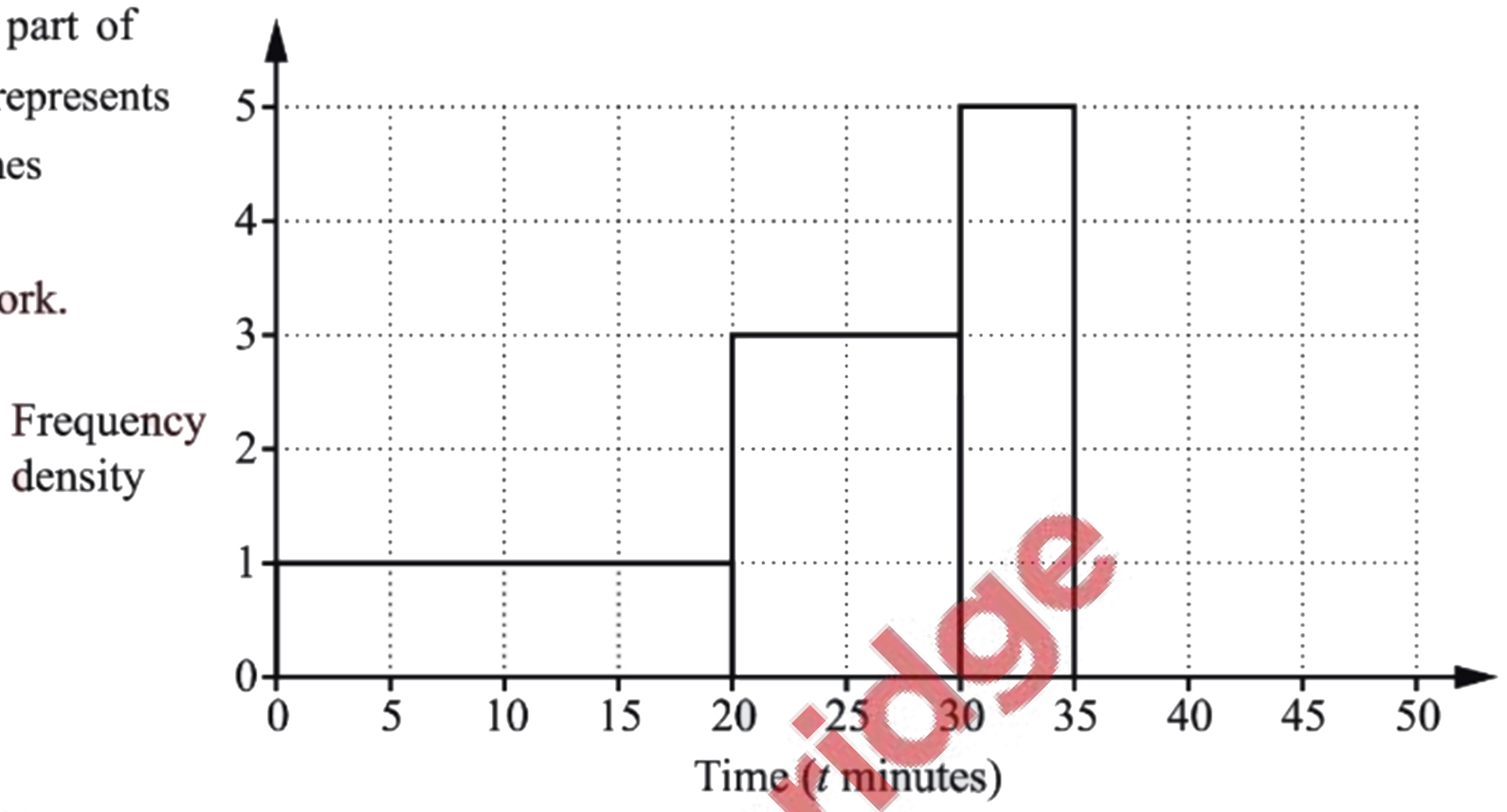
Unit 40: Categorical, Numerical and Grouped Data

1. O/N 16/P12/Q9

The diagram shows part of the histogram which represents the distribution of times taken by some people to travel to work.



(a) Complete the table.

Time (t minutes)	$0 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 35$	$35 < t \leqslant 50$
Frequency		30		30

[2]

(b) Complete the histogram. [1]

2. O/N 16/P12/Q12

A school recorded the number of absent students over a 50-day period.
The results are given in the table.

