



## S25-30min Histograms: 30-minute Pack

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

Name: \_\_\_\_\_ Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

**Answer ALL questions. Show all your working.**

- 1** 51 adults were surveyed about the number of hours,  $h$ , they spent on household chores in a week. The times were grouped using unequal class widths, since chore time varies a lot between people.

| Hours, $h$       | Frequency | Class width | Frequency density |
|------------------|-----------|-------------|-------------------|
| $0 \leq h < 5$   | 9         | 5           | 1.8               |
| $5 \leq h < 10$  | 24        | 5           | ?                 |
| $10 \leq h < 20$ | 15        | 10          | ?                 |
| $20 \leq h < 35$ | 3         | 15          | ?                 |

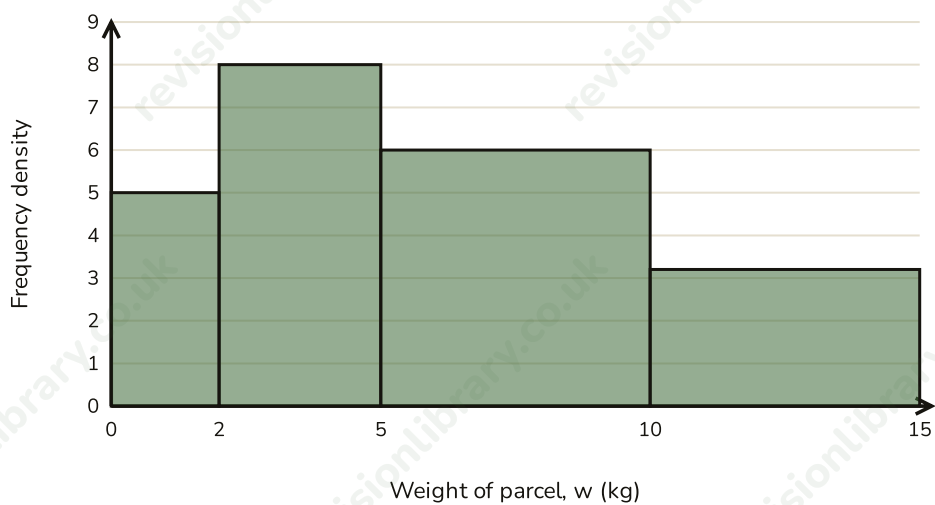
- (a) Work out the frequency density for the class  $5 \leq h < 10$ . (2)

- .....  
(b) Work out the frequency density for the class  $10 \leq h < 20$ . (2)

- .....  
(c) Work out the frequency density for the class  $20 \leq h < 35$ . (2)

.....  
(Total for Question 1 is 6 marks)

- 2 The weight,  $w$  (kg), of 80 parcels handled by a delivery depot one morning was recorded. The histogram shows the results.



(Total for Question 2 is 3 marks)

- 3** The amount of money,  $m$  (£), spent by 90 customers in a bookshop one Saturday was recorded. The histogram shows the results.



- (a)** Write down the frequency density for the class  $10 \leq m < 15$ . **(1)**

- (b)** Work out the percentage of customers who spent less than £15. **(3)**

(Total for Question 3 is 4 marks)

- 4** A petrol station recorded the amount of fuel,  $f$  (litres), put into 40 cars filling up one morning. Some entries in the table are missing.

| Fuel, $f$ (litres) | Frequency | Class width | Frequency density |
|--------------------|-----------|-------------|-------------------|
| $0 \leq f < 20$    | ?         | 20          | ?                 |
| $20 \leq f < 40$   | 16        | 20          | 0.8               |
| $40 \leq f < 50$   | 12        | 10          | 1.2               |
| $50 \leq f < 70$   | 8         | 20          | 0.4               |

- (a)** Show that the total frequency for the three known classes ( $20 \leq f < 40$ ,  $40 \leq f < 50$  and  $50 \leq f < 70$ ) is 36. **(1)**

- (b)** Given that 40 cars were filled in total, work out the frequency for the class  $0 \leq f < 20$ . **(2)**

- (c)** Hence work out the frequency density for the class  $0 \leq f < 20$ . **(2)**

(Total for Question 4 is 5 marks)

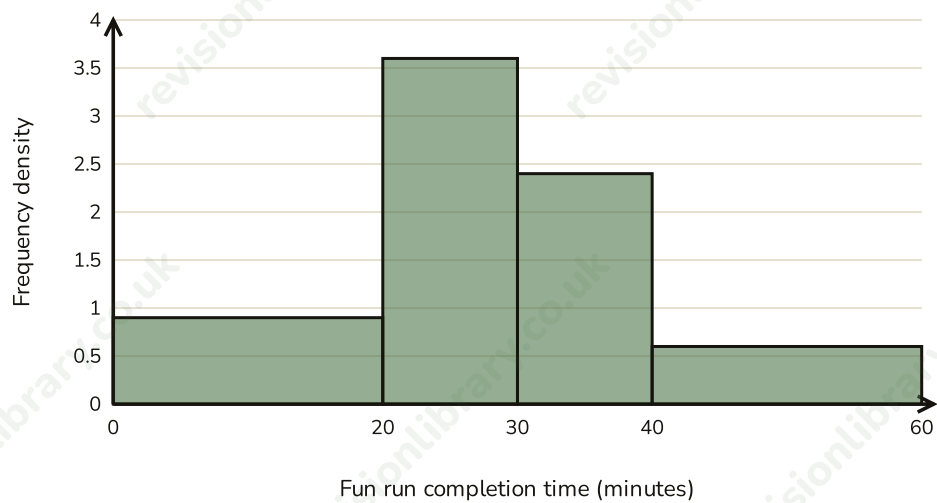
- 5** A conservation charity wants to find out how long, in minutes, visitors spend at a nature reserve's bird hide, in order to help decide the reserve's opening hours. They plan to record the time spent by a sample of 60 visitors, using unequal class widths because most visits are expected to be fairly short, with a few visitors staying much longer. The frequencies they collected are shown below.

