

Cumulative frequency *[53 marks]*

University students were surveyed and asked how many hours, h , they worked each month. The results are shown in the following table.

Hours per month, h	Frequency	Cumulative frequency
$0 < h \leq 10$	3	3
$10 < h \leq 20$	7	10
$20 < h \leq 30$	10	20
$30 < h \leq 40$	14	34
$40 < h \leq 50$	p	44
$50 < h \leq 60$	6	50
$60 < h \leq 70$	4	54
$70 < h \leq 80$	2	q

Use the table to find the following values.

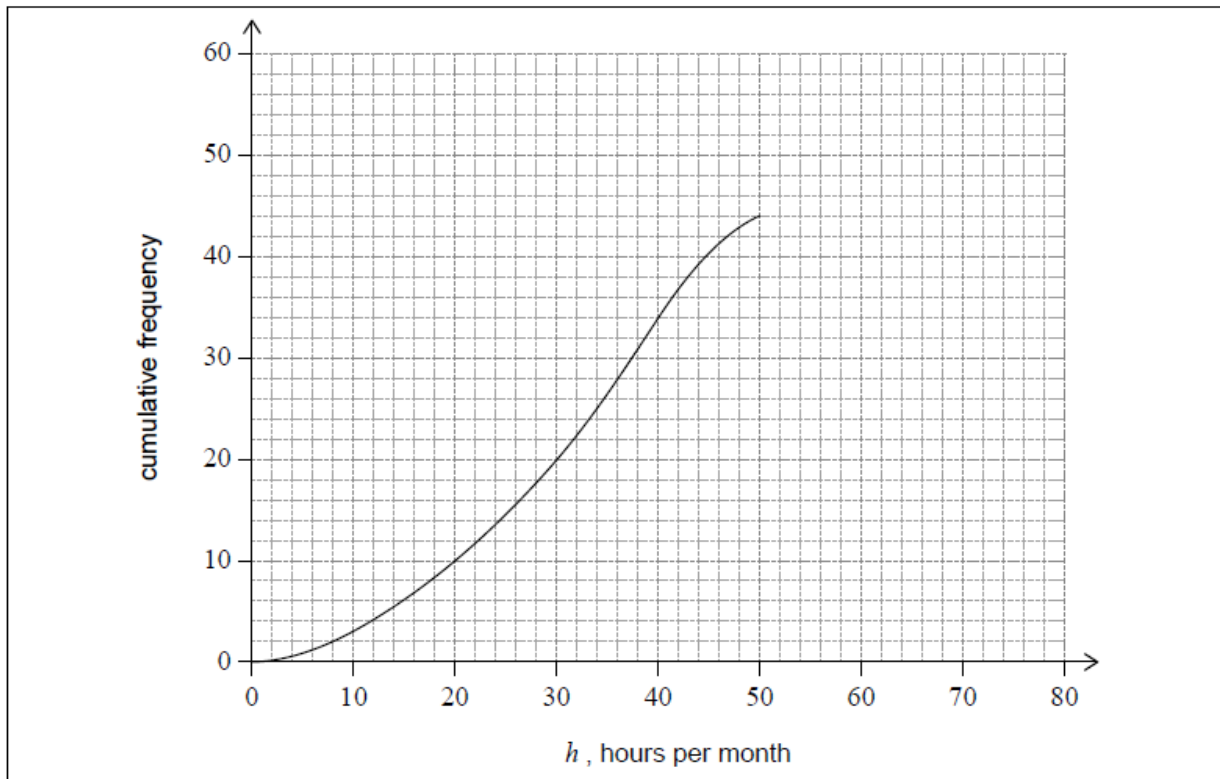
1a. p .

[1 mark]

1b. q .

[1 mark]

