

Misleading charts

Year 7 About 70 minutes No calculator 46 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/ks3-year-7-misleading-charts/

Date _____

A Do Now

Quick questions to start.

A1 Needed today [1 mark] **A2** Needed today [1 mark]

A price rises from £35 to £42.
Find the percentage increase.

Answer

A pie chart shows 72 people.
How many degrees stand for one person?

Answer

A3 Last lesson [1 mark] **A4** From chapter 15 [1 mark]

Set P: mean 21, range 5. Set Q: mean 21, range 12. Which set is more consistent?

Answer

Solve $4(x - 3) = 28$.

Answer

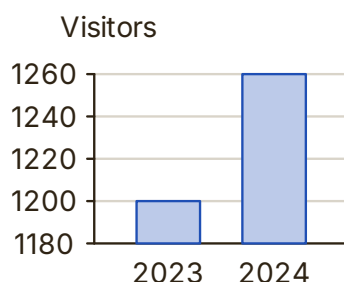
B Example, then your turn

Year 7

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

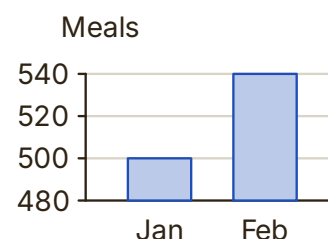
EXAMPLE 1

The bar chart shows the number of visitors to a zoo in two years. The manager says, "Visitors went up four times." (a) How many times as tall as the 2023 bar is the 2024 bar? (b) Work out the real percentage increase. (c) Why is the chart misleading?



Hint Look at where the vertical axis starts. Measure each bar from there, then compare the real numbers.

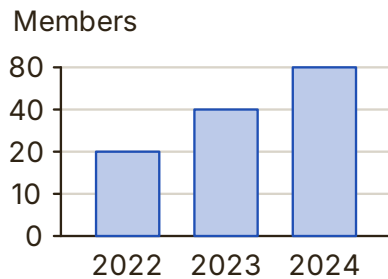
B1 The bar chart shows the number of meals a café sold in January and February. (a) How many times as tall as the January bar is the February bar? (b) Work out the percentage increase in meals sold. [3 marks]



Answer

EXAMPLE 2

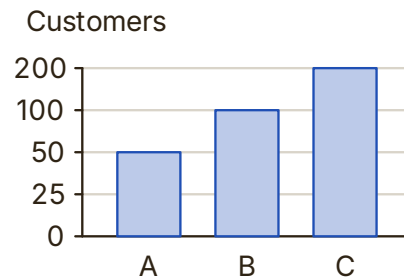
The bar chart shows the members of a chess club. Kim says, "The club gained the same number of members each year." Explain why the chart is misleading and why Kim is wrong.



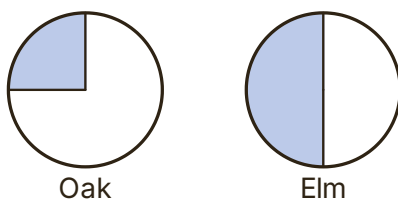
Hint Read the numbers on the vertical axis. Are the steps between them all the same?

B2 The bar chart shows the customers at three shops on one day. [3 marks]

(a) How many times as many customers did shop C have as shop A? (b) How many times as tall is shop C's bar as shop A's? (c) Why is the chart misleading?

**EXAMPLE 3**

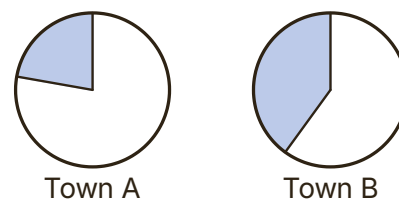
The two pie charts show how pupils get to two schools. 800 pupils were asked at Oak and 200 at Elm. The shaded Walk sector is 90° at Oak and 180° at Elm. (a) How many pupils walk at each school? (b) Why are the pie charts misleading? (c) Elm's pie chart has a radius of 3 cm. What radius should Oak's have, to show the totals fairly?



Hint An angle is a fraction of 360° . For fair pie charts, the radius goes up with the square root of the total.

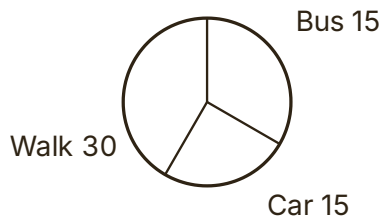
B3 The pie charts show how people in two towns travel to work. [4 marks]

450 people were asked in town A and 50 in town B. The shaded Bus sector is 80° in town A and 144° in town B. (a) How many people use the bus in each town? (b) Town B's pie chart has a radius of 2 cm. What radius should town A's have, to show the totals fairly?



