



Histograms

About 50 minutes Calculator allowed 37 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks] **A2** Last lesson [2 marks]
- The classes $0 < x \leq 10$,
 $10 < x \leq 20$ and $20 < x \leq 30$
have frequencies 10, k and 9. An
estimate of the mean is 14.5.
Find k .
- Find the interquartile range of
these 15 numbers: 27, 38, 58, 57,
15, 21, 32, 4, 20, 53, 19, 43, 33,
56, 1.

Answer

Answer

- A3** From chapter 4 [2 marks] **A4** From chapter 5 [2 marks]
- Find the first term of the
sequence 7, 15, 23, 31, ... that is
greater than 332.
- $x : y = 1 : 5$ and $y : z = 3 : 2$.
Find $x : z$ in its simplest form.

Answer

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

The table shows the masses of some parcels.
Work out the frequency density of each class.

Mass, m (kg)	Frequency
$0 < m \leq 10$	14
$10 < m \leq 15$	21
$15 < m \leq 30$	36
$30 < m \leq 50$	18

Hint Frequency density is frequency divided by
class width. The first class is 10 wide, so
 $14 \div 10 = 1.4$.

- B1** The table shows the times
some students spent on
homework. Work out the
frequency density of each
class. [3 marks]

Time, t (minutes)	Frequency
$0 < t \leq 5$	12
$5 < t \leq 20$	33
$20 < t \leq 30$	26
$30 < t \leq 60$	21

Answer

EXAMPLE 2

On a histogram, the bar for the class $15 < h \leq 40$ has a frequency density of 2.8. How many values are in this class?

Hint The area of the bar is the frequency: density times width, and the width is $40 - 15 = 25$.

B2 On a histogram, the bar for the class $35 < w \leq 60$ has a frequency density of 3.2. How many values are in this class? [2 marks]

Answer

c Practice

C1 A bar on a histogram has a frequency density of 2.5 and stands for 45 values. The class starts at 10. Work out where the class ends. [2 marks]

Answer

C2 On a histogram, the bar for $0 < t \leq 4$ has a frequency density of 6. The bar for $4 < t \leq 10$ has the same frequency. How tall is it? [2 marks]

Answer

C3 The table gives the frequency density of each bar of a histogram showing the heights of some plants. What percentage of the plants are taller than 30 cm? Give your answer to 1 decimal place. [3 marks]

Height, h (cm)	Frequency density
$0 < h \leq 10$	1.5
$10 < h \leq 30$	2.4
$30 < h \leq 40$	3.2

Answer

C4 A histogram is being drawn. The bar for $20 < w \leq 30$ stands for 42 values and is 7 cm tall. The class $30 < w \leq 50$ has a frequency of 36. How tall, in cm, should its bar be? [3 marks]

Answer

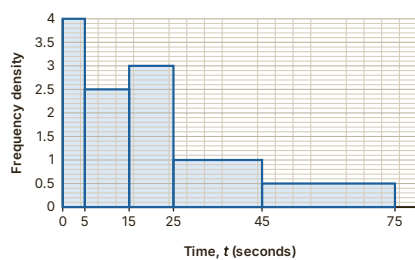
D Exam-style questions

- D1** The table shows the times some people waited for a bus. A histogram is drawn from it. The bar for $10 < t \leq 25$ is twice as tall as the bar for $0 < t \leq 10$. Work out the value of x . You must show your working. [3 marks]

Time, t (minutes)	Frequency
$0 < t \leq 10$	18
$10 < t \leq 25$	x

Answer

- D2** The histogram shows the times, in seconds, some people took to react to a signal.



- (a) Ben says, "More people took 0 to 5 seconds than 25 to 45 seconds, because that bar is taller." Explain why Ben is wrong. [2 marks]

- (b) Estimate how many people took more than 20 seconds. [2 marks]

Answer

- (c) Work out an estimate of the median time. Give your answer to 1 decimal place. [3 marks]

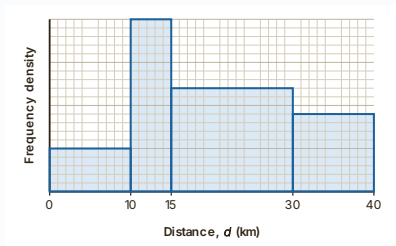
Answer

Total for D2: 7 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 The histogram shows the distances 84 people drive to work. It has no scale on the frequency density axis. Estimate how many of them drive more than 12 km. [4 marks]



Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Count the small squares in each bar. Together they stand for 84 people.
- Hint 2** The bars hold squares in the ratio 10 : 20 : 36 : 18.
- Hint 3** 12 to 15 km is $\frac{3}{5}$ of its bar. Add the two bars after it.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can work out frequency density. ☐ ☐ ☐
- I can read a frequency as a bar's area. ☐ ☐ ☐
- I can estimate part of a class. ☐ ☐ ☐