



Misleading diagrams

About 50 minutes Calculator allowed 41 marks

Date _____

A Do Now

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

- | | |
|---|---|
| <p>A1 Needed today [2 marks]</p> <p>A pie chart for the 300 people in the first survey has radius 6 cm. the second survey has 588 people. Work out the radius of a comparative pie chart for the second survey.</p> | <p>A2 Last lesson [2 marks]</p> <p>A population pyramid for the 20\,000 people of Town K shows that males aged 65 and over are 11% of the population, and females aged 65 and over are 10%. How many people in Town K are aged 65 and over?</p> |
|---|---|

Answer

Answer

- | | |
|--|--|
| <p>A3 Maths skill [2 marks]</p> <p>Write $\frac{84}{105}$ in its simplest form.</p> | <p>A4 Maths skill [2 marks]</p> <p>Amy and Ben share some sweets in the ratio 3 : 7. Ben gets 16 more sweets than Amy. How many sweets are there altogether?</p> |
|--|--|

Answer

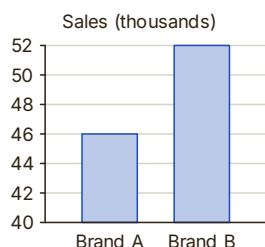
Answer

B Example, then your turn

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

EXAMPLE 1

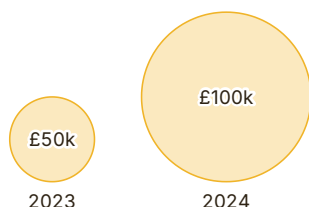
The chart shows the sales of two cereals. (a) How many times as tall as A's bar is B's? (b) How many times A's sales are B's? (c) Why is the chart misleading?



Hint Measure each bar from 40, where the axis starts.

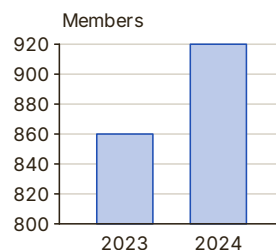
EXAMPLE 2

A firm's profit doubled from £50k to £100k. Its pictogram's 2024 circle has twice the diameter. (a) How many times as big does it look? (b) The 2023 diameter is 2 cm. What diameter is fair?

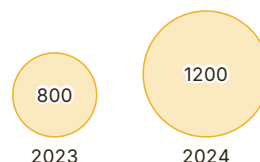


Hint The eye sees the AREA. Area grows by the square of the length factor.

B1 The chart shows a gym's members. The gym says its membership doubled from 2023 to 2024. Explain why the chart is misleading. Show your working. [3 marks]



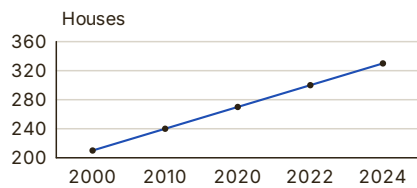
B2 A shop sold 800 games in 2023 and 1200 in 2024. Its pictogram uses circles of radius 3 cm and 4.5 cm. (a) How many times as big does the 2024 circle look? (b) What radius is fair? Give your answer to 2 d.p. [3 marks]



Answer

EXAMPLE 3

The line graph shows the number of houses in a village. Ana says the number of houses grew at a steady rate. Explain why the graph is misleading.



Hint Look at the gaps between the years on the horizontal axis.

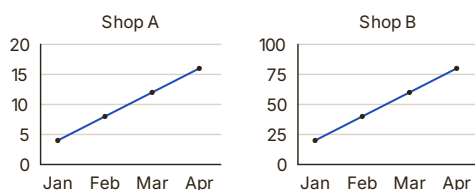
EXAMPLE 4

A magazine shows a survey's results in a 3D pie chart, tilted so the sector for Red is at the front. Explain why the chart is misleading.

Hint What does the tilt do to the sectors at the front?

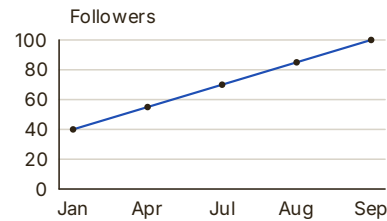
EXAMPLE 5

The graphs show two shops' sales. Kai says both grew by the same amount. Explain why the graphs are misleading.



Hint Read the numbers on each vertical axis.

B3 The line graph shows the followers of Leo's channel in one year. Leo says his followers grew at the same rate all year. Is Leo correct? Give a reason. [3 marks]



B4 A bar chart of the house prices in four towns has no title, no label on the vertical axis and no scale. Give two reasons why a reader cannot use it. [2 marks]

B5 Two bar charts of rainfall sit side by side. City P's axis goes from 0 to 50 mm, City Q's from 0 to 200 mm. Both August bars reach halfway up. Ravi says the cities had the same August rainfall. Explain why Ravi is wrong. [2 marks]

C Practice

- C1** On a bar chart the vertical axis starts at 20 000. A bar 3 cm tall shows 26 000. What does a bar 5 cm tall show? [2 marks]

Answer

- C2** A graph of a firm's profit has its axis from £95m to £100m. The line rises from £96m to £99m. The firm says its profit rose sharply. Comment. [2 marks]

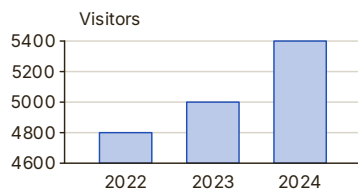
- C3** A bar chart's axis starts at 50. Abi's bar shows 75 and Ben's 60. How many times as tall as Ben's bar is Abi's, and how many times Ben's score is Abi's? [2 marks]

Answer

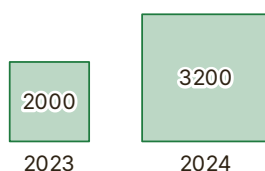
- C4** A pictogram of the cars a garage sold each month has no key. Give one reason it cannot be used, and say what to add. [2 marks]

D Exam-style questions

- D1** The bar chart shows the visitors to a museum. The museum says the visitors in 2024 were four times the visitors in 2022. Explain why the chart might make people think this, and why the claim is wrong. Show your working. [4 marks]



- D2** A charity's donors rose from 2000 in 2023 to 3200 in 2024. Its pictogram shows each year as a square, and each side of the 2024 square is 1.6 times a side of the 2023 square.



- (a)** How many times as big does the 2024 square look? Compare this with the true increase. [2 marks]

- (b) The 2023 square has sides of 5 cm. Work out the side that would show the 2024 donors fairly. Give your answer to 2 decimal places. [2 marks]

Answer

Total for D2: 4 marks

E Extension

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

- E1** A factory's output rose from 8000 boxes to 12 000 boxes. Its pictogram shows each year as a cube, and every edge of the 2024 cube is 1.5 times an edge of the 2023 cube. The 2023 cube has edges of 4 cm. What edge should the 2024 cube have, to show the output fairly? Give your answer to 2 decimal places. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** A reader sees a cube as a volume. Its volume should be 1.5 times as big.
- Hint 2** Volume grows by the cube of the edge factor, so the edge factor is $\sqrt[3]{1.5} = 1.1447$.
- Hint 3** $4 \times 1.1447 = 4.58$ cm. The cube drawn looks $1.5^3 = 3.375$ times as big.

How did it go?

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

- I can say exactly why a diagram misleads: the feature and its effect. ☐ ☐ ☐
- I can work out how big a scaled picture looks, and the fair size. ☐ ☐ ☐
- I can spot unequal scales, uneven time gaps and missing labels. ☐ ☐ ☐