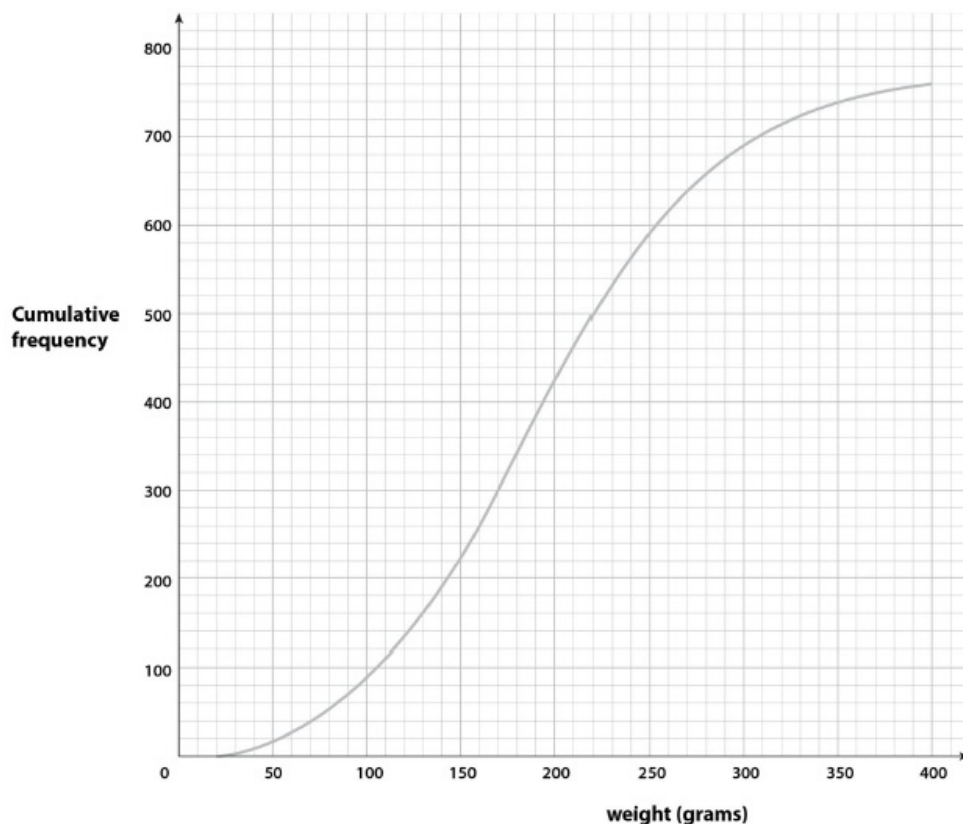
The first five class intervals, indicated in the table, have been used to draw part of a cumulative frequency curve as shown.



1c. On the same grid, complete the cumulative frequency curve for these [2 marks] data.

1d. Use the cumulative frequency curve to find an estimate for the number [2 marks] of students who worked at most 35 hours per month.

A food scientist measures the weights of 760 potatoes taken from a single field and the distribution of the weights is shown by the cumulative frequency curve below.



2a. Find the number of potatoes in the sample with a weight of more than 200 grams. *[2 marks]*

