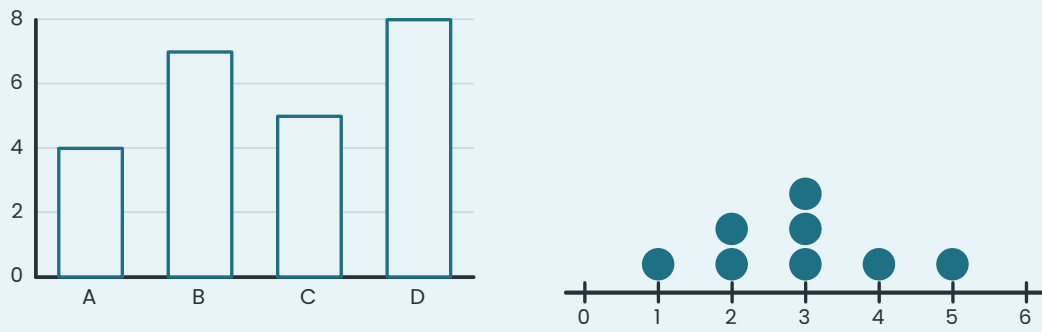


Graph & Data Detective: Case Files for Grades 4–6

6 complete activities from Graph & Data Detective, each with a worked answer.



HOW TO USE

1. Read the situation and the evidence first.
2. Show your thinking in the work boxes, not only an answer.
3. Explain how you know your answer makes sense.
4. Try the new problem at the bottom of the page.

6 activities • 4 answer pages • From the 32-activity collection

11 US Letter pages • Print at 100% / Actual Size

Original Bobotemp educational printable • Fictional names, places and prices

Name _____ Date _____

LEVEL 1



Count the tally marks, fill in a frequency table, and use the totals to compare.

Ms. Ortiz's class watched the school bird feeder for one week. They made a tally mark each time a bird landed. Help the class turn the tallies into a frequency table so they can answer questions about the birds.

TALLY CHART

Cardinal	/	/		
Sparrow	/	/	/	
Blue Jay	/			
Finch	/	/	/	

YOUR FREQUENCY TABLE

Bird	Count
Cardinal	
Sparrow	
Blue Jay	
Finch	
Total	

1. Write the count for each bird in a frequency table.

[illegible]

2. Find the total number of bird visits.

[illegible]

3. How many more sparrow visits than blue jay visits were there?

TRY IT • The next week the class counted 9 cardinals, 21 sparrows, 10 blue jays, and 14 finches. Which week had more bird visits, and how many more?

Name _____ Date _____

LEVEL 1



Use the key to turn symbols, including half symbols, into numbers.

Three classrooms folded paper cranes for a hallway display. Their picture graph uses a key where one crane symbol stands for more than 1 crane. Decode the graph to find out how many cranes each room folded.

PAPER CRANES FOLDED



● KEY: each symbol = 4 cranes

1. How many cranes did each room fold?

2. How many more cranes did Room C fold than Room B?

A blank sheet of graph paper with a grid pattern. The grid consists of 10 columns and 10 rows of squares. The lines are light gray and form a uniform grid across the page.

3. How many cranes did all three rooms fold?

TRY IT • Room D uses a key where one symbol = 8 cranes. Its row shows 3 whole symbols and one quarter symbol. How many cranes did Room D fold?

Name _____ Date _____

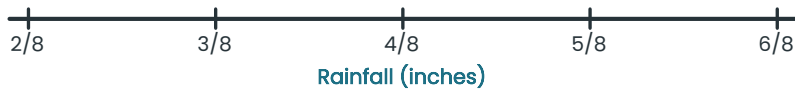
LEVEL 2



Total the fractional rainfall amounts, then share the total equally across the days.

A class rain gauge recorded rainfall for 5 school days. Make a line plot in eighths of an inch. Then find the total rainfall and the fair share: the amount each day would get if the total were spread equally across all 5 days.

RAINFALL — YOUR LINE PLOT



EVIDENCE TO USE

- Monday: $\frac{1}{4}$ in
- Tuesday: $\frac{1}{2}$ in
- Wednesday: $\frac{3}{8}$ in
- Thursday: $\frac{3}{4}$ in
- Friday: $\frac{5}{8}$ in

1. Rename each amount in eighths and find the total rainfall.

2. Find the fair share for each of the 5 days.

A blank sheet of graph paper with a grid pattern. The grid consists of 10 columns and 10 rows of squares. The lines are thin and gray, set against a white background. The grid covers most of the page, leaving margins at the top, bottom, and sides.

3. Which days had more rain than the fair share?

TRY IT • Saturday's gauge shows $\frac{1}{2}$ inch. What is the new fair share for all 6 days?

Name _____ Date _____

LEVEL 2



Test each survey question against both clues, then choose and improve.

The garden club wants one survey question to learn about this summer's harvest. A statistical question expects answers that vary. A good survey question is also neutral, meaning it does not push people toward one answer. Use the clues to choose the best question.

EVIDENCE TO USE

- Question A: How tall is the sunflower by the front door?
- Question B: How many tomatoes did each plant in our garden produce this summer?
- Question C: Don't you agree our garden is the best one in town?
- Question D: How many plants are in Bed 1?