Number of absent students	0	1	2	3	4	5 or more
Number of days	25	15	6	3	1	0

(a) Write down the mode. [1]

(b) Calculate the mean. [2]

3. O/N 16/P11/Q13

During one day, the temperature, in °C, was recorded every 2 hours.
The twelve results are given below.

−3 −2 −1 1 2 4 5 4 2 0 −2 −2

For these results, find

(a) the median, [1]

(b) the mean, [1]

(c) the difference between the highest and the lowest of these temperatures. [1]

4. M/J 15/P12/Q12

Omar has a pack of number cards.
He picks these five cards.

–2	–4	–2	4	1

(a) Write down the mode of the five numbers. **[1]**

(b) He takes another card from the pack.

(i) If the mean of the six numbers is -1, what number did he pick? **[1]**

(ii) If the difference between the highest and lowest of the six numbers is 12, what are the **two** possible numbers he could have picked? **[1]**

5. O/N 14/P12/Q3

In an experiment, a red die and a blue die were thrown 10 times.
Each time, the score on the red die was subtracted from the score on the blue die.
The results are given below.

5 −4 −3 4 0 2 −1 −3 3 −2

For these results, find

(a) the median, **[1]**

(b) the mean. **[1]**

6. O/N 13/P11/Q16

(a) An ordinary die is thrown 15 times.
These are the numbers thrown.

4 5 3 2 2 5 6 1 6 3 5 2 5 1 3

(i) Find the mode. **[1]**

(ii) Find the median. **[1]**

(b) –20 –8 x

The mean of these three numbers is –5.

Find x. **[1]**

7. M/J 13/P12/Q19

(a) Keith records the number of letters he receives each day for 20 days.
His results are shown in the table.

(i) Write down the mode. [1]

(ii) Work out the mean. [2]

Number of letters	Frequency
0	4
1	6
2	3
3	2
4	1
5	4

(b) Over the same 20 days, Emma received a mean of 1.7 letters each day.

How many letters did Emma receive altogether?
[1]

8. M/J 13/P12/Q21

A group of 80 students took a Physics test.

This table shows the distribution of their marks.

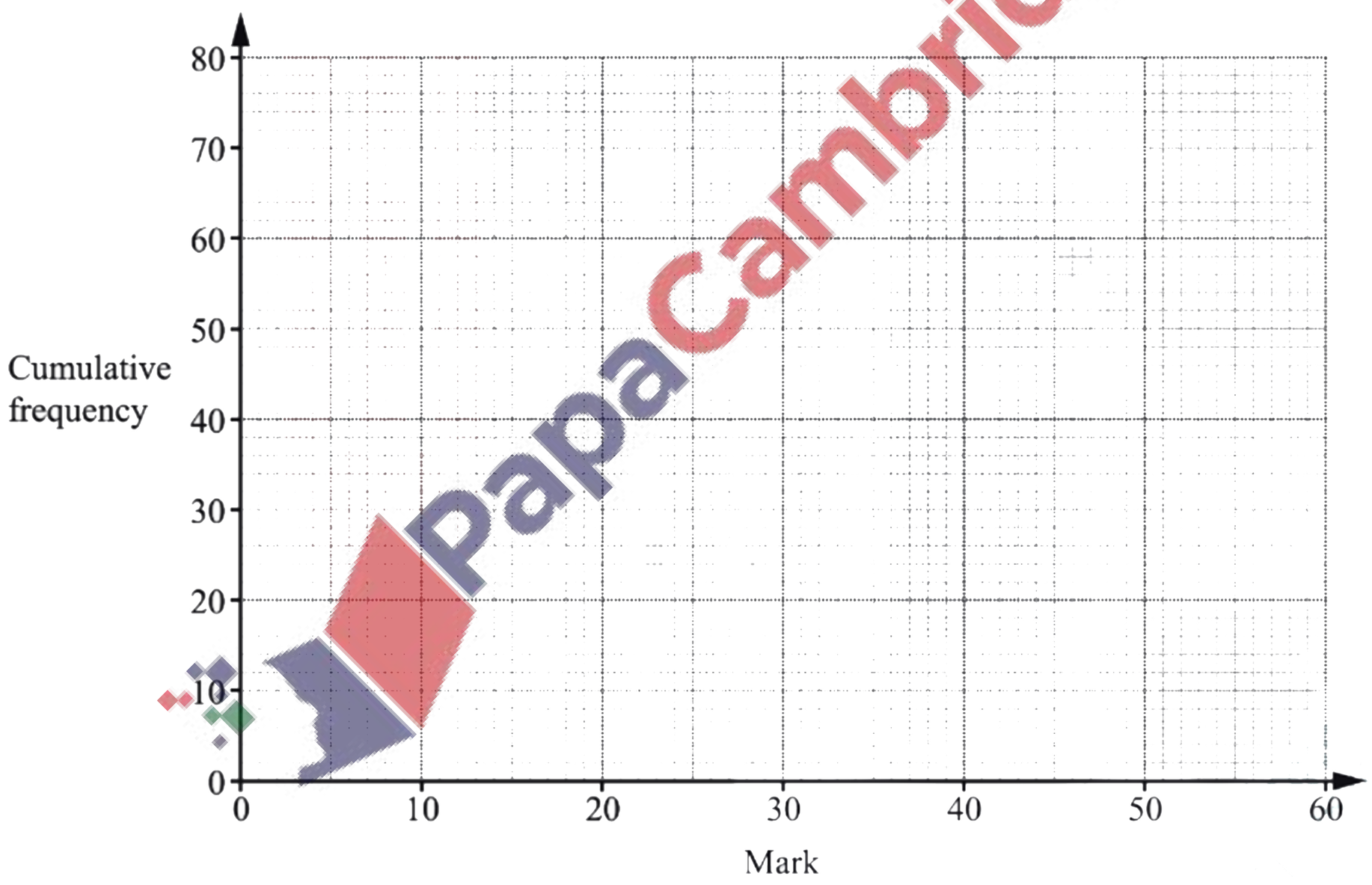
Mark (m)	$0 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 30$	$30 < m \leqslant 40$	$40 < m \leqslant 50$	$50 < m \leqslant 60$
Frequency	4	12	14	22	18	10

