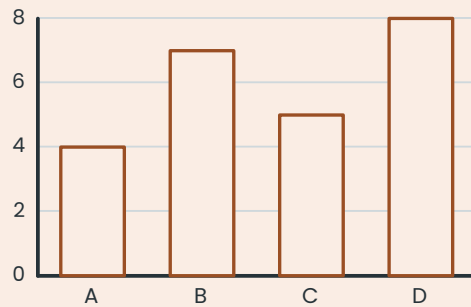
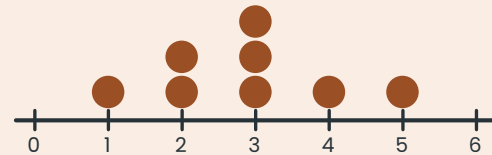


Autumn Data & Planning: Garden, Market, and Schedule Math

6 complete activities from Autumn Data & Planning, 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 • 5 answer pages • From the 16-activity collection

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

Original Bobotemp educational printable • Fictional names, places and prices

Name _____ Date _____

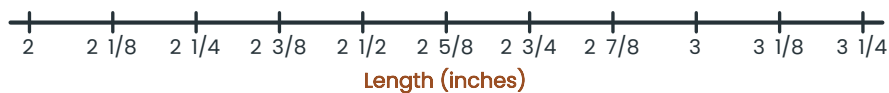
LEVEL 1



Use the table to build a line plot. Then answer each question and show your fraction work.

A class measured 12 leaves to the nearest $\frac{1}{8}$ inch (invented practice data). Draw one X above the number line for each leaf. Then use your line plot to describe the data. Leaves 1 through 4 are the first four rows of the table. Suppose those four leaves were laid end to end and their total length were shared equally among the four. How long would each share be?

LEAF LENGTHS — YOUR LINE PLOT (EVERY 1/8 INCH)



LEAF LENGTHS (INCHES)

Leaf	Inches	Leaf	Inches
1	2 1/8	7	2 3/4
2	2 3/8	8	2 1/2
3	2 3/8	9	3
4	3 1/8	10	2 3/8
5	2 1/2	11	2 7/8
6	2 3/8	12	2 1/8

1. Which length is most common? How many leaves have it?

[illegible]

2. How much longer is the longest leaf than the shortest?

[illegible]

3. Find the total length of Leaves 1–4, then the equal share.

[illegible]

TRY IT • Four leaves measure $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{5}{8}$, and $1\frac{3}{4}$ inches. What is their total length? If the total is shared equally, how long is each share?

Name _____ Date _____

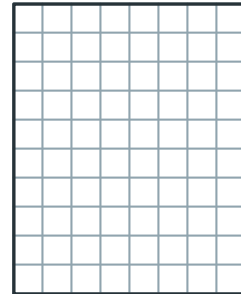
LEVEL 1



Count the tally marks into a frequency table. Then draw a bar graph on the grid and explain your scale.

Volunteers kept a tally of fruit picked at a school orchard (invented data). Each bundle of tally marks stands for 5 pieces of fruit. Make a frequency table from the tally marks. Then draw a bar graph on the grid: label both axes, choose the scale, and draw four bars. You may choose a scale of 2, 5, or 10 for the gridlines. On a scale of 10, some bars would end between gridlines. Explain how to read those bars.

GRAPH SPACE (10 GRIDLINES TALL)



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

[illegible]

2. Choose a scale of 2, 5, or 10, explain why it fits, and draw the bars on the graph grid.

[illegible]

3. Find the total fruit and how many more yellow apples than pears.

TRY IT • On a bar graph with a scale of 10, the Squash bar stops halfway between 60 and 70. The Corn bar stops at 40. How many more squash than corn were picked?

Name _____ Date _____

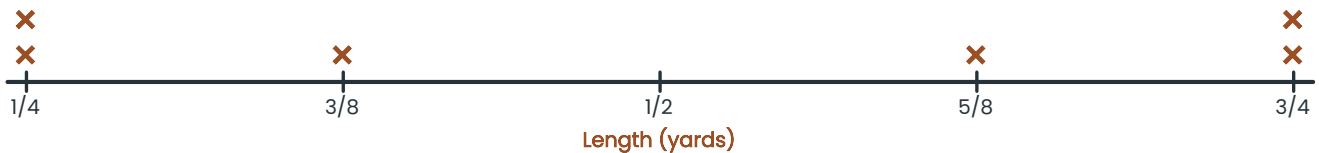
LEVEL 2



Read the line plot carefully. Each X is one ribbon piece. Use eighths to add and share.

