

Drawing Histograms

Histograms may look like innocent bar charts, but don't be fooled — they've got a few hidden depths. Luckily you've got these nice steps to follow and before you know it you'll be drawing them in your sleep.

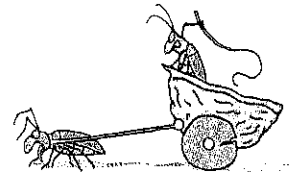
Example

Ali was investigating the length of beetles in her garden. Her results are shown in the table below. Draw a histogram of her results.

Length (mm)	Frequency
$0 < x \leq 10$	32
$10 < x \leq 15$	36
$15 < x \leq 18$	24
$18 < x \leq 22$	28
$22 < x \leq 30$	16

< just means 'less than' and
 \leq means 'less than or equal to'.
 > means 'greater than' and
 \geq means 'greater than or equal to'.

Histograms are great for showing data when one variable is continuous (numerical data that can have any value within a range, like length).



- 1 Work out the class width of each class by subtracting the smallest number in each class from the largest number.

It's this column of numbers that's used to work out the class widths.

Length (mm)	Frequency	Class Width
$0 < x \leq 10$	32	$10 - 0 = 10$
$10 < x \leq 15$	36	$15 - 10 = 5$
$15 < x \leq 18$	24	$18 - 15 = 3$
$18 < x \leq 22$	28	$22 - 18 = 4$
$22 < x \leq 30$	16	$30 - 22 = 8$

It's useful to add another column to do this working in.

Each of these groups of lengths is known as a class.

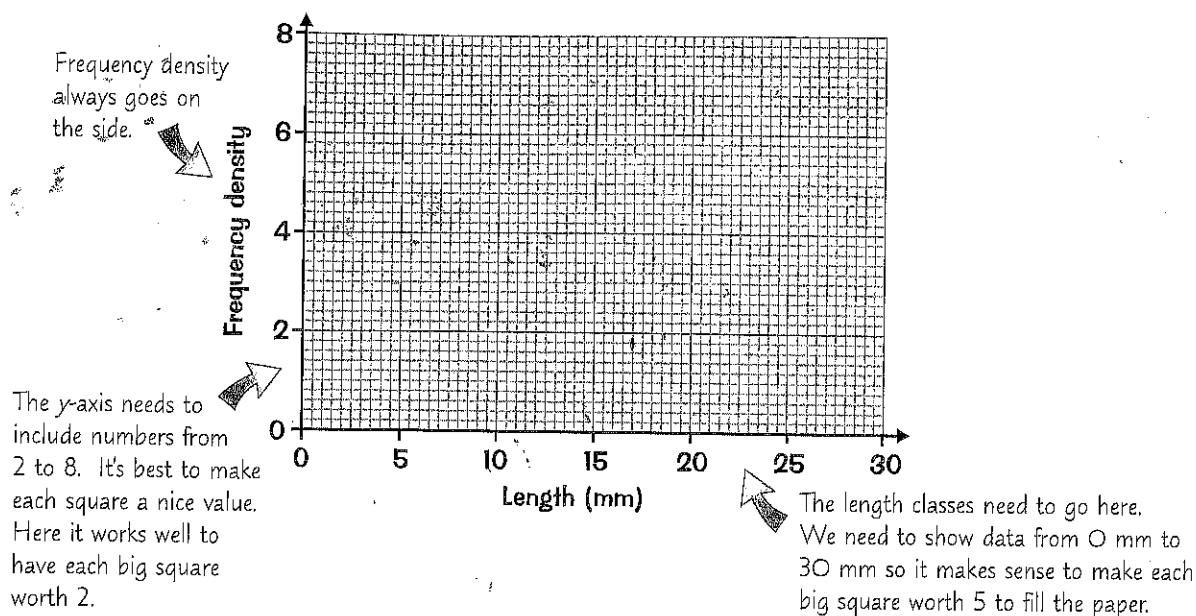
- 2 Divide the frequency of each class by the class width to work out frequency density.