1. Clue 1: Which questions expect answers that vary?



2. Clue 2: Which questions use neutral wording?

A blank sheet of graph paper with a grid pattern. The grid consists of 10 columns and 10 rows of squares. The paper has rounded corners and a light gray border.

3. Name the best question. Then rewrite Question C so it is neutral.

[illegible]

TRY IT • Is ‘How many windows are in our classroom?’ a statistical question? If not, rewrite it so it is.

Name _____ Date _____

Same Mean, Different Story

LEVEL 3



Compare two data sets with equal means by looking at their spread.

Two garden beds were harvested for 5 weeks. The gardener says the beds did the same because their means match. Find each mean and range. Then decide which bed was more consistent from week to week.

EVIDENCE TO USE

- Bed A tomatoes per week: 9, 11, 12, 13, 15
- Bed B tomatoes per week: 4, 7, 12, 16, 21
- Range = greatest value – least value

1. Find the mean of each bed.

2. Find the range of each bed.

3. How much greater is Bed B's range? Which bed was more consistent?

TRY IT • Bed C produced 12 tomatoes every week for 5 weeks. Find its mean and range.

Name _____ Date _____

LEVEL 3

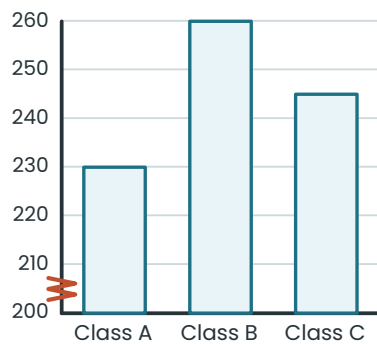


Compare the visual ratio with the true numbers, then redraw the bar graph from 0.

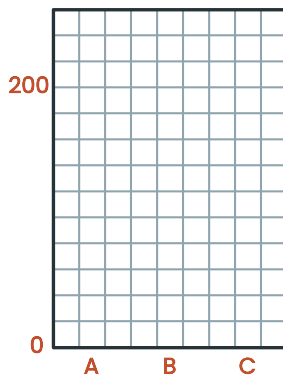
A poster shows bottles collected by three classes for recycling. The vertical axis starts at 200, not 0. Compare how the bars look with what the numbers really say, then fix the graph.

POSTER (AXIS STARTS AT 200)

↑ Bottles



YOUR REDRAW (START AT 0)



EVIDENCE TO USE

- Class A: 230 bottles
- Class B: 260 bottles
- Class C: 245 bottles
- Vertical axis starts at 200
- Visible bar height = value - 200

1. Find each bar's visible height above the axis start.

2. How many times as tall does Class B's bar look than Class A's? What is the real difference?

[illegible]

3. Redraw the graph on the blank grid, starting at 0. Describe how it changes.

[illegible]

TRY IT • Compare Class C with Class A on the poster. How many times as tall does C's bar look, and what is the real difference?

1. Bird Feeder Watch

LEVEL 1

Cardinal 12, Sparrow 18, Blue Jay 7, Finch 15. Total = 52 bird visits. There were 11 more sparrow visits than blue jay visits.

WORKED REASONING • Count bundles by 5s, then add the single marks. Cardinal: $5 + 5 + 2 = 12$. Sparrow: $5 + 5 + 5 + 3 = 18$. Blue Jay: $5 + 2 = 7$. Finch: $5 + 5 + 5 = 15$. Total: $12 + 18 + 7 + 15 = 52$ bird visits. Compare: $18 - 7 = 11$ more sparrow visits.

WATCH FOR • Students may count each bundle as 1 mark or as 4 marks. A bundle has 4 vertical marks plus a slash, so it stands for 5.

TRANSFER • Week 2: $9 + 21 + 10 + 14 = 54$ visits. $54 - 52 = 2$, so Week 2 had 2 more bird visits.

2. Picture Graph Key Decoder

LEVEL 1

Room A 22, Room B 12, Room C 26 cranes. Room C folded 14 more than Room B. Total = 60 cranes.

WORKED REASONING • A half symbol = $4 \div 2 = 2$ cranes. Room A: $5 \times 4 + 2 = 22$ cranes. Room B: $3 \times 4 = 12$ cranes. Room C: $6 \times 4 + 2 = 26$ cranes. Compare: $26 - 12 = 14$ more cranes. Total: $22 + 12 + 26 = 60$ cranes.

WATCH FOR • Students often count symbols instead of cranes (Room A = $5 \frac{1}{2}$) or treat a half symbol as 1 crane. Each whole symbol is 4 cranes, so half a symbol is 2 cranes.

TRANSFER • A quarter of 8 is 2. So $3 \times 8 + 2 = 26$ cranes.

11. Rain Gauge Fair Share

LEVEL 2

Total = $20/8 = 2 \frac{1}{2}$ inches. Fair share = $4/8 = 1/2$ inch per day. Thursday ($3/4$ in) and Friday ($5/8$ in) had more than the fair share.