A line plot shows six ribbon pieces used as garden row markers (invented data). The class wants to cut and retie the ribbon so all six pieces are the same length. They will use all of the ribbon and waste none. Use the line plot to find the total ribbon and the equal length. Then find how much each piece would gain or lose.

RIBBON LENGTHS (EACH X IS ONE PIECE)



1. Find the total length of all six pieces.

2. Find the equal length for each of the 6 pieces.

A large rectangular area containing a light gray grid pattern, intended for drawing. The grid consists of approximately 10 columns and 8 rows of squares.

3. Which pieces gain ribbon, which lose, and by how much?

TRY IT • A line plot shows 8 pieces of twine: three at $\frac{1}{2}$ yd, two at $\frac{3}{4}$ yd, and three at 1 yd. If all the twine is shared equally among 8 pieces, how long is each piece?

Name _____ Date _____

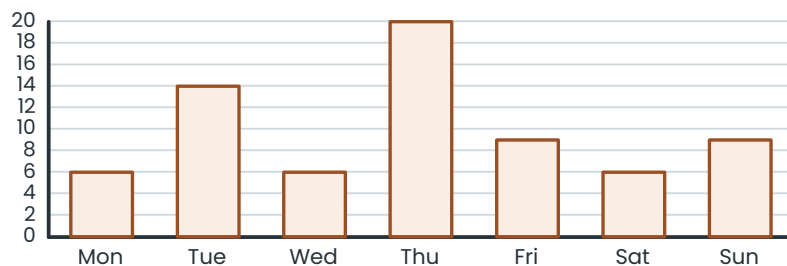
LEVEL 2



Find each measure, show your steps, and explain which measure describes a typical day.

A class rain gauge recorded rainfall each day for one week (invented data, in millimeters). Find the mean, median, mode, and range. Then decide which measure best describes a typical day this week. Explain why one very rainy day affects the mean more than the median.

↑ mm



- Mon 6 mm, Tue 14 mm, Wed 6 mm
- Thu 20 mm, Fri 9 mm
- Sat 6 mm, Sun 9 mm
- Mean = total ÷ number of days

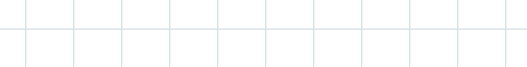
- Mon 6 mm, Tue 14 mm, Wed 6 mm
- Thu 20 mm, Fri 9 mm
- Sat 6 mm, Sun 9 mm
- Mean = total ÷ number of days

1. Find the total rainfall and the mean.

[illegible]

2. Order the data; find the median, mode, and range.

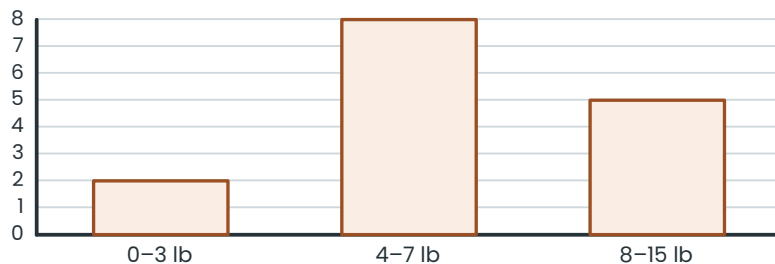
3. Which measure best describes a typical day? Why?



TRY IT • Rainfall for 5 days was 4, 8, 15, 8, and 10 mm. Find the mean, median, mode, and range.

Squash Weight Histogram

Fifteen squash from a garden were weighed to the nearest pound (invented data). Make a frequency table with equal 4-pound bins: 0–3, 4–7, 8–11, and 12–15. Use the bin counts to decide which bin holds the median. Then critique a classmate’s histogram. It used bins 0–3, 4–7, and 8–15 and claimed that squash heavier than 7 lb are much more common than light squash (3 lb or less), because the 8–15 lb bar is more than twice as tall as the 0–3 lb bar.



