S05-30min Estimated Mean from Grouped Data: 30-minute Pack

Total Marks

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write down the midpoint of the class interval $10 < h \leq 20$.

(Total for Question 1 is 1 mark)

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2 The table shows the time, in minutes, that 25 customers spent in a coffee shop.

Class interval (minutes)	Frequency	Midpoint	fx
$0 < t \leq 5$	3		
$5 < t \leq 10$	8		
$10 < t \leq 15$	7		
$15 < t \leq 20$	5		
$20 < t \leq 25$	2		
Total	25		

(a) Complete the table to show the midpoint and the value of fx for each class interval. **(3)**

(b) Work out an estimate for the mean time that a customer spent in the coffee shop. **(2)**

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(Total for Question 2 is 5 marks)

3 The mass of 20 apples, in grams, is grouped below.

Class interval (g)	Frequency
$80 < m \leq 100$	8
$100 < m \leq 120$	7
$120 < m \leq 140$	5

Work out an estimate for the mean mass of an apple.

(Total for Question 3 is 2 marks)

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4 The times, in minutes, that 30 students took to complete a puzzle are grouped below.

Class interval (minutes)	Frequency
$0 < t \leq 5$	6
$5 < t \leq 10$	14
$10 < t \leq 15$	7
$15 < t \leq 20$	3

Calculate an estimate for the mean time taken, giving your answer correct to 1 decimal place.

(Total for Question 4 is 3 marks)

5 The mass, in kg, of 40 parcels is grouped below.

Class interval (kg)	Frequency
$0 < m \leq 5$	10
$5 < m \leq 10$	18
$10 < m \leq 15$	8
$15 < m \leq 20$	4

(a) Write down the modal class. **(1)**

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(b) Work out the class interval that contains the median mass. **(2)**

.....

(Total for Question 5 is 3 marks)

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6 The table shows the time, in minutes, that 60 members of a gym spent on a treadmill during one visit. The frequency for the class $30 < t \leq 40$ is missing and is shown as x.

Class interval (minutes)	Frequency
$0 < t \leq 10$	8
$10 < t \leq 20$	14
$20 < t \leq 30$	12
$30 < t \leq 40$	x
$40 < t \leq 50$	6
Total	60

(a) Work out the value of x. **(2)**

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(b) Using $x = 20$, work out an estimate for the mean time spent on the treadmill. **(3)**

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(Total for Question 6 is 5 marks)

7 A researcher wants to find out how long customers wait in a queue at a post office. She plans to record the waiting time, in minutes, of a sample of customers on a busy Saturday morning.

(a) Give one reason why the researcher should record the waiting times of a sample of customers, rather than every customer who visits the post office in a year. **(1)**

(b) She records the waiting times of 50 customers and groups the results into the table below. **(4)**

Class interval (minutes)	Frequency	Midpoint	fx
$0 < w \leq 5$	8		
$5 < w \leq 10$	20		
$10 < w \leq 15$	14		
$15 < w \leq 20$	8		
Total	50		

Complete the table and use it to calculate an estimate for the mean waiting time.

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(c) The post office claims that, on average, customers wait 8 minutes or less. Using your answer to part (b), does the data support this claim? Give a reason. **(2)**

(Total for Question 7 is 7 marks)

8 A researcher recorded the time, in minutes, that shoppers spent in a supermarket. The table shows some of the results, where y is the number of shoppers in the class $10 < t \leq 20$. The estimated mean time spent was 16 minutes.

Class interval (minutes)	Frequency	Midpoint
$0 < t \leq 10$	8	5
$10 < t \leq 20$	y	15
$20 < t \leq 30$	12	25

Show that y = 20.

(Total for Question 8 is 3 marks)

Mark scheme · S05-30min Estimated Mean from Grouped Data: 30-minute Pack

Question 1

- **B1** 15 cao
- **Answer: 15**

Question 2

- (a) **B1** all midpoints correct: 2.5, 7.5, 12.5, 17.5, 22.5
- (a) **B1** all fx values correct: 7.5, 60, 87.5, 87.5, 45
- (a) **B1** sum of fx = 287.5
- **(a) Answer: Midpoints 2.5, 7.5, 12.5, 17.5, 22.5; fx values 7.5, 60, 87.5, 87.5, 45; sum of fx = 287.5**
- (b) **M1** 287.5 ÷ 25, oe (sum of fx ÷ sum of f)
- (b) **A1** 11.5 cao
- **(b) Answer: 11.5 minutes**

Question 3

- **M1** 8x90+7x110+5x130 (=2140), oe (using midpoints 90, 110, 130)
- **A1** 107 cao
- **Answer: 107 g**

Question 4

- **M1** midpoints 2.5, 7.5, 12.5, 17.5 used
- **M1** sum of fx = 260, oe (6x2.5+14x7.5+7x12.5+3x17.5)
- **A1** 8.7 awrt
- **Answer: 8.7 minutes**

Question 5

- (a) **B1** $5 < m \leq 10$ cao
- **(a) Answer: $5 < m \leq 10$**
- (b) **M1** cumulative frequencies 10, 28, 36, 40 found and the middle position (half(40+1) = 20.5th value) identified
- (b) **A1** $5 < m \leq 10$ cao
- **(b) Answer: $5 < m \leq 10$**

Question 6

- (a) **M1** 8+14+12+6, oe (adds the four known frequencies)
- (a) **A1** x = 20 cao
- **(a) Answer: x = 20**
- (b) **M1** midpoints 5, 15, 25, 35, 45 used
- (b) **M1** sum of fx = 1,520, oe
- (b) **A1** 25.3 cao (awrt 25.3)
- **(b) Answer: 25.3 minutes (1 d.p.)**

Question 7

- (a) **B1** any suitable reason, e.g. it would take too long/be too costly/be impractical to record every customer who visits in a year
- (b) **B1** all midpoints correct: 2.5, 7.5, 12.5, 17.5
- (b) **B1** all fx values correct: 20, 150, 175, 140
- (b) **M1** 485 ÷ 50, oe
- (b) **A1** 9.7 cao
- **(b) Answer: 9.7 minutes**
- (c) **B1** No cao
- (c) **B1** correct reason, e.g. the estimated mean waiting time (9.7 minutes) is greater than the claimed 8 minutes
- **(c) Answer: No**

Question 8

- **M1** sum of fx = 8×5 + 15y + 12×25 = 340 + 15y and sum of f = 20 + y set up
- **M1** correct equation formed: (340+15y) ÷ (20+y) = 16, leading to 340+15y = 320+16y
- **A1** y = 20 shown correctly, cao
- **Answer: y = 20**