Length (mm)	Frequency	Class Width	Frequency Density
$0 < x \leq 10$	32	$10 - 0 = 10$	$32 \div 10 = 3.2$
$10 < x \leq 15$	36	$15 - 10 = 5$	$36 \div 5 = 7.2$
$15 < x \leq 18$	24	$18 - 15 = 3$	$24 \div 3 = 8$
$18 < x \leq 22$	28	$22 - 18 = 4$	$28 \div 4 = 7$
$22 < x \leq 30$	16	$30 - 22 = 8$	$16 \div 8 = 2$

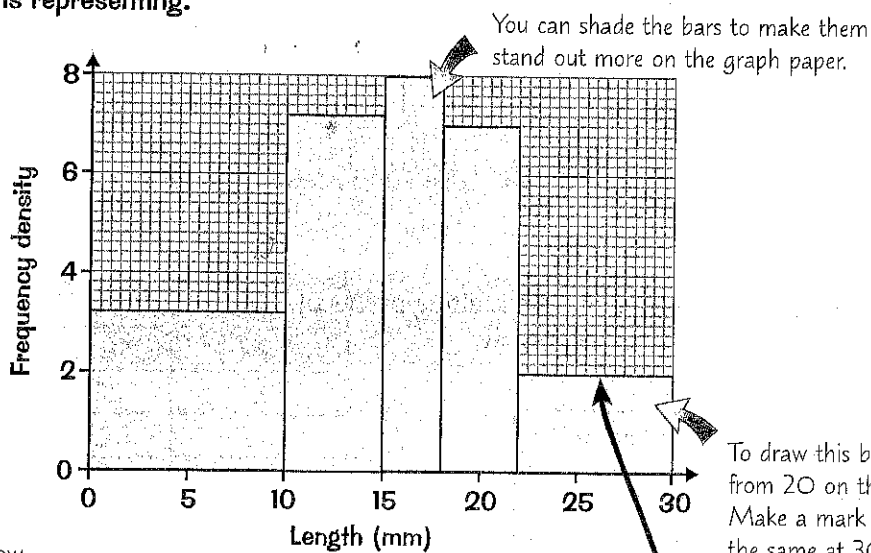
Again, adding another column to work out the frequency density is a good idea. You're less likely to make a mistake if you write out your working.

Frequency Class width

- 3 Draw your axes with a sensible scale and label them. The axes should take up at least half of the space on the graph paper you've been given. Always draw frequency density on the y-axis and the classes on the x-axis.



- 4 Draw the bars neatly with a sharp pencil. Each bar needs to be as wide as the class it is representing.



Length (mm)	Frequency	Class Width	Frequency Density
$0 < x \leq 10$	32	$10 - 0 = 10$	$32 \div 10 = 3.2$
$10 < x \leq 15$	36	$15 - 10 = 5$	$36 \div 5 = 7.2$
$15 < x \leq 18$	24	$18 - 15 = 3$	$24 \div 3 = 8$
$18 < x \leq 22$	28	$22 - 18 = 4$	$28 \div 4 = 7$
$22 < x \leq 30$	16	$30 - 22 = 8$	$16 \div 8 = 2$

Drawing Histograms

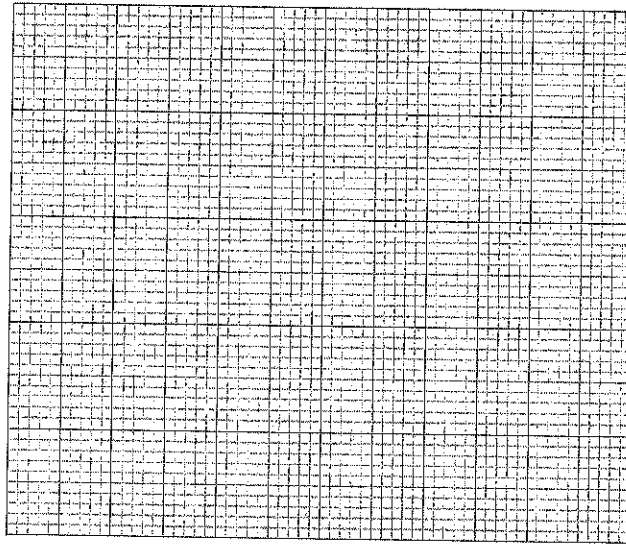
Grab a ruler and a calculator and get stuck into these questions. You might just learn to love histograms...