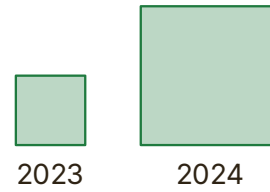
Answer

- C1** This pie chart for 60 pupils has sectors drawn the wrong size. Work out the angle the Bus sector should have. [2 marks]



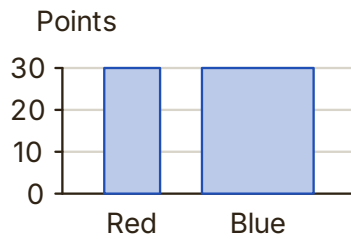
Answer

- C2** Sales doubled from 200 to 400. Each side of the 2024 square is twice as long. How many times as big does it look? [2 marks]

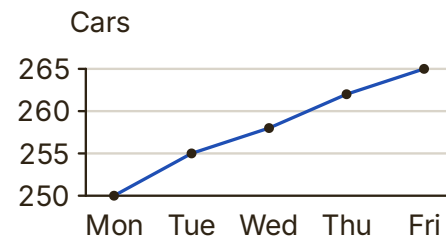


Answer

- C3** Both teams scored 30 points. Explain why this bar chart is misleading. [2 marks]



- C4** A car park says, "Car numbers rose sharply." Work out the percentage increase from Monday to Friday. [2 marks]



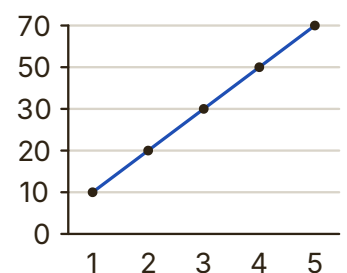
Answer

D Exam-style questions

GCSE Foundation

- D1** Ana's line graph shows a sunflower's height, in cm, at the end of weeks 1 to 5. She says, "It grew by the same amount each week." [4 marks]

Is Ana right? Give a reason, using figures from the graph. Then say how the graph should be drawn.

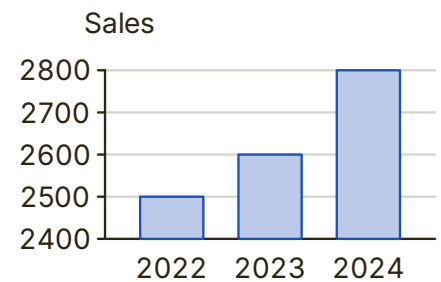


D2

The bar chart shows a company's sales. The director says, "Sales in 2024 were four times sales in 2022."

Use the chart to check what the director says.

- (a) Explain why the chart makes it look as if the director is right. [2 marks]



- (b) Work out the real percentage increase in sales from 2022 to 2024. [2 marks]

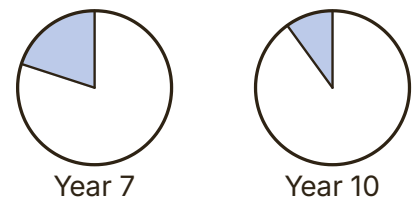
Answer

- (c) Write down one change that would make the chart fair. [1 mark]

Total for D2: 5 marks

- D3** Rory drew these two pie charts the same size. 150 Year 7 pupils and 600 Year 10 pupils chose their favourite sport. The shaded Swim sector is 72° for Year 7 and 36° for Year 10.

- (a) Work out how many pupils chose swimming in each year group. Use your answers to explain why the pie charts could mislead. [3 marks]



- (b) Rory redraws the Year 7 pie chart with a radius of 2.5 cm. What radius should the Year 10 pie chart have, to show the totals fairly? [2 marks]

Answer

Total for D3: 5 marks

D4 The table shows the number of boxes a factory made each month.

(a) Ravi wants a bar chart that makes the fall look large. [2 marks]
Explain how he could draw it.

(b) Work out the percentage fall from January to June. [2 marks]

Month	Boxes
Jan	5000
Feb	4990
Mar	4975
Apr	4960
May	4930
Jun	4900

Answer

(c) Ravi's manager wants a bar chart that makes the fall look small. Explain one way to draw it. [2 marks]

Total for D4: 6 marks

E Extension

Stretch

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

E1 Two pie charts are drawn fairly. The pie chart for town A shows 180 people and has a radius of 3 cm. The pie chart for town B has a radius of 5 cm. How many people does the pie chart for town B show? [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** For fair pie charts, the AREA of each chart is in proportion to its total, and area grows with the square of the radius.
- Hint 2** The radius goes up by $5 \div 3$, so the area goes up by $\left(\frac{5}{3}\right)^2 = \frac{25}{9}$.
- Hint 3** $180 \times \frac{25}{9} = 500$

How did it go?

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

- I can tell when an axis that does not start at 0 makes a change look bigger. ☐ ☐ ☐
- I can spot unequal steps on a scale and bars or pictures of the wrong size. ☐ ☐ ☐
- I can say why two pie charts of the same size can mislead, and find a fair radius. ☐ ☐ ☐
- I can explain how to draw a chart fairly. ☐ ☐ ☐