Histograms with unequal class widths

Grade 6 | Worked solutions

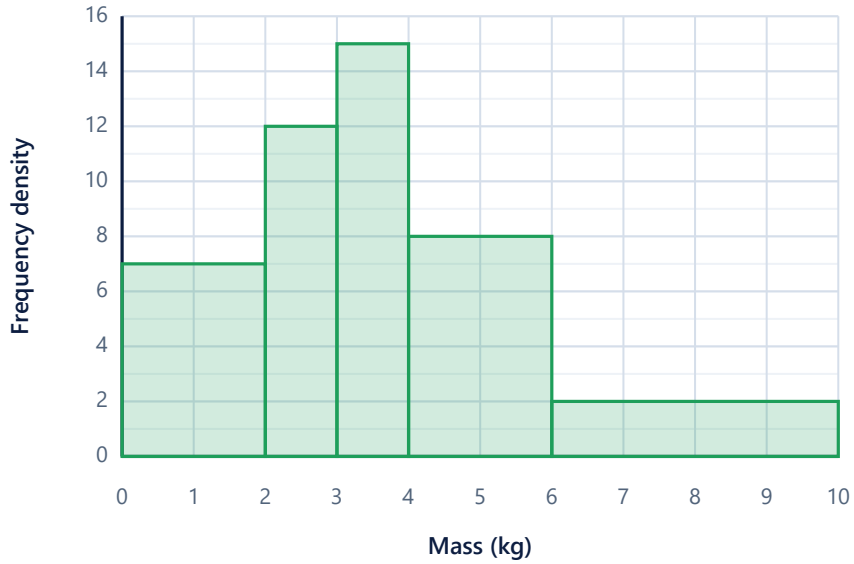
GCSE Statistics topic practice

1 The table shows the masses, m kg, of the 65 parcels a courier delivered one morning.

Mass, m (kg)	**$0 < m \leq 2$**	**$2 < m \leq 3$**	**$3 < m \leq 4$**	**$4 < m \leq 6$**	**$6 < m \leq 10$**
Frequency	14	12	15	16	8

a. Work out the frequency density for each class. (2)

b. On the grid, draw a histogram for this information. (2)



(4 marks)

a)

Frequency density = frequency ÷ class width

14 ÷ 2 = 7

12 ÷ 1 = 12

15 ÷ 1 = 15

16 ÷ 2 = 8

8 ÷ 4 = 2

b)

Draw each bar as wide as its class.

The heights are the frequency densities.

Leave no gaps between the bars.

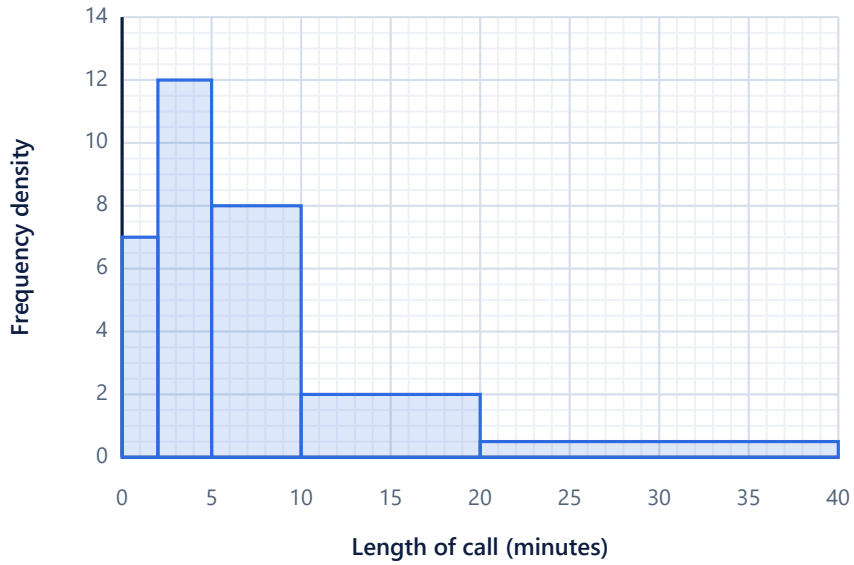
a) 7, 12, 15, 8, 2 b) bars of height 7, 12, 15, 8, 2

