

WA6MPSS2

Statistics

Core + Challenge

Misleading Graphs — Marking Key

I can spot how a graph might mislead people and redraw it honestly.

For tutors and parents. Award method marks for correct working even if the final answer is wrong.

Marks summary

A Warm up: 16 B Practise: 23 C Think it through: 10 D Challenge: 9 **Total: 58**

Gold shading in this key shows what the child should have shaded or drawn. Accept any correct arrangement unless the question fixes it.

A

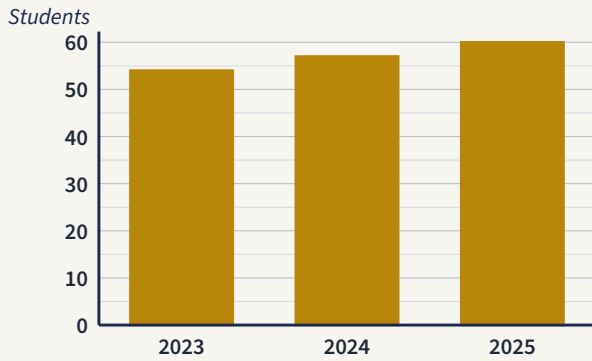
Warm up *answers*

/ 16 marks

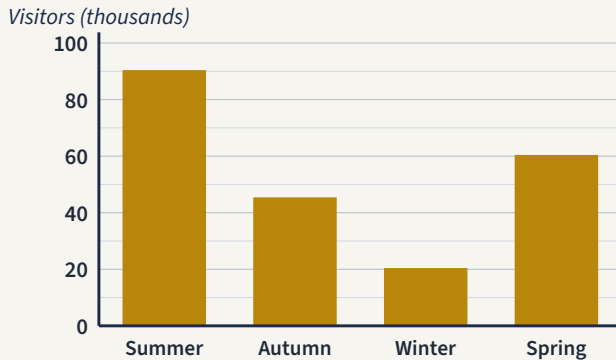
Q	Answer	Model answer / notes	Marks
1	Axis does not start at 0	The scale starts at 50, so the differences look much bigger.	1
2	The steps are not equal	0, 1, 2, 5, 10: the gaps between the numbers are different.	1
3	The icons are different sizes	Both rows have 2 icons (the same amount), but B's icons are bigger so B looks like more.	1
4	There are no numbers on the axis	Without a scale you cannot tell how big the values are.	1
5	48	Read across from the top of Ava's column: 48.	1
6	52	52.	1
7	3 times	The axis starts at 46: Ava's column is 2 units tall, Ben's is 6 units. $6 \div 2 = 3$.	1
8	4	$52 - 48 = 4$: only a few more, not 3 times as many.	1
9	30	$3 \text{ icons} \times 10 = 30$.	1
10	20	$2 \text{ icons} \times 10 = 20$ (the icons are just drawn bigger).	1
11	25	$2\frac{1}{2} \text{ icons: } 20 + 5 = 25$.	1
12	Monday	30 is the most. Tuesday only looks biggest because of its big icons.	1
13	10	Read the scale: 10.	1
14	40	40.	1
15	2 times	Monday's column reaches the 2nd step, Saturday's the 4th step: 2 times as tall.	1
16	4 times	$40 \div 10 = 4$. The uneven scale hides the real difference.	1

B Practise *answers and working*

/ 23 marks

Q	Answer	Working / sample response	Marks
1	Small sample; biased sample	Only 10 kids were asked: a very small survey. They were at a Zoom party, so they probably already like Zoom. They do not represent all kids. <i>1 mark for each different reason (small sample, biased or unfair sample, who paid for the poster, etc.).</i>	2
2	a) 4 times c) 6 students	 a) The axis starts at 52: 2023 is 2 units tall, 2025 is 8 units tall. $8 \div 2 = 4$. b) Columns 54, 57, 60 on an axis from 0. c) $60 - 54 = 6$ students (a small rise). <i>1 mark: 4 times.</i> <i>1 mark: honest graph from 0 with correct heights (± 2).</i> <i>1 mark: 6.</i>	3
3	a) 4 times b) 2 and 4 bottles	 1 bottle icon = 100 bottles a) Twice as tall and twice as wide: $2 \times 2 = 4$ small bottles would fit inside it. So it looks 4 times bigger, but 400 is only 2 times 200. b) Every icon the same size: 2024 = 2 bottles, 2025 = 4 bottles. <i>1 mark: 4 times with a reason (2×2).</i> <i>1 mark: 2 bottles for 2024.</i> <i>1 mark: 4 bottles for 2025, all the same size.</i>	3
4	b) Boys $\frac{1}{2}$, girls $\frac{3}{4}$ c) No	a) More boys than girls play sport (25 v 15). b) Boys $\frac{25}{50} = \frac{1}{2}$. Girls $\frac{15}{20} = \frac{3}{4}$. c) No. Different numbers of boys and girls were asked. A bigger fraction of the girls play sport. <i>1 mark: a).</i> <i>1 mark: $\frac{1}{2}$ and $\frac{3}{4}$.</i> <i>1 mark: explains the groups were different sizes, so girls are actually more likely to play.</i>	3