COMPLETED LINE PLOT



WORKED REASONING • In eighths: $2/8, 4/8, 3/8, 6/8, 5/8$. Total: $2 + 4 + 3 + 6 + 5 = 20$ eighths = $20/8 = 2 \frac{1}{2}$ in. Fair share: $20 \text{ eighths} \div 5 = 4 \text{ eighths}$, so $4/8 = 1/2$ in per day. Compare each day with $4/8$: Thursday ($6/8$) and Friday ($5/8$) are greater. Tuesday ($4/8$) is equal.

WATCH FOR • Students may add numerators and denominators ($1/4 + 1/2 = 2/6$). Fractions need a common denominator before adding, and the denominator stays the same in the sum.

TRANSFER • Total = $2 \frac{1}{2} + 1/2 = 3$ in, which is 24 eighths. $24 \text{ eighths} \div 6 = 4 \text{ eighths} = 1/2$ in. Adding a value equal to the fair share leaves the fair share unchanged.

12. Is It Statistical?

LEVEL 2

Question B. Sample neutral rewrite of C: 'How would you rate our garden on a scale of 1 to 5?'

WORKED REASONING • Clue 1: A and D each have one answer that you measure or count once. B (many plants, many counts) and C (different people answer differently) expect variability. Survivors: B, C. Clue 2: C begins with 'Don't you agree' and says 'the best,' which pushes people toward yes. A, B, and D are neutral. Survivors: A, B, D. Both clues: Question B.

WATCH FOR • Students may think any question with a number answer is statistical. 'How many plants are in Bed 1?' has a number answer, but only one answer, so there is no variability.

TRANSFER • No, it has only one answer. A statistical version: 'How many windows are in each classroom in our school?'

21. Same Mean, Different Story

LEVEL 3

Both means = 12 tomatoes. Range A = 6 tomatoes and range B = 17 tomatoes. Bed B's range is 11 tomatoes greater, so Bed A was more consistent.

WORKED REASONING • Bed A: $9 + 11 + 12 + 13 + 15 = 60$, and $60 \div 5 = 12$. Bed B: $4 + 7 + 12 + 16 + 21 = 60$, and $60 \div 5 = 12$. Ranges: A is $15 - 9 = 6$, and B is $21 - 4 = 17$. Difference: $17 - 6 = 11$. The centers are the same, but Bed A's weekly counts stay close to 12, so Bed A is more consistent.

WATCH FOR • Students may think equal means make two data sets alike. The mean describes only the center; the spread shows how much the values vary around it.

TRANSFER • Mean = $60 \div 5 = 12$ tomatoes. Range = $12 - 12 = 0$. Bed C is perfectly consistent.

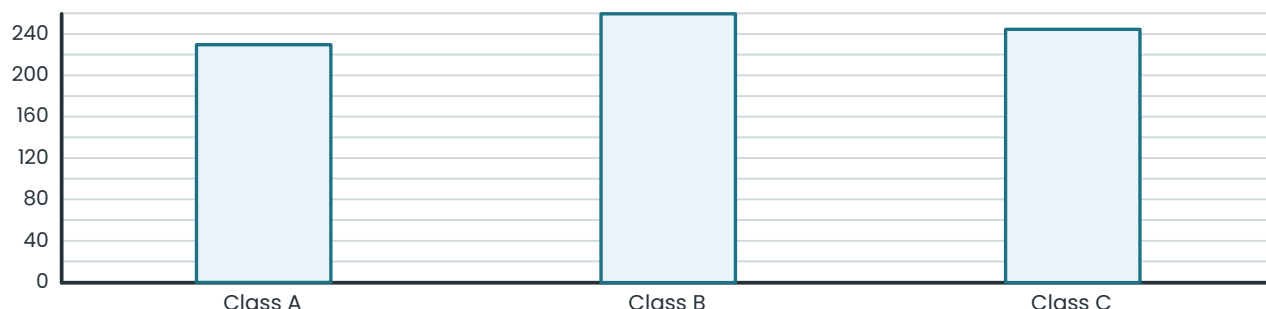
22. Broken Axis Alert

LEVEL 3

Visible heights: A 30, B 60, C 45. Class B's bar looks 2 times as tall as Class A's, but Class B collected only 30 more bottles (260 vs. 230), not twice as many. Starting from 0, the bars look nearly the same height.

REDRAWN FROM 0 (EACH ROW = 20 BOTTLES)

↑ Bottles



WORKED REASONING • Visible heights: $230 - 200 = 30$, $260 - 200 = 60$, and $245 - 200 = 45$. Visual ratio: $60 \div 30 = 2$. True difference: $260 - 230 = 30$ more bottles. Twice Class A would be $2 \times 230 = 460$ bottles, so 'twice as many' is false. On an axis that starts at 0, Class B's bar is only slightly taller than Class A's.

WATCH FOR • Students may decide that every graph not starting at 0 is wrong. For bar graphs, bar length stands for amount, so a cut-off axis distorts comparisons. Line graphs that show small changes can sometimes start above 0.

TRANSFER • Visible heights are 45 and 30, so C's bar looks $1 \frac{1}{2}$ times as tall. Real difference: $245 - 230 = 15$ bottles.