Worksheet 49: Misleading Data — The Truncated Axis
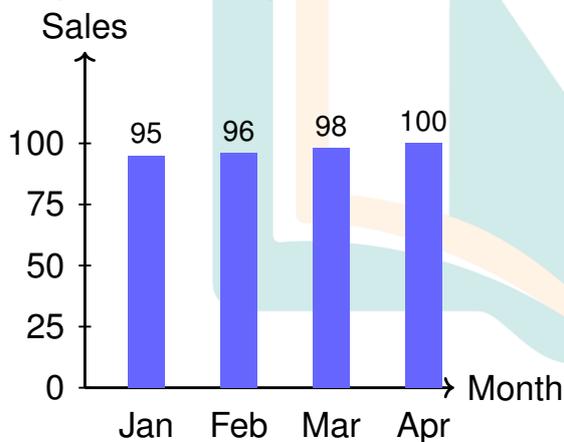
Year 6 Mathematics — Data & Probability — Name:

_____

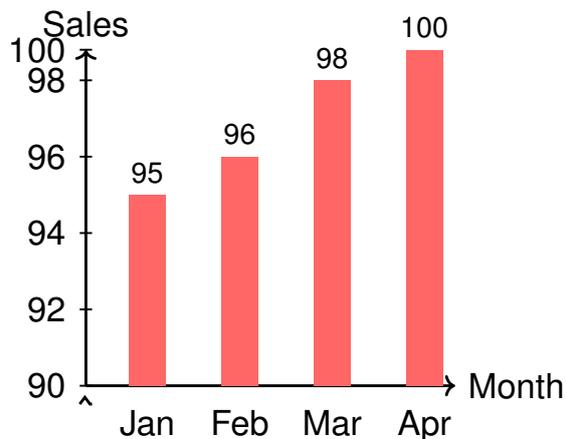## Section 1: Fluency — Spot the Difference

Important: A **truncated axis** is when a graph doesn't start at zero. This can make small changes look HUGE!

Look at these two graphs showing the same data:

Graph A: Monthly Sales (Starts at 0)

Graph B: Monthly Sales (Starts at 90)

Question 1: Look at Graph A. Does the increase from January to April look like a big change or a small change?

Answer: _____

Question 2: Look at Graph B. Does the increase from January to April look like a big change or a small change?

Answer: _____

Question 3: Look carefully at the y-axis (vertical axis) on Graph B. What number does it start at?

Answer: _____

Question 4: What is the actual difference in sales between January (95) and April (100)?

Answer: _____

Question 5: Which graph gives a more honest picture of the data: Graph A or Graph B? Why?

Answer: _____

Data Detective!

Why did the bar chart go to therapy?
Because it had too many issues with its scale!

Section 2: Reasoning — Why Do They Do It?

Question 6: Why might a company use a graph like Graph B (that doesn't start at zero)? What are they trying to make you think?

Answer: _____

Question 7: Look at this newspaper headline: "House prices SKYROCKET!" The graph shows prices went from $500,000 to $505,000, but the axis starts at $499,000. Is this misleading? Explain.

Answer: _____

Question 8: Explain in your own words why Graph A (starting at 0) is a more honest representation of the sales data.

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Answer: _____

Question 9: You see a graph showing temperatures: 20℃, 21℃, 22℃. The axis starts at 19℃. Should you be worried about "extreme temperature increases"?

Answer: _____

Question 10: What symbol is used on Graph B to show that the axis is "broken" (doesn't start at zero)?

Answer: _____

Truth Tracker!

What did the honest graph say to the misleading one?
You've really got to work on your baseline!

Section 3: Challenge — Correcting the Graph

Question 11: A graph shows student heights: 150cm, 151cm, 152cm, 153cm. The axis starts at 149cm, making the differences look huge. In the space below, draw a rough sketch showing how this data should look if the axis starts at 0.

Question 12: A company shows their profits went from $95 to $100 million. Their graph makes it look like profits doubled. What did they do wrong?

Answer: _____

Question 13: You are creating a graph about daily temperatures in summer: 28°C, 29°C, 30°C, 31°C. Would it be okay to start the axis at 20°C? Explain your thinking.

Answer: _____

Question 14: What should you ALWAYS check when looking at a graph?

Answer: _____

Question 15: Create your own example: Think of a situation where someone might use a truncated axis to trick people.

Answer: _____

Graph Guardian!

Why don't graphs ever lie at the beach?
Because they always get caught in the tide (tide = tide marks... ticks!)!

Excellent detective work! Check your answers on the next page.

Worksheet 49: Answer Key

Section 1: Fluency — Spot the Difference

Question 1: Small change (the bars look almost the same height)

Question 2: Big change (the bars look very different in height)

Question 3: 90 (not zero)

Question 4: 5 (100 - 95 = 5)

Question 5: Graph A, because it starts at zero and shows the true scale of the change

Section 2: Reasoning — Why Do They Do It?

