2.17 Cumulative Frequency: 1-hour Pack

EDEXCEL 1ST0 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The table shows the amounts, in pounds, that shoppers spent. There are 60 shoppers altogether. The cumulative frequency graph is drawn by plotting the upper class boundary against the cumulative frequency and joining the points with straight lines.

Class (pounds)	Frequency
$0 < x \leq 10$	16
$10 < x \leq 20$	6
$20 < x \leq 30$	15
$30 < x \leq 40$	8
$40 < x \leq 50$	15

(a) Work out the cumulative frequency for each class.

(b) The median is the value at position n/2, where n is the total frequency. Write down this position in the cumulative frequency list, and the class that contains the median.

(Total for Question 1 is 4 marks)

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2 The table shows the speeds, in km/h, of cars on a road. There are 88 cars altogether. The cumulative frequency graph is drawn by plotting the upper class boundary against the cumulative frequency and joining the points with straight lines.

Class (km/h)	Frequency
$10 < x \leq 20$	20
$20 < x \leq 30$	20
$30 < x \leq 40$	8
$40 < x \leq 50$	20
$50 < x \leq 60$	12
$60 < x \leq 70$	8

(a) Use linear interpolation between the plotted points to estimate the median. Give your answer to 1 decimal place.
(b) Use linear interpolation to estimate the lower quartile and the upper quartile, and so the interquartile range. Give your answer to 1 decimal place.
(c) Estimate how many values are greater than 25.

(Total for Question 2 is 8 marks)

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3 A box plot shows the times, in minutes, taken by 40 people to finish a puzzle. The lower quartile is 15, the median is 26 and the upper quartile is 36.

(a) Work out the interquartile range.

(b) Estimate how many values are less than 15.

(c) Estimate how many values lie between 15 and 36.

(Total for Question 3 is 4 marks)

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4 The table shows the length of time, in seconds, that people spent at a ticket machine. There are 72 people altogether. The cumulative frequency graph is drawn by plotting the upper class boundary against the cumulative frequency and joining the points with straight lines.

Class (seconds)	Frequency
$0 < x \leq 20$	8
$20 < x \leq 40$	20
$40 < x \leq 60$	12
$60 < x \leq 80$	12
$80 < x \leq 100$	4
$100 < x \leq 120$	16

(a) Work out the cumulative frequency for each class.

(b) The median is the value at position n/2, where n is the total frequency. Write down this position in the cumulative frequency list, and the class that contains the median.

(Total for Question 4 is 4 marks)

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5 The table shows the masses, in grams, of apples picked. There are 72 apples altogether. The cumulative frequency graph is drawn by plotting the upper class boundary against the cumulative frequency and joining the points with straight lines.

Class (g)	Frequency
$0 < x \leq 20$	15
$20 < x \leq 40$	15
$40 < x \leq 60$	8
$60 < x \leq 80$	16
$80 < x \leq 100$	8
$100 < x \leq 120$	10

(a) Use linear interpolation between the plotted points to estimate the median. Give your answer to 1 decimal place.
(b) Use linear interpolation to estimate the lower quartile and the upper quartile, and so the interquartile range. Give your answer to 1 decimal place.
(c) Estimate how many values are greater than 50.

(Total for Question 5 is 8 marks)

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6 The table shows the length of time, in seconds, that people spent at a ticket machine. There are 64 people altogether. The cumulative frequency graph is drawn by plotting the upper class boundary against the cumulative frequency and joining the points with straight lines.

Class (seconds)	Frequency
$0 < x \leq 20$	20
$20 < x \leq 40$	8
$40 < x \leq 60$	10
$60 < x \leq 80$	10
$80 < x \leq 100$	16

(a) Work out the cumulative frequency for each class.

(b) Use linear interpolation between the plotted points to estimate the median. Give your answer to 1 decimal place.

(c) Estimate how many values are less than 70.

(Total for Question 6 is 7 marks)

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7 The table shows the heights, in centimetres, of young trees. There are 68 trees altogether. The cumulative frequency graph is drawn by plotting the upper class boundary against the cumulative frequency and joining the points with straight lines.

Class (cm)	Frequency
$10 < x \leq 20$	20
$20 < x \leq 30$	12
$30 < x \leq 40$	12
$40 < x \leq 50$	6
$50 < x \leq 60$	10
$60 < x \leq 70$	8

(a) Work out the cumulative frequency for each class.

(b) Use linear interpolation between the plotted points to estimate the median. Give your answer to 1 decimal place.

(c) Estimate how many values are less than 45.

(Total for Question 7 is 7 marks)

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8 Two box plots show the masses, in kilograms, of each group. The five-figure summaries are in the table.

Statistic	Team X	Team Y
Minimum	24	21
Lower quartile	29	28
Median	39	34
Upper quartile	42	42
Maximum	51	49

(a) Work out the interquartile range for Team X and for Team Y.

(b) Write down one comparison of the averages and one comparison of the spread, in context.