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Q	Answer	Working / sample response	Marks
5	See lines	Axis starts at 90 Icons of different sizes Steps 0, 10, 20, 50, 100 Only 3 good months Show the whole year Start the axis at 0 Use equal steps Same-size icons Axis starts at 90 → start at 0. Different icons → same size. Uneven steps → equal steps. Only 3 good months → show the whole year. <i>2 marks: all four. 1 mark: two or three.</i>	2
6	a) Rising fast b) Falling overall	a) Sales are rising strongly every week. b) Sales fell from 80 to 55 over weeks 1 to 8, rose for a few weeks, then dropped to 57 in week 12. Overall they are falling. c) Those are the only weeks where sales went up, so they make the shop look successful. <i>1 mark each part.</i>	3
7	a) B b) 80c	a) Graph B: its axis starts at \$3.90, so the line looks very steep. b) $\\$4.80 - \\$4.00 = \\$0.80$ (80 cents). <i>1 mark: B with a reason about the axis. 1 mark: \$0.80.</i>	2
8	a) Uneven steps c) $4\frac{1}{2}$ times	 a) The steps go 0, 10, 20, 50, 100: they are not equal, so big numbers are squashed. b) Columns 90, 45, 20, 60 on an even scale (e.g. steps of 10). c) $90 \div 20 = 4.5$, so $4\frac{1}{2}$ times (on the misleading graph it looks less than 2 times). <i>1 mark: steps are not equal. 1 mark: honest graph with all four columns correct (± 2). 1 mark: $4\frac{1}{2}$ (or 4.5).</i>	3
9	a) B b) Yes, 15 members	a) Graph B is tall and narrow, so the line is steeper. b) Both show 20, 25, 30, 35. The club grew by $35 - 20 = 15$ members. <i>1 mark: B. 1 mark: same data, 15 members.</i>	2

C

Think it through *sample answers and criteria*

/ 10 marks

Q	Answer	Working / sample response	Marks
1	True	The height of each column shows the amount. If the axis starts higher, part of every column is cut off and differences look bigger than they are. <i>1 mark: True.</i> <i>1 mark: explains column heights compare amounts.</i>	2
2	No: only 6 more points	The axis starts at 81, so the columns are 9 and 3 units tall: the Dockers' column looks 3 times as tall. The real scores are 90 and 84: only 6 points more. <i>1 mark: disagrees.</i> <i>1 mark: explains the axis does not start at 0 (with the real scores).</i>	2
3	Never	The data values stay the same (e.g. 90 and 84 points). Only the picture changes: the scale changes how big the differences look. <i>1 mark: Never.</i> <i>1 mark: explains only the look/impression changes.</i>	2
4	Same data; B misleads	Same: both show Perth 9 hours and Melbourne 6 hours. Different: B's axis starts at 5, so Perth's column looks 4 times as tall. Really 9 is only 1½ times 6. B is misleading. <i>1 mark: same data values.</i> <i>1 mark: B's axis starts at 5, making the difference look bigger.</i>	2
5	To look dramatic; only 3 more	The axis starts at 40, so 2025's column looks 4 times as tall. A dramatic graph sells papers or gets clicks. Really, sightings went from 41 to 44: only 3 more. <i>1 mark: a reason (to shock, to sell papers, to grab attention).</i> <i>1 mark: only 3 more sightings (41 to 44).</i>	2

D

Challenge *solutions and criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	a) A 50, B 70 b) $\frac{7}{5} = 1.4$ times c) 10 cm, 14 cm	a) A: $40 + 2 \times 5 = 50$. B: $40 + 6 \times 5 = 70$. b) $70 \div 50 = 1.4$ (or $\frac{7}{5}$): less than 1½ times, not 3 times. c) $50 \div 5 = 10$ cm and $70 \div 5 = 14$ cm. <i>1 mark: 50 and 70.</i> <i>1 mark: 1.4 or $\frac{7}{5}$ (accept "less than 1½ times" with 70 and 50).</i> <i>1 mark: 10 cm and 14 cm.</i>	3

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Q	Answer	Working / sample response	Marks												
2	e.g. axis 58–67 v 0–70	Looks huge kg <table><caption>Data for 'Looks huge' graph</caption><thead><tr><th>Term</th><th>Weight (kg)</th></tr></thead><tbody><tr><td>Term 1</td><td>60</td></tr><tr><td>Term 2</td><td>66</td></tr></tbody></table> Honest kg <table><caption>Data for 'Honest' graph</caption><thead><tr><th>Term</th><th>Weight (kg)</th></tr></thead><tbody><tr><td>Term 1</td><td>60</td></tr><tr><td>Term 2</td><td>66</td></tr></tbody></table> Misleading: start the axis just below 60 (e.g. at 58), so Term 2's column (8 units) looks 4 times Term 1's (2 units). Honest: start the axis at 0 with equal steps (e.g. 0, 10, ... 70); the columns are 60 and 66, almost the same height. <i>1 mark: misleading graph with a truncated axis and correct columns.</i> <i>1 mark: honest graph from 0 with equal steps.</i> <i>1 mark: both axes labelled with correct numbers.</i>	Term	Weight (kg)	Term 1	60	Term 2	66	Term	Weight (kg)	Term 1	60	Term 2	66	3
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3	a) Apr–Jun, May–Jul b) e.g. Jul–Sep c) Falling	a) Apr to Jun (38 → 41 → 44) and May to Jul (41 → 44 → 47). In every other run of three months the line goes down at least once. b) Feb–Apr, Jul–Sep or Aug–Oct. c) Sales go up and down but finish lower: \$42 000 in January, \$35 000 in December. Overall they are falling. <i>1 mark: both Apr to Jun and May to Jul (no others).</i> <i>1 mark: any correct falling run.</i> <i>1 mark: falling overall, using January and December (or similar).</i>	3												