



H16-1hour Histograms and Frequency Density: 1-hour Pack

EDEXCEL 1ST0 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A class has frequency density 4 and class width 7. Work out the frequency for this class.

(Total for Question 1 is 1 mark)

- 2** A class has frequency density 3.5 and class width 6. Work out the frequency for this class.

(Total for Question 2 is 1 mark)

- 3** A class has frequency 54 and frequency density 9. Work out the class width for this class.

(Total for Question 3 is 1 mark)

- 4** A class has frequency 33 and frequency density 5.5. Work out the class width for this class.

(Total for Question 4 is 1 mark)

- 5** A class has frequency density 2.4 and class width 5. Work out the frequency for this class.

(Total for Question 5 is 1 mark)

- 6** A class has frequency 96 and class width 12. Work out the frequency density for this class.

(Total for Question 6 is 2 marks)

7 A class has frequency density 3.25 and class width 8. Work out the frequency for this class.

(Total for Question 7 is 2 marks)

8 A class has frequency 51 and frequency density 8.5. Work out the class width for this class.

(Total for Question 8 is 2 marks)

9 A class has frequency density 2.8 and class width 15. Work out the frequency for this class.

(Total for Question 9 is 2 marks)

10 A class has frequency 91 and class width 13. Work out the frequency density for this class.

(Total for Question 10 is 2 marks)

11 A class has frequency density 6.5 and frequency 78. Work out the class width for this class.

(Total for Question 11 is 2 marks)

12 A cafe manager records the waiting time, w minutes, of 90 customers using unequal class widths. The class $0 < w \leq 5$ has frequency 25. A second class, $5 < w \leq 15$, has the same frequency density as the first class. Work out the frequency for the second class.

(Total for Question 12 is 3 marks)

- 13** A vet records the mass, m kg, of some dogs using a grouped frequency table with unequal class widths, shown below.

Mass, m (kg)	Frequency	Class width	Frequency density
$0 < m \leq 10$	12	10	?
$10 < m \leq 25$	?	15	2.4
$25 < m \leq 40$	12	15	?

Work out the frequency density for the class $0 < m \leq 10$, the frequency for the class $10 < m \leq 25$, and the frequency density for the class $25 < m \leq 40$.

(Total for Question 13 is 3 marks)

- 14** A forestry researcher records the age, y years, of 100 trees using a histogram with unequal class widths. Three of the four classes are: $0 < y \leq 20$ with frequency density 1.5; $20 < y \leq 40$ with frequency density 2.0; $40 < y \leq 70$ with frequency density 0.6. Given that the total frequency for all 100 trees is shared across all four classes, work out the frequency for the missing fourth class.

(Total for Question 14 is 3 marks)

- 15** A market trader sells phone cases and records his sales on a histogram. He says: 'Looking at my sales histogram, the tallest bar is for cases priced £10 to £15, so I sold more cases in that price range than in any other.'



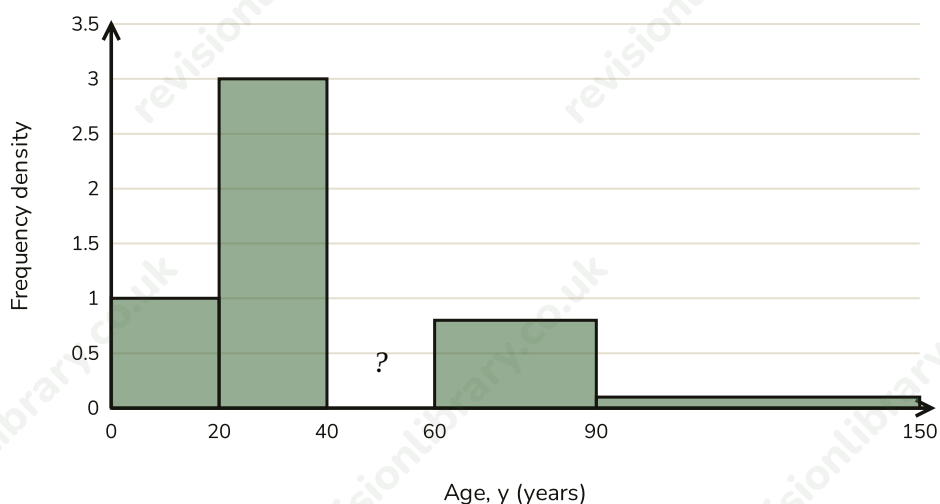
- (a) Work out the number of phone cases sold priced £10 to £15. (2)

- (b) Work out the number of phone cases sold priced £15 to £30. (2)

- (c) Evaluate the trader's claim, using your answers to parts (a) and (b). (2)

(Total for Question 15 is 6 marks)

- 16** A forestry researcher recorded the age, y years, of 150 trees in a plantation. Four of the classes are shown on the histogram below; the bar for the class $40 < y \leq 60$ has been left out.