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2 The histogram shows the lengths, t minutes, of the calls to a council helpline one day.

a. Leo says, "The tallest bar is for calls of between 2 and 5 minutes, so this class has more calls than any other class." Is Leo correct? You must show your working. (2)

b. Work out the total number of calls to the helpline that day. (2)



(4 marks)

a)

Frequency = frequency density x class width

2 to 5 class = 12 x 3

= 36

5 to 10 class = 8 x 5

= 40

40 > 36 so Leo is not correct.

The 5 to 10 class has the most calls.

b)

0 to 2 class = 7 x 2

= 14

10 to 20 class = 2 x 10

= 20

20 to 40 class = 0.5 x 20

= 10

Total = 14 + 36 + 40 + 20 + 10

= 120

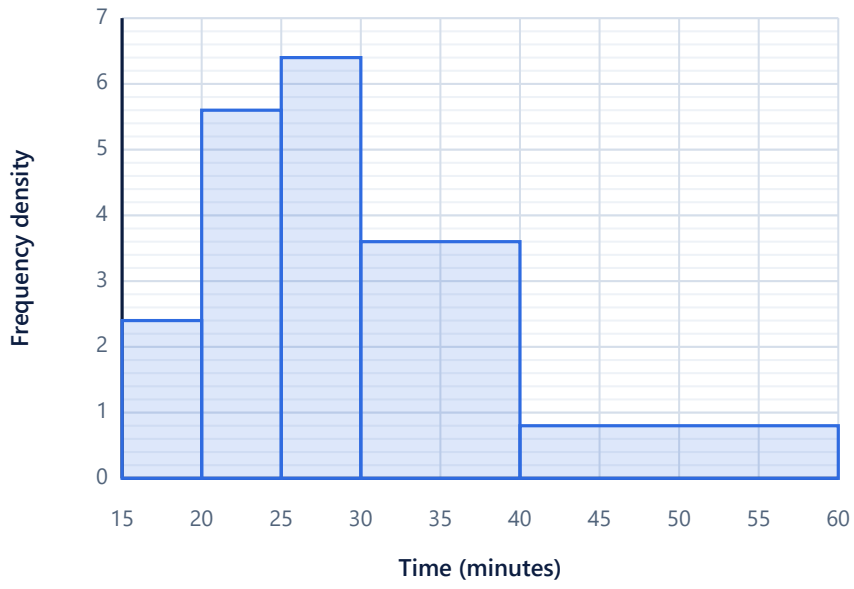
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a) no, 36 calls is less than 40 calls b) 120 calls

3 The histogram shows the times, t minutes, taken by the runners in a 5 km fun run.

a. Work out an estimate for the number of runners who took between 25 minutes and 45 minutes. (3)

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



(4 marks)

a)

Frequency = frequency density x class width

25 to 30 = 6.4 x 5

= 32

30 to 40 = 3.6 x 10

= 36

Only 40 to 45 is needed from the last class

40 to 45 = 0.8 x 5

= 4

32 + 36 + 4 = 72

b)

We do not know the exact times in the 40 to 60 class. We have to assume they are spread evenly across the class.

