

Histograms

Histograms – Example A

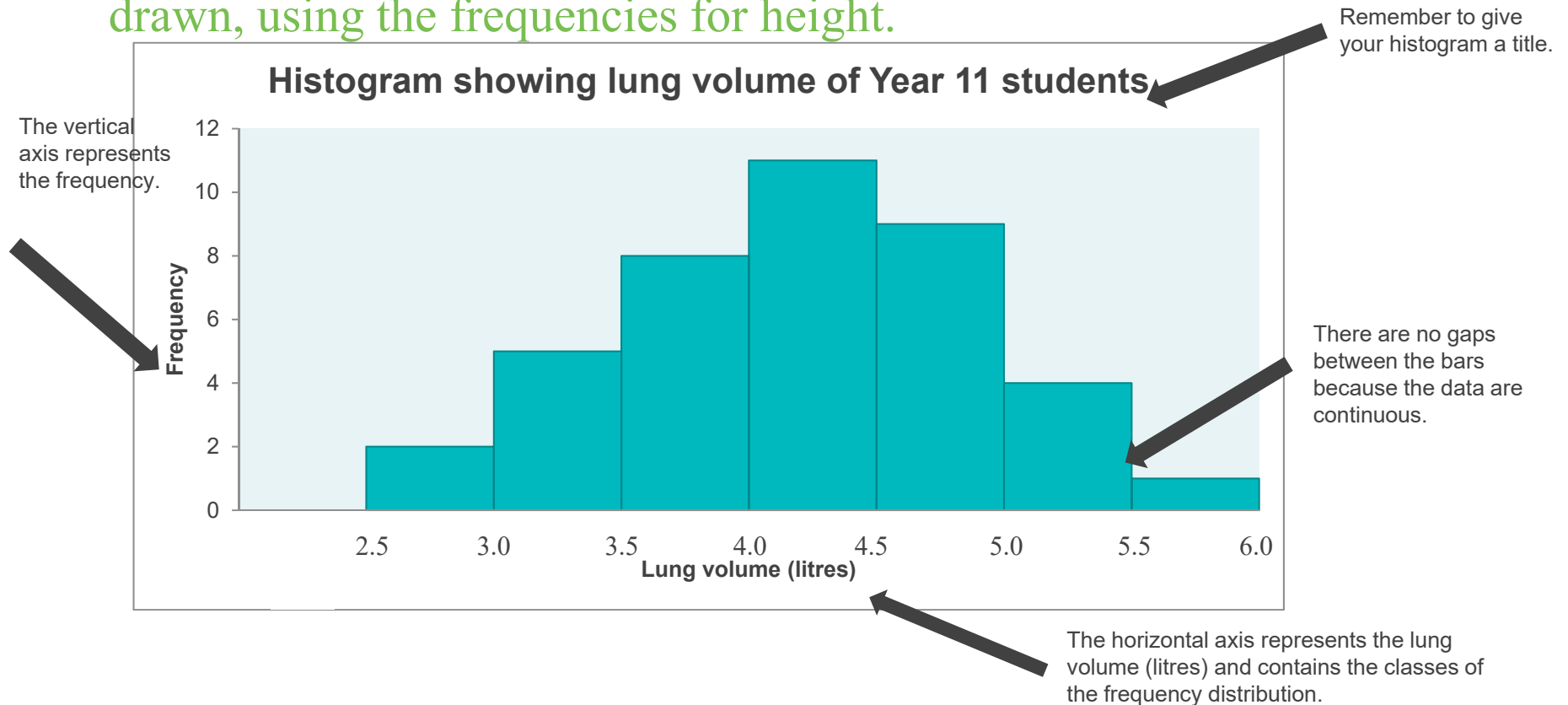
Histograms are a useful way to illustrate the frequency distribution of continuous data. For example, the data in the table below show the lung volume of a group of students.

