Estimated mean from a grouped frequency table

Grade 4 | Worked solutions

GCSE Statistics topic practice

1 A courier weighs 30 parcels. The table shows information about the mass, m kg, of each parcel.

Mass, m (kg)	Frequency, f	Midpoint, x	$f \times x$
$0 < m \leq 2$	4	1	4
$2 < m \leq 4$	10	3	
$4 < m \leq 6$	9		
$6 < m \leq 10$	7		
Total	30		

a. Complete the table. (2)

b. Work out an estimate for the mean mass of a parcel. (2)

(4 marks)

a)

The midpoint of 4 to 6 is 5

The midpoint of 6 to 10 is 8

Frequency x midpoint

$10 \times 3 = 30$

$9 \times 5 = 45$

$7 \times 8 = 56$

Total

$4 + 30 + 45 + 56 = 135$

The total of the last column is 135

b)

Divide by the total frequency

$135 \div 30 = 4.5$

a) 5, 8 then 30, 45, 56, total 135 b) 4.5 kg

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2 The table shows the time, t minutes, that 40 employees took to travel to work one morning.

Time, t (minutes)	Frequency
$0 < t \leq 10$	6
$10 < t \leq 20$	11
$20 < t \leq 30$	14
$30 < t \leq 40$	7
$40 < t \leq 50$	2

a. Work out an estimate for the mean time. (3)

b. Explain why your answer to part (a) is only an estimate. (1)

(4 marks)

a)

Midpoint x frequency

$5 \times 6 = 30$

$15 \times 11 = 165$

$25 \times 14 = 350$

$35 \times 7 = 245$

$45 \times 2 = 90$

Add them up

$30 + 165 + 350 + 245 + 90 = 880$

Divide by the total frequency

$880 \div 40 = 22$

b)

The exact times are not known.

The midpoint of each class is used instead.

a) 22 minutes b) exact times not known, midpoints used

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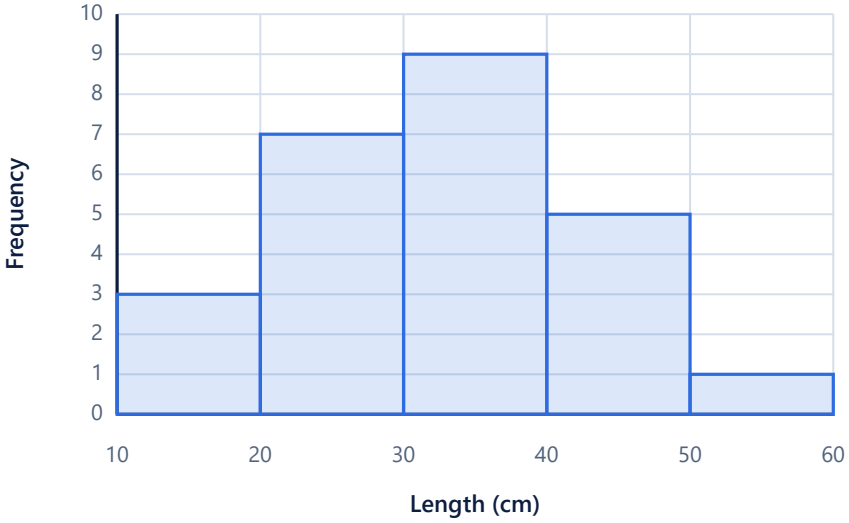
3 An angler measures the length, x cm, of each fish she catches in a week. The frequency diagram shows her results.

The first bar shows the fish with a length where $10 < x \leq 20$

a. How many fish did she catch in the week? (1)

b. Work out an estimate for the mean length of a fish. (3)

c. Write down the modal class. (1)



(5 marks)

a)

3 + 7 + 9 + 5 + 1 = 25

She caught 25 fish.

b)

Midpoint x frequency

15 x 3 = 45

25 x 7 = 175

35 x 9 = 315

45 x 5 = 225

55 x 1 = 55

Add them up

45 + 175 + 315 + 225 + 55 = 815

Divide by the number of fish

815 ÷ 25 = 32.6

c)

The tallest bar is $30 < x \leq 40$

a) 25 b) 32.6 cm c) $30 < x \leq 40$

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4 50 students recorded the time, t minutes, they spent on homework one evening.

Time, t (minutes)	Frequency
$0 < t \leq 20$	8
$20 < t \leq 40$	15
$40 < t \leq 60$	17
$60 < t \leq 80$	10

Jake works out an estimate for the mean time. Here is his working.

$(20 \times 8) + (40 \times 15) + (60 \times 17) + (80 \times 10) = 2580$

$2580 \div 50 = 51.6$ minutes

a. Describe the mistake Jake has made. (1)

b. Work out the correct estimate for the mean time. (3)

(4 marks)

a)

He used the top value of each class.

He should have used the midpoint of each class.

b)

Midpoint x frequency

$10 \times 8 = 80$

$30 \times 15 = 450$

$50 \times 17 = 850$

$70 \times 10 = 700$

Add them up

$80 + 450 + 850 + 700 = 2080$

Divide by the total frequency

$2080 \div 50 = 41.6$

a) used class tops, not midpoints b) 41.6 minutes

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5 40 people cycle to work. The table shows information about the distance, d km, each person cycles. One frequency is missing.

Distance, d (km)	Frequency
$0 < d \leq 2$	9
$2 < d \leq 4$	13
$4 < d \leq 6$	
$6 < d \leq 10$	6
$10 < d \leq 20$	2

a. Work out the missing frequency. (1)

b. Work out an estimate for the mean distance. (3)

c. Explain how a more accurate value for the mean could be found. (1)

(5 marks)

a)

$9 + 13 + 6 + 2 = 30$

$40 - 30 = 10$

The missing frequency is 10

b)

Midpoint x frequency

$1 \times 9 = 9$

$3 \times 13 = 39$

$5 \times 10 = 50$

$8 \times 6 = 48$

$15 \times 2 = 30$

Add them up

$9 + 39 + 50 + 48 + 30 = 176$

Divide by the total frequency

$176 \div 40 = 4.4$

c)

Use the exact distance for each person, not the midpoints of the classes.

a) 10 b) 4.4 km c) use the exact distances

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