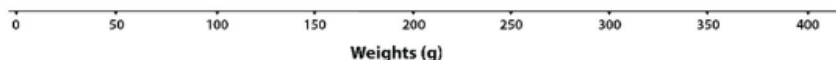
2b. Find the median weight. *[1 mark]*

2c. Find the lower quartile. *[1 mark]*

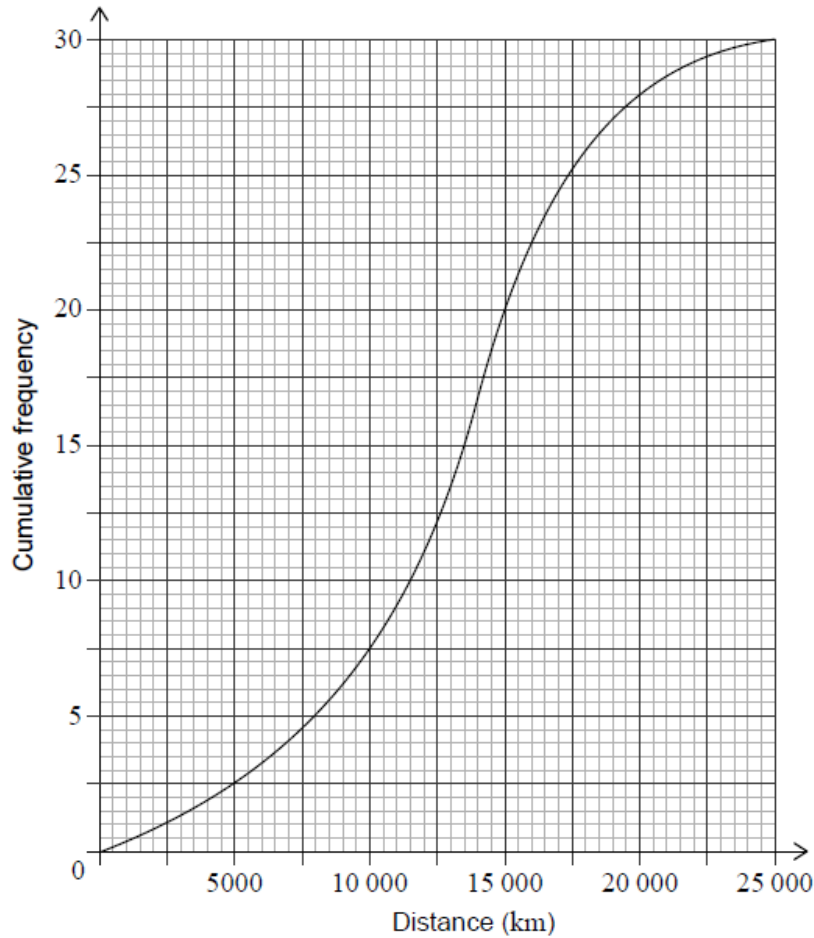
2d. Find the upper quartile. *[1 mark]*

2e. The weight of the smallest potato in the sample is 20 grams and the weight of the largest is 400 grams. *[2 marks]*

Use the scale shown below to draw a box and whisker diagram showing the distribution of the weights of the potatoes. You may assume there are no outliers.



A transportation company owns 30 buses. The distance that each bus has travelled since being purchased by the company is recorded. The cumulative frequency curve for these data is shown.



3a. Find the number of buses that travelled a distance between 15000 and 20000 kilometres. [2 marks]

3b. Use the cumulative frequency curve to find the median distance. [2 marks]

3c. Use the cumulative frequency curve to find the lower quartile. [1 mark]

3d. Use the cumulative frequency curve to find the upper quartile. [1 mark]

3e. Hence write down the interquartile range. [1 mark]

3f. Write down the percentage of buses that travelled a distance greater than the upper quartile. [1 mark]

3g. Find the number of buses that travelled a distance less than or equal to 12 000 km. [1 mark]

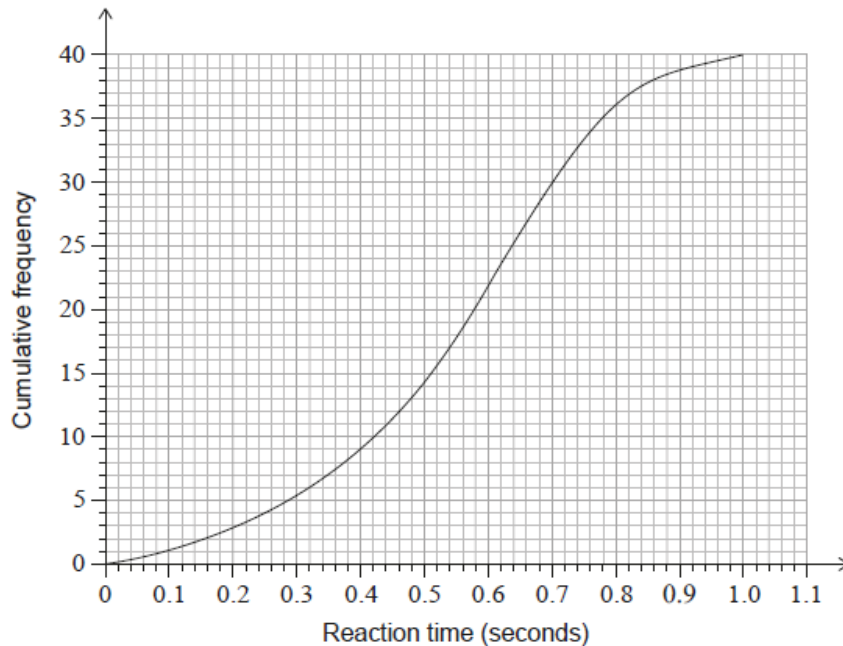
It is known that 8 buses travelled more than m kilometres.

3h. Find the value of m . [2 marks]

3i. The smallest distance travelled by one of the buses was 2500 km. [4 marks]
The longest distance travelled by one of the buses was 23 000 km.

On graph paper, draw a box-and-whisker diagram for these data. Use a scale of 2 cm to represent 5000 km.