Lung volume (litres)	Frequency
2.5–2.9	2
3.0–3.4	5
3.5–3.9	8
4.0–4.4	11
4.5–4.9	9
5.0–5.4	4
5.5–5.9	1

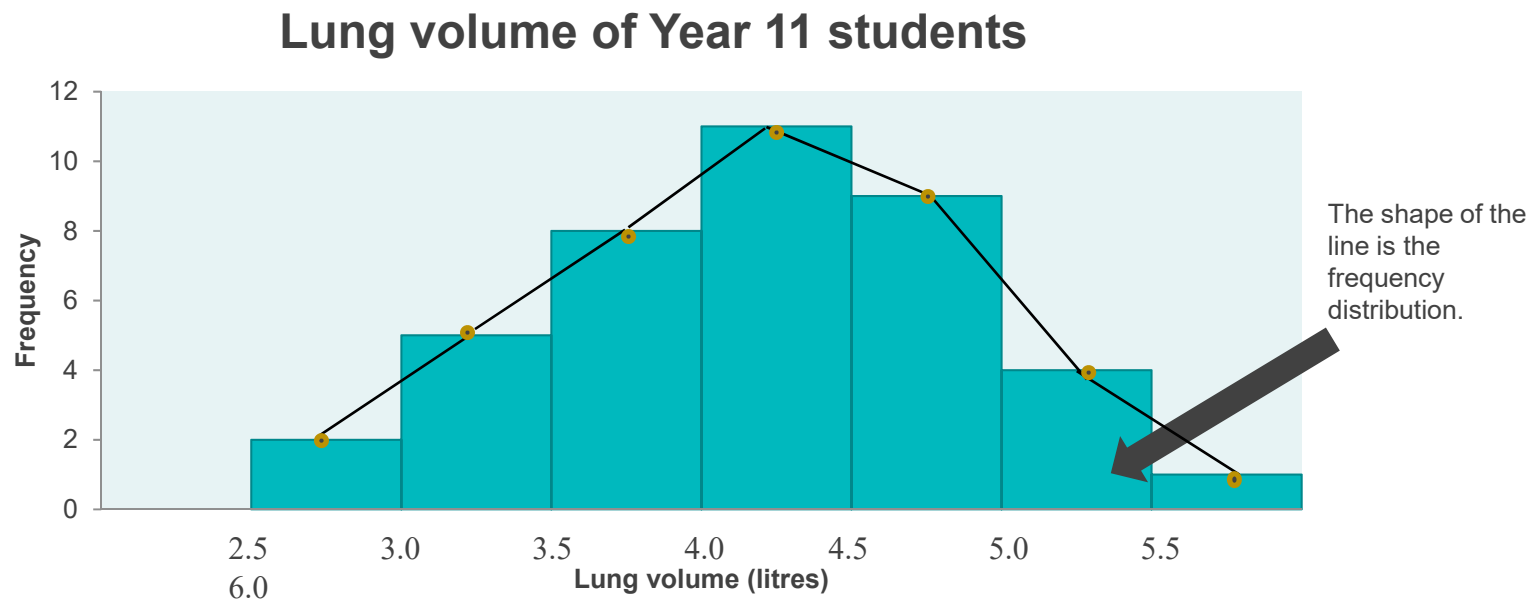
What are the class widths?

Histograms – Example A

Since the classes are of equal width, a standard histogram can be drawn, using the frequencies for height.



Histograms – Example A



A frequency polygon is obtained by joining the mid-points of the top of the histogram bars.

Histograms – Example B

If the classes are not of equal width, we cannot use the frequency as the vertical axis. This is because the frequency needs to be shown by the area of the bar, not just the height of the bar.

What are the class widths in this example?

Lung volume (Litres)	Frequency
2.0–2.9	2
3.0–3.2	6
3.3–3.5	8
3.6–4.0	10
4.1–5.0	9
5.1–5.5	4
5.6–5.7	1

Histograms – Example B

Instead of using frequency on the vertical axis, **frequency density** is used.