Question 6: To make small changes look bigger / To make their performance look better / To impress people (accept reasonable answers)

Question 7: Yes, it's misleading because $5,000 is only a 1% increase, but the graph makes it look huge

Question 8: Because starting at 0 shows the real size of the change / It gives proper context / You can see that 5 is small compared to 100 (accept reasonable explanations)

Question 9: No, this is only a 3-degree change, which is normal daily variation (the truncated axis makes it look dramatic)

Question 10: A zigzag line (or squiggle / wavy line)

Section 3: Challenge — Correcting the Graph

Question 11: Student sketch should show bars that are all very similar in height, nearly at the top of the graph (all around 150 on a scale from 0)

Question 12: They used a truncated axis that didn't start at 0, making the small increase look like a huge jump

Question 13: It could be debatable - starting at 20℃ is better than 27℃, but starting at 0℃ would show the temperatures are all quite warm. For temperature, context matters. (Accept thoughtful answers)

Question 14: Where the axis starts / What numbers are on the scale / Whether the scale is even/consistent

Question 15: Accept creative, reasonable examples (e.g., "A lemonade stand showing sales went from 48 to 52 cups, but starting the axis at 45 to make it look like sales doubled")
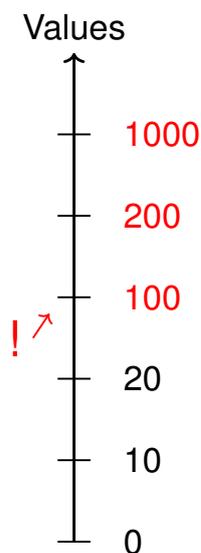
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Worksheet 50: Misleading Data — Scale & Perspective Tricks

Year 6 Mathematics — Data & Probability — Name:

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Section 1: Fluency — Checking the Scale

Important: A **scale** should go up by equal amounts (e.g., 0, 10, 20, 30...). An irregular scale can be very misleading!

Look at this graph axis:

Values

1000

200

100

!↗

20

10

0

Question 1: Look at the scale on the left. What are the numbers from bottom to top?

Answer: _____

Question 2: From 0 to 10 is a jump of 10. From 10 to 20 is also 10. What is the jump from 20 to 100?

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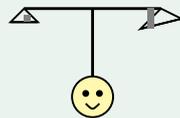**Answer:** _____

Question 3: What is the jump from 200 to 1000?

Answer: _____

Question 4: Is this scale regular (equal jumps) or irregular (unequal jumps)?

Answer: _____

Question 5: Why is an irregular scale like this misleading?

Answer: _____

Scale Sleuth!

Why was the uneven scale always invited to parties?
Because it knew how to tip the balance in its favor!

Section 2: Reasoning — Sample Size

Important: **Sample size** matters! Asking 3 people isn't enough to make big claims about "everyone."

Question 6: A headline says: "100% of people LOVE this chocolate!" In small print it says: "Survey of 2 people: My mum and my sister." Why is this misleading?

Answer: _____

Question 7: What would be a more reasonable sample size to claim that "most people" like something?

Answer: _____

Question 8: A toothpaste brand claims "9 out of 10 dentists recommend our toothpaste!" What important question should you ask about this survey?

Answer: _____

Question 9: A school newspaper says "Everyone thinks homework should be banned!" They surveyed 5 students from one class. What's the problem?

Answer: _____

Question 10: You want to find out the most popular sport in Australia. Would you: (a) Ask 10 friends at your school, or (b) Survey 1000 people from different cities and ages?

Answer: _____

Question 11: A pet store claims "Cats are more popular than dogs!" They surveyed customers who bought cat food. Why is this biased?
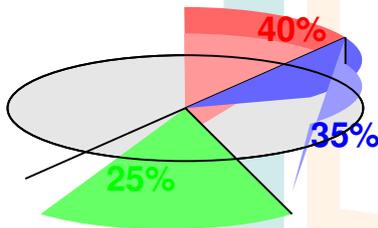
Answer: _____

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Sample Size Sage!

What did the statistician say to the tiny survey?
You're not significant enough!

Section 3: Challenge — 3D Distortion

Important: 3D graphs can be misleading! Slices that are closer to you look bigger than they really are.

Look at this 3D pie chart:

Question 12: In the 3D pie chart above, which slice LOOKS the biggest?

Answer: _____

Question 13: Look at the percentages. Which slice IS actually the biggest?

Answer: _____

Question 14: Why does the red slice (40%) look so much bigger than it should?

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Answer: _____

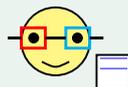**Question 15:** Would a regular flat (2D) pie chart be more honest? Why?

Answer: _____

Question 16: True or False: You should always read the actual numbers or percentages on a graph, not just trust what it looks like.

Answer: _____

Question 17: Give one example of when you might see misleading data in real life.

Answer: _____

Perspective Pro!

Why did the pie chart wear 3D glasses?
Because it wanted to add more depth to the situation!

Outstanding work! Check your answers on the next page.

Worksheet 50: Answer Key

Section 1: Fluency — Checking the Scale

Question 1: 0, 10, 20, 100, 200, 1000

Question 2: 80 (100 - 20 = 80)

Question 3: 800 (1000 - 200 = 800)

Question 4: Irregular (unequal jumps)

Question 5: Because the spaces look equal, but they represent very different amounts / It makes comparisons impossible / It distorts the visual representation (accept reasonable answers)

Section 2: Reasoning — Sample Size

Question 6: Because only 2 people were surveyed - that's not enough to represent "everyone" / The sample is too small and biased (family members)

Question 7: At least 100-1000 people / A large random sample from different groups (accept reasonable numbers like 50+)

Question 8: How many dentists were surveyed? / Were they paid? / What other toothpastes did they compare it to? (accept relevant questions)

Question 9: The sample size is too small (5 students) / They only asked one class, not the whole school / "Everyone" is an exaggeration

Question 10: (b) Survey 1000 people from different cities and ages

Question 11: Because they only asked people buying cat food - of course those people prefer cats! / The sample is biased toward cat lovers

Section 3: Challenge — 3D Distortion

Question 12: The red slice (at the front)

Question 13: The red slice (40%) - but it looks even bigger than 40% because of the 3D effect

Question 14: Because it's at the front of the 3D pie / The perspective makes it look bigger / 3D distortion exaggerates its size

Question 15: Yes, because a 2D pie chart shows all slices from the same angle / No perspective distortion / All slices are comparable

Question 16: True

Question 17: Accept reasonable examples: advertisements, news reports, social media claims, product packaging, political campaigns, etc.

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