

Misleading graphs



Look for the axis baseline, the axis-break symbol, and area distortion.

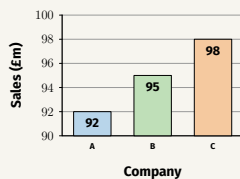
Name _____

Date _____

Spotting a misleading graph

A good graph has: a good title, clearly labelled axes (with units), simplicity, clear data points, and an uninterrupted (zero-baseline) axis. Watch for a **truncated axis** (doesn't start at 0 – exaggerates differences) and **area distortion** (an icon's width and height both scale with value, so its area grows much faster than the true value).

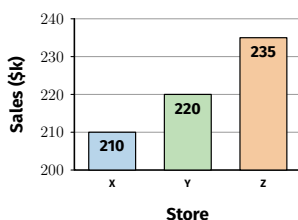
Worked example This graph compares three companies' sales. Explain why it's misleading.



The y-axis starts at 90, not 0, with no break symbol. The true difference (92 to 98, about 6%) looks huge because it fills the whole plot.

1. Explain why this graph is misleading. Use the actual sales figures.

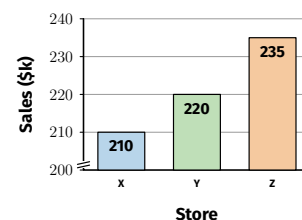
Solution: The y-axis starts at 200, not 0. X's bar is drawn 10 units tall and Z's 35 units tall – Z looks 3.5 times taller than X – but the true sales (210 vs 235) differ by only about 12%.



Working

2. This is the same data with a break symbol. What does the symbol warn readers about?

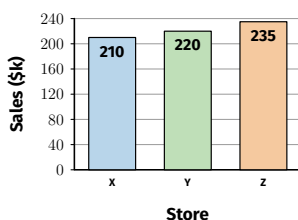
Solution: It warns that the axis does not start at zero – the reader knows a chunk near the bottom is missing. It does not change the bar heights, so the 3.5-times-taller exaggeration is still there.



Working

3. Redraw this comparison honestly (in your head): describe how different the bars would really look.

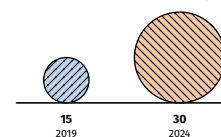
Solution: On a zero-baseline axis all three bars (210, 220, 235) look nearly the same height – correctly showing that the real difference between them is only about 12%.



Working

4. Why is this pictogram misleading, even though each icon's label is correct?

Solution: The value doubles (15 to 30), so the icon's diameter also doubles – but that makes its area 4 times bigger, not 2. The 2024 icon looks like it quadrupled, when it only doubled.



Working

Misleading graphs (continued)



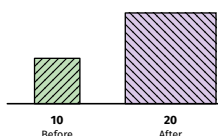
Look for the axis baseline, the axis-break symbol, and area distortion.

Name _____

Date _____

5. A symbol's width and height both double for a doubled value. By what factor does its area actually grow?

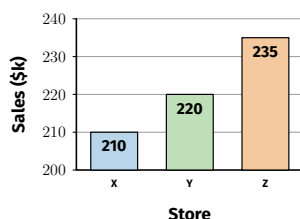
Solution: Area is proportional to size squared. Doubling both the width and height multiplies the area by $2 \times 2 = 4$, not 2.



Working

7. Calculate the true % difference between the smallest and largest bars in Question 1.

Solution: $(235 - 210) \div 210 \times 100 \approx 11.9\%$ – about 12%, even though the truncated axis made Z look 3.5 times taller than X.



Working

6. List the five features every good, honest graph should have.

Solution

A good title; clearly labelled axes (with units); simplicity; clear data points; an uninterrupted (zero-baseline) axis.

8. Design your own truncated-axis graph idea (without drawing). Describe the data and the misleading impression it would create.

Solution

Example: revenue rises from \$180k to \$200k (about 11%), but is plotted on an axis from \$175k to \$205k – making the bar rise sharply and suggesting a much bigger jump than the true 11%.