| Time, $t$ (minutes) | Frequency | Class width | Frequency density |
|---------------------|-----------|-------------|-------------------|
| $0 \leq t < 10$     | 12        | 10          | ?                 |
| $10 \leq t < 20$    | 30        | 10          | ?                 |
| $20 \leq t < 40$    | 14        | 20          | ?                 |
| $40 \leq t < 80$    | 4         | 40          | ?                 |

- (a) (Plan) Write down a suitable question the charity could investigate using this data. (1)
- .....
- (b) (Collect) Give one reason why the charity chose to record the times using unequal class widths, rather than four equal-width classes of 20 minutes each. (1)
- (c) (Process) Complete the table above by calculating the frequency density for each class. (4)
- (d) (Interpret) Write down the modal class, and use it to describe when visitors are typically most concentrated at the hide. (2)
- .....
- (e) (Interpret) The reserve manager claims: 'More than half of all visitors spend less than 20 minutes at the bird hide.' Comment on whether this claim is supported, using figures from the table. (2)

(Total for Question 5 is 10 marks)

- 6** The times, in minutes, taken by 90 competitors to complete a fun run were recorded. The histogram shows the results.



- (a) Estimate the number of competitors who took between 25 and 35 minutes to complete the fun run. (3)
- (b) Explain why your answer to part (a) is an estimate rather than an exact value. (1)

(Total for Question 6 is 4 marks)

## Mark scheme · S25-30min Histograms: 30-minute Pack

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### Question 1

- (a) **M1**  $24 / 5$ , oe
- (a) **A1** 4.8 cao
- (a) **Answer: 4.8**
- (b) **M1**  $15 / 10$ , oe
- (b) **A1** 1.5 cao
- (b) **Answer: 1.5**
- (c) **M1**  $3 / 15$ , oe
- (c) **A1** 0.2 cao
- (c) **Answer: 0.2**

### Question 2

- **M1** identifies the interval 3 to 5 kg has width 2, within the class  $2 \leq w < 5$  (frequency density 8)
- **M1**  $8 \times 2$ , oe
- **A1** 16 cao
- **Answer: 16**

### Question 3

- (a) **B1** 5 cao
- (a) **Answer: 5**
- (b) **M1**  $2 \times 10 + 5 \times 5$  ( $= 20 + 25 = 45$ ), oe
- (b) **M1**  $45 / 90$ , ft
- (b) **A1** 50% cao
- (b) **Answer: 50%**

### Question 4

- (a) **B1**  $16 + 12 + 8 = 36$ , fully shown
- (a) **Answer: 36**
- (b) **M1**  $40 - 36$ , ft from (a)
- (b) **A1** 4 cao
- (b) **Answer: 4**
- (c) **M1**  $4 / 20$ , ft from (b)
- (c) **A1** 0.2 cao
- (c) **Answer: 0.2**

### Question 5

- (a) **B1** sensible statistical question, e.g. 'Do most visitors spend less than 20 minutes at the bird hide?'
- **(a) Answer: Do most visitors spend less than 20 minutes at the bird hide?**
- (b) **B1** sensible reason, e.g. most visit times are expected to cluster in a fairly short range, so narrower classes there give more detail, while the few long visits can share a wider class without lots of very low frequencies
- **(b) Answer: Unequal widths let the narrow, closely-clustered range of typical visit times be shown in more detail.**
- (c) **B1** 1.2 cao
- (c) **B1** 3.0 cao
- (c) **B1** 0.7 cao
- (c) **B1** 0.1 cao
- **(c) Answer: 1.2, 3.0, 0.7, 0.1**
- (d) **B1**  $10 \leq t < 20$ , ft from (c)
- (d) **B1** sensible interpretation, e.g. visit times are most concentrated between 10 and 20 minutes, more so than any other length of time relative to its class width
- **(d) Answer:  $10 \leq t < 20$ ; this class has the greatest concentration of visit times.**
- (e) **M1**  $12 + 30 = 42$ , and  $42 / 60 (= 0.7 \text{ or } 70\%)$ , oe
- (e) **A1** supported, since 70% is more than half, with correct figures quoted
- **(e) Answer: Supported: 42 out of 60 visitors (70%) spend under 20 minutes at the bird hide.**

### Question 6

- (a) **M1**  $3.6 \times 5$  (25 to 30 minutes, oe)
- (a) **M1**  $2.4 \times 5$  (30 to 35 minutes, oe)
- (a) **A1**  $18 + 12 = 30$  cao
- **(a) Answer: 30**
- (b) **B1** the method assumes the competitors' times are spread evenly (uniformly) across each class, which may not be true
- **(b) Answer: The calculation assumes the data is spread evenly within each class, which may not actually be the case.**