(a) Complete the cumulative frequency table.

Mark (m)	$m \leqslant 10$	$m \leqslant 20$	$m \leqslant 30$	$m \leqslant 40$	$m \leqslant 50$	$m \leqslant 60$
Cumulative frequency						

[1]

(b) Draw a cumulative frequency curve for this information.



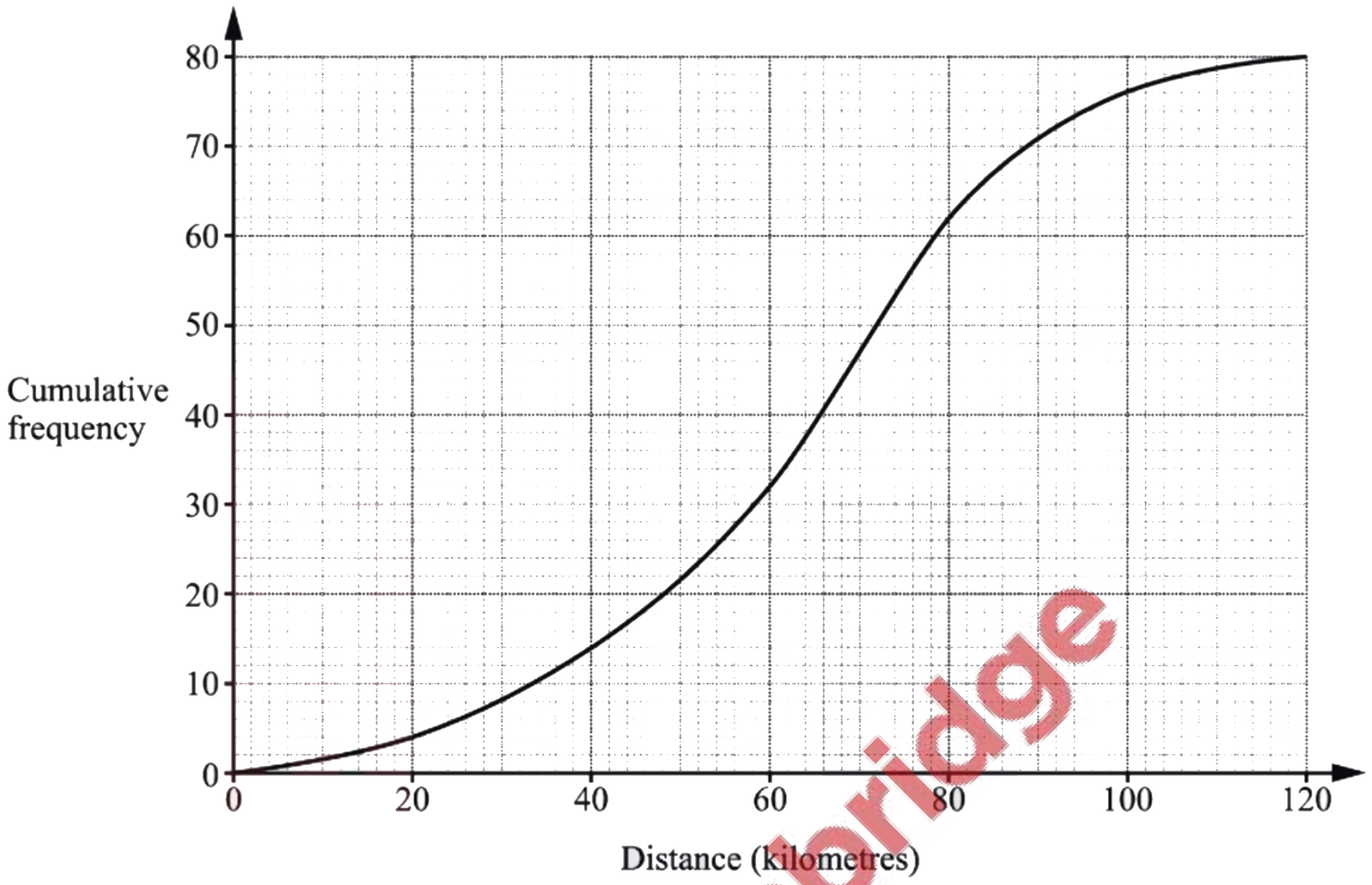
[2]