- (a) Work out the total frequency represented by the four classes shown on the histogram. (3)

- (b) Given that there are 150 trees in total, work out the frequency for the missing class $40 < y \leq 60$. (2)

- (c) Hence work out the frequency density that should be used to draw the missing bar. (2)

(Total for Question 16 is 7 marks)

- 17** A courier company recorded the delivery time, d minutes, for a sample of 100 parcels. The histogram shows the results.



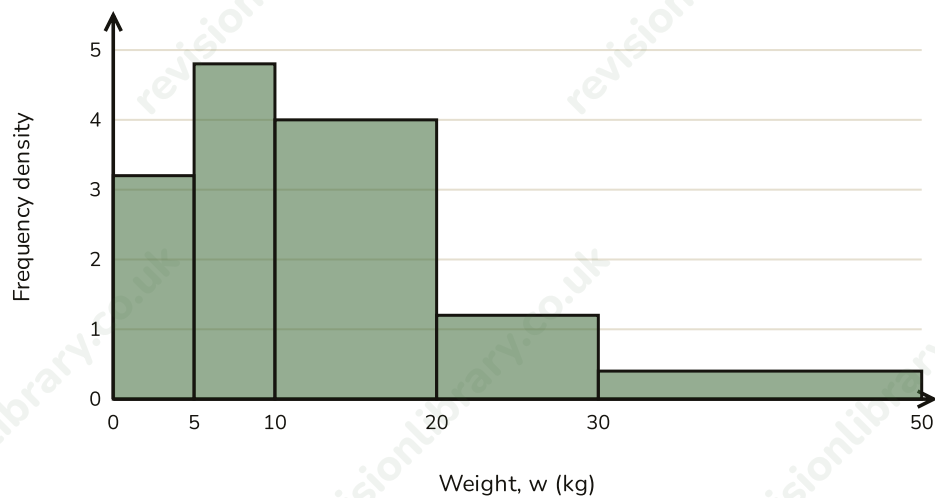
- (a) Write down the class with the highest frequency density. (1)
- (b) Use the histogram to complete a frequency table for the delivery times. (5)
- (c) Using midpoints, estimate the mean delivery time. (3)
- (d) Explain why your answer to part (c) is an estimate rather than an exact value. (1)

(Total for Question 17 is 10 marks)

- 18** A factory tests the lifetime, t hours, of 200 batteries using a histogram with unequal class widths, because most batteries fail within a similar time but a few last much longer. The class $0 < t \leq 50$ has frequency density 0.6. The class $50 < t \leq 150$ has frequency density 1.28. Show that the number of batteries lasting more than 50 hours is 128, and hence find the probability that a randomly chosen battery from this sample lasts more than 50 hours. Give your answer as a decimal.

(Total for Question 18 is 4 marks)

- 19** A recycling centre recorded the weight, w kg, of 100 bags of glass collected in one week. The histogram shows the results.



- (a) Show that the frequency for the class $10 < w \leq 20$ is 40. (2)
- (b) Show that the median weight lies in the class $10 < w \leq 20$. (2)
- (c) Use linear interpolation to estimate the median weight. (3)

(Total for Question 19 is 7 marks)