(Total for Question 8 is 4 marks)

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9 The table shows the masses, in grams, of apples picked. There are 64 apples altogether. The cumulative frequency graph is drawn by plotting the upper class boundary against the cumulative frequency and joining the points with straight lines.

Class (g)	Frequency
$0 < x \leq 10$	12
$10 < x \leq 20$	6
$20 < x \leq 30$	20
$30 < x \leq 40$	6
$40 < x \leq 50$	20

(a) Work out the cumulative frequency for each class.

(b) Use linear interpolation between the plotted points to estimate the median. Give your answer to 1 decimal place.

(c) Estimate how many values are less than 15.

(Total for Question 9 is 7 marks)

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10 The table shows the masses, in grams, of apples picked. There are 72 apples altogether. The cumulative frequency graph is drawn by plotting the upper class boundary against the cumulative frequency and joining the points with straight lines.

Class (g)	Frequency
$0 < x \leq 10$	6
$10 < x \leq 20$	10
$20 < x \leq 30$	20
$30 < x \leq 40$	12
$40 < x \leq 50$	12
$50 < x \leq 60$	12

(a) Work out the cumulative frequency for each class.

(b) Use linear interpolation between the plotted points to estimate the median. Give your answer to 1 decimal place.

(c) Estimate how many values are less than 25.

(Total for Question 10 is 7 marks)

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Mark scheme · 2.17 Cumulative Frequency: 1-hour Pack

Question 1

running totals of the frequencies	**M1**
16, 22, 37, 45, 60 cao	**A1**
position 30	**B1**
$20 < x \leq 30$	**B1**

Answer: (a) 16, 22, 37, 45, 60; (b) position 30; class $20 < x \leq 30$

Question 2

uses 44 on the cumulative frequency axis	**M1**
linear interpolation within the class	**M1**
35 cao (accept values within 1 of this)	**A1**
positions 22 and 66 used	**M1**
linear interpolation for each quartile	**M1**
28 cao	**A1**
interpolates at 25 and subtracts from 88	**M1**
58 cao	**A1**

Answer: (a) 35; (b) 28; (c) 58

Question 3

21	**B1**
quarter of 40	**M1**
10	**A1**
half of 40 = 20	**B1**

Answer: (a) 21; (b) 10; (c) 20

Question 4

running totals of the frequencies	**M1**
8, 28, 40, 52, 56, 72 cao	**A1**
position 36	**B1**
$40 < x \leq 60$	**B1**

Answer: (a) 8, 28, 40, 52, 56, 72; (b) position 36; class $40 < x \leq 60$

Question 5

uses 36 on the cumulative frequency axis	**M1**
linear interpolation within the class	**M1**
55 cao (accept values within 1 of this)	**A1**
positions 18 and 54 used	**M1**
linear interpolation for each quartile	**M1**
56 cao	**A1**
interpolates at 50 and subtracts from 72	**M1**
38 cao	**A1**

Answer: (a) 55; (b) 56; (c) 38

Question 6

running totals of the frequencies	**M1**
20, 28, 38, 48, 64 cao	**A1**
uses 32 on the cumulative frequency axis	**M1**
linear interpolation within the class	**M1**
48 cao (accept values within 1 of this)	**A1**
reads or interpolates the cumulative frequency at 70	**M1**
43 cao	**A1**

Answer: (a) 20, 28, 38, 48, 64; (b) 48; (c) 43

Question 7

running totals of the frequencies	**M1**
20, 32, 44, 50, 60, 68 cao	**A1**
uses 34 on the cumulative frequency axis	**M1**
linear interpolation within the class	**M1**
31.7 cao (accept values within 1 of this)	**A1**
reads or interpolates the cumulative frequency at 45	**M1**
47 cao	**A1**

Answer: (a) 20, 32, 44, 50, 60, 68; (b) 31.7; (c) 47

Question 8

upper quartile minus lower quartile	**M1**
13 and 14 cao	**A1**
Team X has the higher median (39 compared with 34)	**B1**
Team X has the smaller interquartile range, so the data is less spread out	**B1**

Answer: (a) Team X 13, Team Y 14; (b) Team X has the higher median; Team X has the smaller IQR so is more consistent

Question 9

running totals of the frequencies	**M1**
12, 18, 38, 44, 64 cao	**A1**
uses 32 on the cumulative frequency axis	**M1**
linear interpolation within the class	**M1**
27 cao (accept values within 1 of this)	**A1**
reads or interpolates the cumulative frequency at 15	**M1**
15 cao	**A1**

Answer: (a) 12, 18, 38, 44, 64; (b) 27; (c) 15

Question 10

running totals of the frequencies	**M1**
6, 16, 36, 48, 60, 72 cao	**A1**
uses 36 on the cumulative frequency axis	**M1**
linear interpolation within the class	**M1**
30 cao (accept values within 1 of this)	**A1**
reads or interpolates the cumulative frequency at 25	**M1**
26 cao	**A1**

Answer: (a) 6, 16, 36, 48, 60, 72; (b) 30; (c) 26

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