(c) The pass mark for the test is 45.

Use your cumulative frequency curve to estimate the number of students who passed. [2]

9. M/J 13/P11/Q18

Eighty cyclists were each asked the distance (in kilometres) they cycled last week.



The cumulative frequency diagram represents the results.

Use the graph to estimate

(a) the number of cyclists who cycled between 60 and 80 kilometres, [1]

(b) the median distance cycled, [1]

(c) the interquartile range for the distance cycled. [2]

10. O/N 12/P12/Q9

The number of goals scored by some football teams during one weekend was recorded.
The table shows the results.

Number of goals scored	0	1	2	3	4
Number of teams	x	1	5	4	2

(a) If the mode is 0, find the smallest possible value of x. [1]

(b) If the median is 1, find the value of x. [1]

11. O/N 12/P11/Q11

In an experiment, 4 dice are thrown and the number of Fives is recorded.
The experiment is repeated 12 times.
The table shows the results.

Number of Fives	0	1	2	3	4
Frequency	1	2	3	5	1

For this distribution of Fives,

(a) write down the mode, [1]

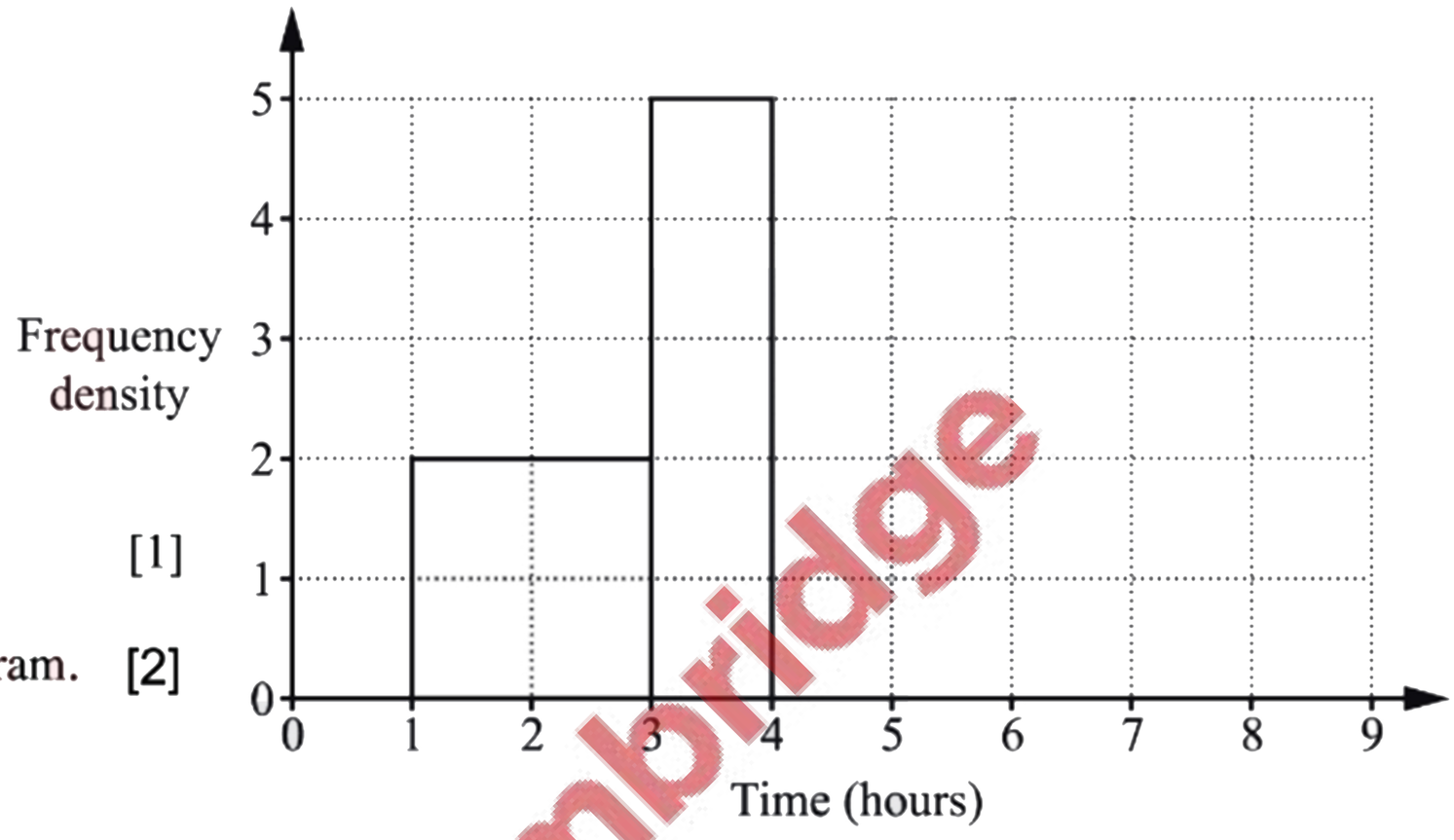
(b) find the median. [1]

12. O/N 11/P12/Q16

The distribution of the lengths of time taken by an engineer to repair some washing machines is given in the table.

Time (t hours)	$1 < t \leqslant 3$	$3 < t \leqslant 4$	$4 < t \leqslant 5$	$5 < t \leqslant 8$
Frequency	k	5	4	3

The histogram represents some of this information.



(a) Find k. [1]

(b) Complete the histogram. [2]