Mackenzie conducted an experiment on the reaction times of teenagers. The results of the experiment are displayed in the following cumulative frequency graph.



Use the graph to estimate the

4a. median reaction time. [1 mark]

4b. interquartile range of the reaction times. [3 marks]

4c. Find the estimated number of teenagers who have a reaction time greater than 0.4 seconds. [2 marks]

4d. Determine the 90th percentile of the reaction times from the cumulative [2 marks] frequency graph.

Mackenzie created the cumulative frequency graph using the following grouped frequency table.

Reaction time, t (s)	Frequency
$0 < t \leq 0.2$	3
$0.2 < t \leq 0.4$	a
$0.4 < t \leq 0.6$	13
$0.6 < t \leq 0.8$	14
$0.8 < t \leq 1.0$	b

4e. Write down the value of a . [1 mark]

4f. Write down the value of b . [1 mark]

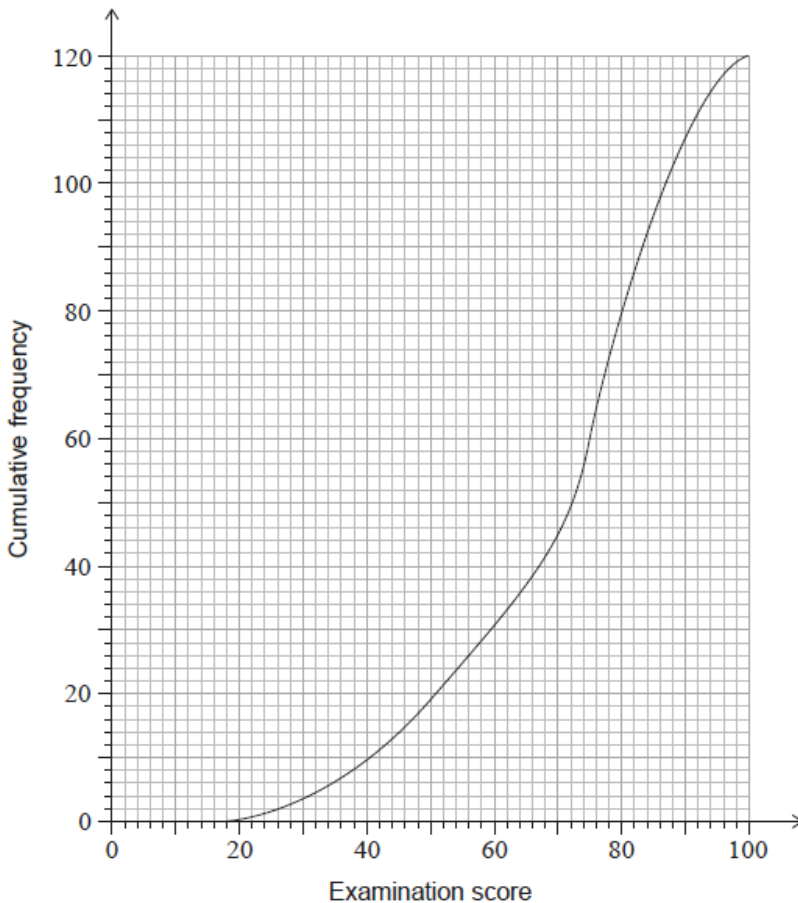
4g. Write down the modal class from the table. [1 mark]

4h. Use your graphic display calculator to find an estimate of the mean reaction time. [2 marks]

Upon completion of the experiment, Mackenzie realized that some values were grouped incorrectly in the frequency table. Some reaction times recorded in the interval $0 < t \leq 0.2$ should have been recorded in the interval $0.2 < t \leq 0.4$.

4i. Suggest how, if at all, the estimated mean and estimated median reaction times will change if the errors are corrected. Justify your response. [4 marks]

A group of 120 students sat a history exam. The cumulative frequency graph shows the scores obtained by the students.



5a. Find the median of the scores obtained.

[1 mark]

The students were awarded a grade from 1 to 5, depending on the score obtained in the exam. The number of students receiving each grade is shown in the following table.

Grade	1	2	3	4	5
Number of students	6	13	26	a	b

5b. Find an expression for a in terms of b .

[2 marks]

The mean grade for these students is 3.65.

5c. Find the number of students who obtained a grade 5.

[3 marks]

5d. Find the minimum score needed to obtain a grade 5.

[2 marks]

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