Mark scheme • H16-1hour Histograms and Frequency Density: 1-hour Pack

Question 1

- **B1** 28 cao
- **Answer: 28**

Question 2

- **B1** 21 cao
- **Answer: 21**

Question 3

- **B1** 6 cao
- **Answer: 6**

Question 4

- **B1** 6 cao
- **Answer: 6**

Question 5

- **B1** 12 cao
- **Answer: 12**

Question 6

- **M1** $96 / 12$, oe
- **A1** 8 cao
- **Answer: 8**

Question 7

- **M1** 3.25×8 , oe
- **A1** 26 cao
- **Answer: 26**

Question 8

- **M1** $51 / 8.5$, oe
- **A1** 6 cao
- **Answer: 6**

Question 9

- **M1** 2.8×15 , oe
- **A1** 42 cao
- **Answer: 42**

Question 10

- **M1** $91 / 13$, oe
- **A1** 7 cao
- **Answer: 7**

Question 11

- **M1** $78 / 6.5$, oe
- **A1** 12 cao
- **Answer: 12**

Question 12

- **M1** $25 / 5$, oe (finds the frequency density of the first class)
- **M1** their frequency density $\times 10$, oe
- **A1** 50 cao
- **Answer: 50**

Question 13

- **B1** 1.2 cao
- **B1** 36 cao
- **B1** 0.8 cao
- **Answer: 1.2, 36, 0.8**

Question 14

- **M1** 1.5×20 , 2.0×20 and 0.6×30 , oe (at least two correct)
- **M1** $30 + 40 + 18$, oe ($=88$)
- **A1** 12 cao
- **Answer: 12**

Question 15

- (a) **M1** 8×5 , oe
- (a) **A1** 40 cao
- **(a) Answer: 40**
- (b) **M1** 3×15 , oe
- (b) **A1** 45 cao
- **(b) Answer: 45**
- (c) **B1** the claim is not correct/is false
- (c) **B1** correct reasoning: although £10-£15 has the tallest bar (highest frequency density), £15-£30 is a wider price band and actually accounts for more cases sold, 45 compared with 40, ft from (a) and (b)
- **(c) Answer: The claim is false: 45 cases were sold priced 15-£30, more than the 40 sold priced 10-£15, even though 10-£15 has the taller bar.**

Question 16

- (a) **M1** 1.0×20 , 3.0×20 , 0.8×30 and 0.1×60 , oe (at least 2 correct)
- (a) **M1** $20 + 60 + 24 + 6$, oe (sum of all four)
- (a) **A1** 110 cao
- **(a) Answer: 110**
- (b) **M1** $150 - 110$, ft from (a)
- (b) **A1** 40 cao
- **(b) Answer: 40**
- (c) **M1** $40 \div 20$, ft from (b)
- (c) **A1** 2.0 cao
- **(c) Answer: 2.0**

Question 17

- (a) **B1** $20 < d \leq 30$ cao
- (a) **Answer: $20 < d \leq 30$**
- (b) **B1** 10 cao (1.0×10)
- (b) **B1** 25 cao (2.5×10)
- (b) **B1** 30 cao (3.0×10)
- (b) **B1** 20 cao (1.0×20)
- (b) **B1** 15 cao (0.75×20)
- (b) **Answer: 10, 25, 30, 20, 15**
- (c) **M1** midpoints 5, 15, 25, 40, 60 identified
- (c) **M1** sum of (frequency $\times$ midpoint) = 2875, oe
- (c) **A1** 28.75 (minutes) cao
- (c) **Answer: 28.75 minutes**
- (d) **B1** the exact delivery time of each parcel within a class is not known, only the class it falls in, so the midpoint is used as an approximation for every value in that class
- (d) **Answer: The exact times within each class are unknown, so the midpoint is used as an approximation.**

Question 18

- **M1** 1.28×100 , oe
- **A1** 128, fully shown
- **M1** $128 / 200$, ft
- **A1** 0.64 cao
- **Answer: 0.64**

Question 19

- (a) **M1** 4.0×10 , oe
- (a) **A1** 40, fully shown
- (a) **Answer: 40**
- (b) **M1** cumulative frequency before this class: $(3.2 \times 5) + (4.8 \times 5) = 16 + 24 = 40$, which is less than 50 (half of 100)
- (b) **A1** cumulative frequency through this class: $40 + 40 = 80$, which is at least 50, so the 50th value (the median) falls in $10 < w \leq 20$
- (b) **Answer: Median lies in $10 < w \leq 20$, since the cumulative frequency passes 50 within this class.**
- (c) **M1** $(50 - 40) \div 40$, oe
- (c) **M1** their fraction $\times 10$ ($= 2.5$)
- (c) **A1** $10 + 2.5 = 12.5$ (kg) cao
- (c) **Answer: 12.5 kg**