13. O/N 11/P12/Q24

The table shows the number of goals scored by 40 football teams during one weekend.

Number of goals	0	1	2	3	4	5	6
Number of teams	16	6	6	6	4	0	2

Find

(a) the mode, [1]

(b) the median, [1]

(c) the mean. [1]

14. M/J 11/P12/Q20

The table shows the distribution of the number of complete lengths swum by a group of swimmers.

Number of complete lengths (n)	$0 < n \leqslant 20$	$20 < n \leqslant 40$	$40 < n \leqslant 60$	$60 < n \leqslant 80$
Frequency	5	20	10	5

(a) Find the modal class. [1]

(b) Calculate an estimate of the mean. [3]

15. O/N 10/P11/Q22

The grouped frequency table below shows the times taken for 70 students to solve a problem.

Time (t minutes)	$0 < t \leqslant 3$	$3 < t \leqslant 4$	$4 < t \leqslant 5$	$5 < t \leqslant 6$	$6 < t \leqslant 8$
Number of students	24	12	16	10	8

(a) Complete the cumulative frequency table for this information.

Time (t minutes)	$t \leqslant 3$	$t \leqslant 4$	$t \leqslant 5$	$t \leqslant 6$	$t \leqslant 8$
Number of students	24				

[1]

(b) In which group of the frequency table does the 40th percentile lie? [1]

(c) Complete the frequency density table for this information.

Time (t minutes)	$0 < t \leqslant 3$	$3 < t \leqslant 4$	$4 < t \leqslant 5$	$5 < t \leqslant 6$	$6 < t \leqslant 8$
Frequency density	8	12	16		

[2]

16. M/J 10/P11/Q16

Dai played three games of cricket.
His mean score was 9 runs.
His median score was 8 runs.
His highest score was 7 runs more than his lowest score.