a) 72 runners b) exact times in the class are not known

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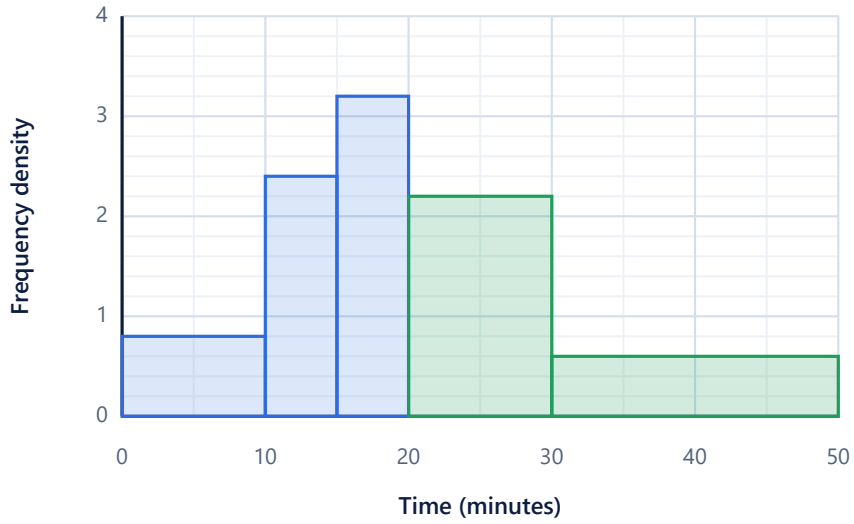
4 The incomplete table and histogram show the time, t minutes, that shoppers spent in a supermarket.

Time, t (min)	$0 < t \leq 10$	$10 < t \leq 15$	$15 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 50$
Frequency	8	12		22	12

a. Use the histogram to work out the missing frequency in the table. (1)

b. Complete the histogram. (2)

c. Work out an estimate for the number of shoppers who spent more than 25 minutes in the supermarket. (2)



(5 marks)

a)

Frequency = frequency density × class width

3.2 × 5 = 16

b)

Frequency density = frequency ÷ class width

22 ÷ 10 = 2.2

12 ÷ 20 = 0.6

c)

25 is halfway through the 20 to 30 class

22 ÷ 2 = 11

11 + 12 = 23

a) 16 b) bars of height 2.2 and 0.6 c) 23 shoppers

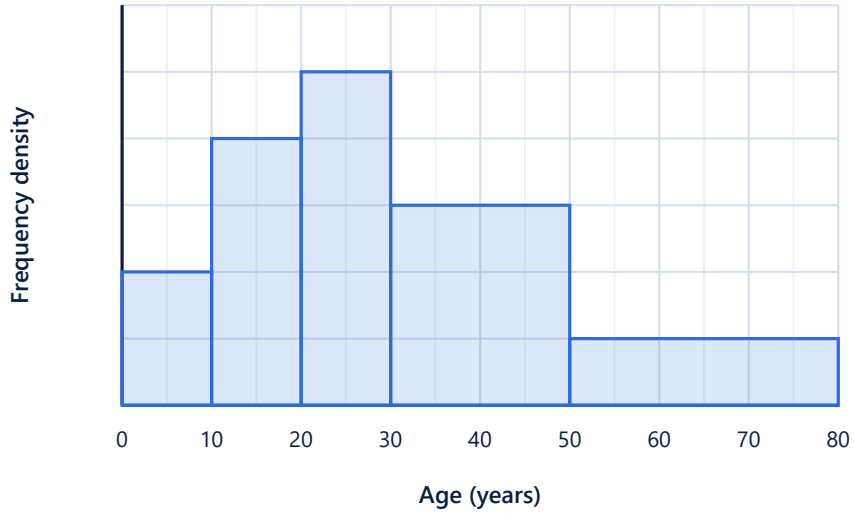
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5 The histogram shows the ages, in years, of the visitors to a museum one Saturday. The frequency density axis has no scale.

There were 60 visitors aged over 10 and up to 20.

a. Work out the number of visitors aged over 30 and up to 50. (2)

b. Work out an estimate for the percentage of the visitors who were aged over 40. (3)



(5 marks)

a)

Area of a bar = class width × height in squares

10 to 20 bar = 10 × 4

= 40

An area of 40 stands for 60 visitors

60 ÷ 40 = 1.5 visitors for each unit of area

30 to 50 bar = 20 × 3

= 60

60 × 1.5 = 90

b)

Find the total area of all the bars

20 + 40 + 50 + 60 + 30 = 200

Total visitors = 200 × 1.5

= 300

40 is halfway through the 30 to 50 class

90 ÷ 2 = 45

50 to 80 bar = 30 × 1 × 1.5

= 45

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$$\text{Over } 40 = 45 + 45$$

$$= 90$$

$$\frac{90}{300} \times 100 = 30\%$$

a) 90 visitors b) 30%

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