Frequency density is calculated by the following formula:

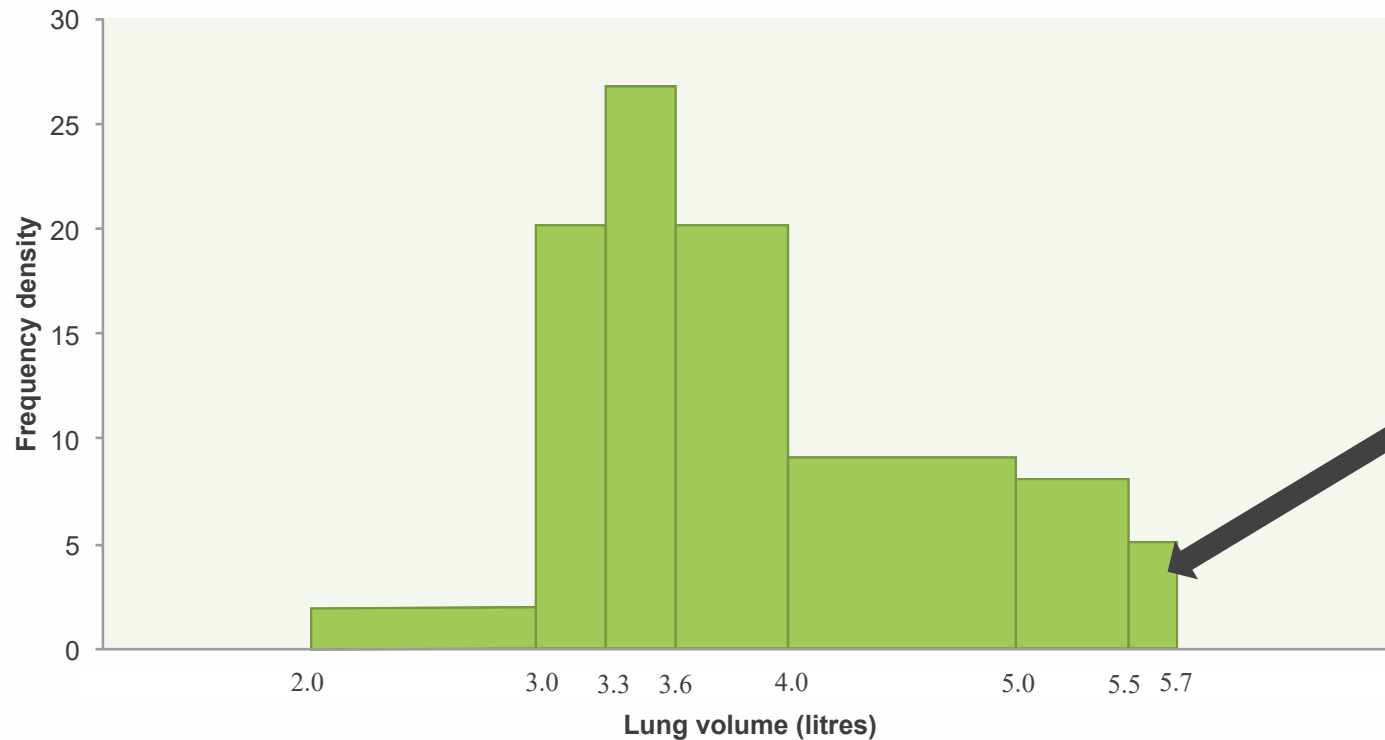
Frequency density = frequency/width

Lung volume (litres)	Frequency	Class width	Frequency density
2.0–2.9	2	1.0	2.0
3.0–3.2	6	0.3	20.0
3.3–3.5	8	0.3	26.6
3.6–4.0	10	0.5	20.0
4.1–5.0	9	1.0	9.0
5.1–5.5	4	0.5	8.0
5.6–5.7	1	0.2	5.0

Histograms – Example B

This time, frequency density is plotted against lung volume.

Histogram showing lung volume of Year 12 students



The area of the bar represents the frequency.

Other types of graph

Histograms are one way of illustrating data. Others include:

- bar charts
- line graphs
- pie charts
- scatter diagrams.

[See some examples of 'bad' graphs.](#)