- Q1** Some students were investigating the height of apple trees in an orchard. Draw a histogram of their results below.

Height (m)	Frequency
$0 < x \leq 2$	38
$2 < x \leq 3.5$	30
$3.5 < x \leq 4$	22
$4 < x \leq 4.5$	18
$4.5 < x \leq 6$	15

BIOLOGY

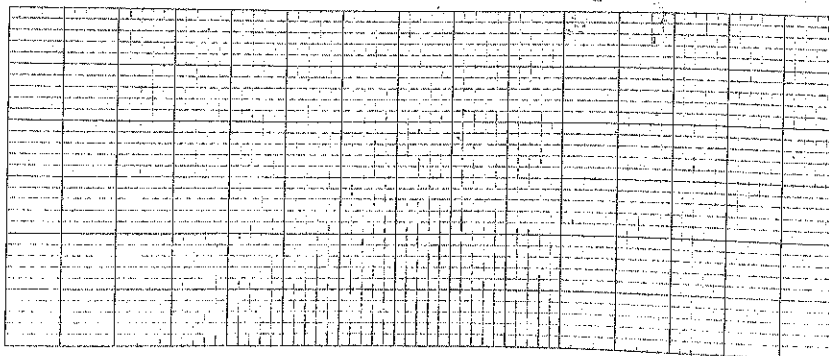
TIP: there are a couple of columns you might want to add to the table to help with your working.



- Q2** Some students are investigating the melting points of different substances. Draw a histogram of the results below.

Melting Point ($^{\circ}\text{C}$)	Frequency
$0 < x \leq 15$	6
$15 < x \leq 30$	9
$30 < x \leq 40$	13
$40 < x \leq 50$	11
$50 < x \leq 70$	16

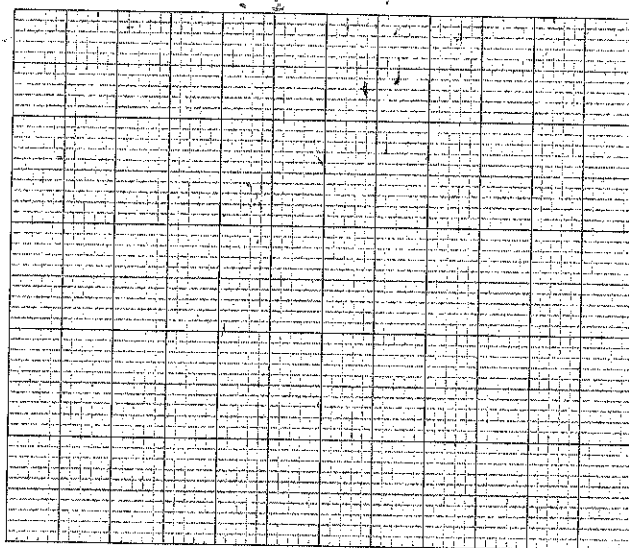
PHYSICS



Q3 Draw a histogram of the data below.

CHEMISTRY

Concentration (g/dm ³)	Frequency
$0 < x \leq 0.4$	2
$0.4 < x \leq 1.0$	9
$1.0 < x \leq 1.2$	10
$1.2 < x \leq 1.6$	16
$1.6 < x \leq 2.4$	4



Q4 Ellie did an investigation into body temperature. Draw a histogram of her results below.

BIOLOGY

Body Temperature (°C)	Frequency
$35.5 < x \leq 36.5$	5
$36.5 < x \leq 36.75$	2
$36.75 < x \leq 37.25$	5
$37.25 < x \leq 37.5$	1
$37.5 < x \leq 38.5$	1

