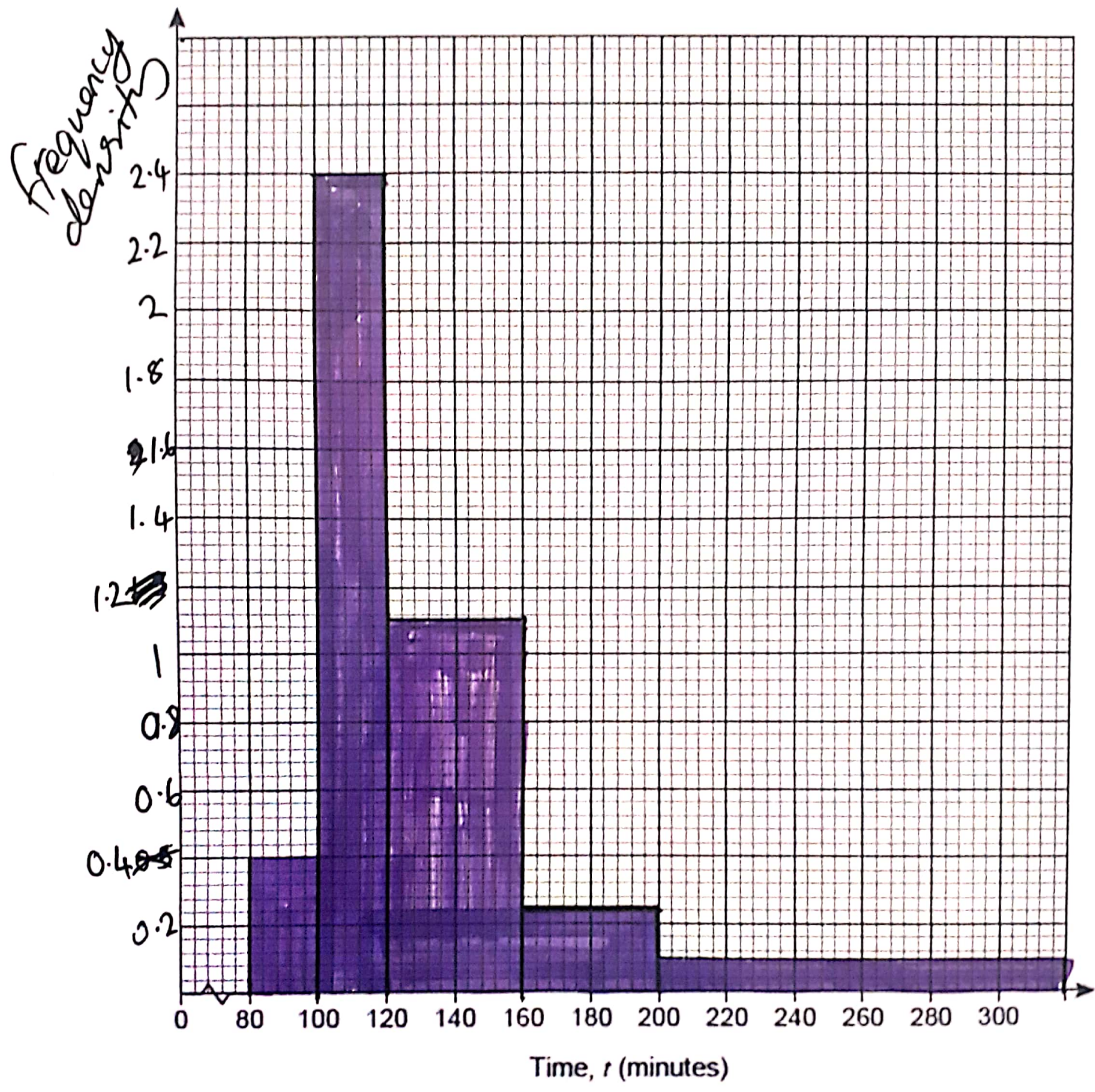
Q26. Here are the histograms for four different sets of data.
Each set of data has the same number of values.

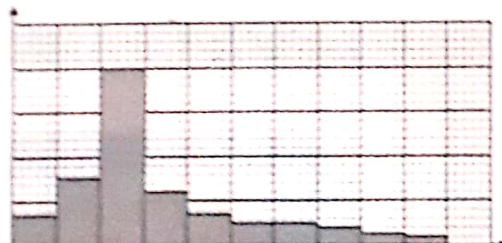Complete the table to match each box plot to a histogram.

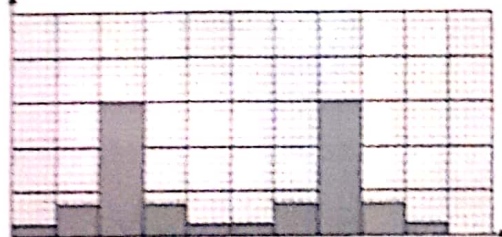| Histogram	Box plot
1	B
2	D
3	A
4	C

Histogram 1

Histogram 2

Histogram 3

Histogram 4

Here are the box plots for the same four sets of data.

Box plot A

Box plot B

Box plot C

Box plot D