(a) Find the number of runs he scored in each of the three games. [3]

(b) Dai batted in a fourth game.
The mean of his four scores was 11 runs.

Find the number of runs that Dai scored in the fourth game. [1]

17. O/N 09/P01/Q11

The table below shows the number of pets owned by 20 families.

Number of pets	0	1	2	3	4	5	6	7
Number of families	2	5	3	2	4	1	1	2

Find

(a) the modal number of pets, [1]

(b) the mean number of pets. [2]

18. O/N 08/P01/Q5

The number of items bought by 10 customers at a local store is shown below.

6 7 5 9 10 7 18 10 7 9

(a) State the mode of this distribution. [1]

(b) Find the median number of items bought. [1]

19. O/N 08/P01/Q23/b

(a) The table summarises the playing times of each of the 100 tracks on Tom's MP3 player.

Playing time (t minutes)	Frequency
$2.5 < t \leqslant 3.5$	5
$3.5 < t \leqslant 4.5$	30
$4.5 < t \leqslant 5.5$	50
$5.5 < t \leqslant 6.5$	15

Calculate an estimate of the mean playing time of the individual tracks. [3]

20. M/J 08/P01/Q24/a

(a) Fifty students were asked how many books they each took to school on Monday. The results are summarised in the table below.

Number of books	0	1	2	3	4	5	6	7
Frequency	10	11	8	3	6	7	4	1

(i) Write down the median. [1]

(ii) Calculate the mean number of books. [3]

(iii) What is the probability that two students, chosen at random, both took 5 books to school?
Give your answer as a fraction in its simplest form. [2]

Answers Section

1. O/N 16/P12/Q9

(a) 20 **1**

25 **1**

(b) Rectangle with base 35 to 50 and height 2 **1**

2. O/N 16/P12/Q12

(a) 0 **1**

(b) 0.8 oe **2**

3. O/N 16/P11/Q13

(a) 0.5 oe **1**

(b) $\frac{2}{3}$ oe **1**

(c) (–) 8 **1**

4. M/J 15/P12/Q12

(a) –2 **1**

(b) **(i)** –3 **1**

(ii) –8, 8 **1**

5. O/N 14/P12/Q3

(a) –0.5 **1**

(b) 0.1 **1**

6. O/N 13/P11/Q16

(a) **(i)** 5 **1**

(ii) 3 **1**

(b) 13 **1**

7. M/J 13/P12/Q19

(a) **(i)** 1 **1**

(ii) 2.1 r $2\frac{1}{10}$ only. **2**

(b) 34 **1**

8. M/J 13/P12/Q21

(a) 4 16 30 52 70 80 **1**

(b) Correct ft curve **2**

(c) 16 to 18 **2**

9. M/J 13/P11/Q18

(a) 30 **1**

(b) 66 **1**

(c) 30 **2**

10. O/N 12/P12/Q9

(a) 6 **1**

(b) 11 **1**

11. O/N 12/P11/Q11

(a) 3 **1**

(b) 2.5 **1**

12. O/N 11/P12/Q16

(a) 4 **1**

(b) rectangles

base 4 to 5, height 4 **1**

base 5 to 8, height 1 **1**

13. O/N 11/P12/Q24

(a) 0 **1**

(b) 1 **1**

(c) 1.6 or $1\frac{3}{5}$ or $\frac{8}{5}$ **2**

14. M/J 11/P12/Q20

(a) $20 < n \quad 40$ **1**

(b) 37.5 **3**

15. O/N 10/P11/Q22

(a) 36, 52, 62, 70 **1**

(b) $3 < t < 4$

(c) 10

4

16. M/J 10/P11/Q16

(a) 6 8 13

(b) 17 cao

17. O/N 09/P01/Q11

(a) 1

(b) 2.9, $2\frac{9}{10}$, $\frac{29}{10}$

18. O/N 08/P01/Q5

(a) 7 cao

(b) 8 cao

19. O/N 08/P01/Q23/b

(a) 4.75 or 4 + equiv. fra

20. M/J 08/P01/Q24/a

(a) **(i)** 2 **1**

(ii) 2.52, $2\frac{13}{25}$ or $2\frac{26}{50}$ www **3**

(iii) $\frac{3k}{175k}$ oe **2**