- Weights (lb): 2, 3, 4, 4, 5, 5, 6, 6
- 6, 7, 8, 9, 11, 12, 14
- Equal bins: 0-3, 4-7, 8-11, 12-15
- Classmate's bins: 0-3, 4-7, 8-15

[illegible][illegible][illegible]

Name _____ Date _____

Missing Value Mystery

LEVEL 3



Use the mean to find a missing value. Then test how an outlier changes the summary.

Five harvest baskets had a mean weight of 18 lb (invented data). Four weights are known, but one label was smudged. Find the missing weight. Then a sixth basket weighing 48 lb is added. Find the old median, then the new mean and the new median. Explain which measure the outlier changed more.

EVIDENCE TO USE

- Mean of 5 baskets: 18 lb
- Known: 16 lb, 21 lb, 14 lb, 19 lb
- Missing: Basket E
- Added later: Basket F, 48 lb

1. Find the total of all 5 baskets and Basket E's weight.

2. Find the old median, then the new mean and new median with Basket F.

3. Which measure changed more? Explain why.

TRY IT • The mean of 4 scores is 12. Three of the scores are 10, 15, and 9. What is the fourth score?

1. Leaf Length Line Plot

LEVEL 1

The most common length is $2 \frac{3}{8}$ in (4 leaves). The longest minus the shortest is $3 \frac{1}{8} - 2 \frac{1}{8} = 1$ in. Leaves 1–4 total 10 in, so each equal share is $2 \frac{1}{2}$ in.

COMPLETED LINE PLOT



WORKED REASONING • Line plot counts: $2 \frac{1}{8}$ (2), $2 \frac{3}{8}$ (4), $2 \frac{1}{2}$ (2), $2 \frac{3}{4}$ (1), $2 \frac{7}{8}$ (1), 3 (1), $3 \frac{1}{8}$ (1). That is 12 X's. The tallest stack is at $2 \frac{3}{8}$ in. Longest $3 \frac{1}{8}$ in minus shortest $2 \frac{1}{8}$ in = 1 in. Leaves 1–4 in eighths: $\frac{17}{8} + \frac{19}{8} + \frac{19}{8} + \frac{25}{8} = \frac{80}{8} = 10$ in. Share: $10 \div 4 = 2$ R 2. Split the 2 leftover inches into 4 equal parts of $\frac{2}{4}$ in each, so each share is $2 \frac{2}{4} = 2 \frac{1}{2}$ in. Alternative: add the whole numbers, $2 + 2 + 2 + 3 = 9$. Then add the fractions, $\frac{1}{8} + \frac{3}{8} + \frac{3}{8} + \frac{1}{8} = \frac{8}{8} = 1$. The total is 10 in.

WATCH FOR • Some students add numerators and denominators ($\frac{1}{8} + \frac{3}{8} = \frac{4}{16}$) instead of keeping eighths as the unit. Others mark only one X per length value instead of one X per leaf.

TRANSFER • The total is $\frac{10}{8} + \frac{11}{8} + \frac{13}{8} + \frac{14}{8} = \frac{48}{8} = 6$ in. Each equal share is $1 \frac{1}{2}$ in.

2. Orchard Tally to Scaled Bar Graph

LEVEL 1

Red 35, Green 20, Yellow 45, Pears 15. The total is 115 pieces of fruit, and there are 30 more yellow apples than pears. A scale of 5 fits best because 45 needs only 9 of the 10 gridlines and every bar ends on a gridline. Also accept a scale of 10 if the student explains that 35, 45, and 15 end halfway between gridlines. A scale of 2 does not fit, because 45 would need 22.5 gridlines.

COMPLETED BAR GRAPH (SCALE OF 5)

↑ Fruit



WORKED REASONING • Multiply bundles by 5: $7 \times 5 = 35$, $4 \times 5 = 20$, $9 \times 5 = 45$, and $3 \times 5 = 15$. Total: $35 + 20 + 45 + 15 = 115$. Difference: $45 - 15 = 30$. A scale of 2 would need $45 \div 2 = 22.5$ gridlines, which is too tall for 10. A scale of 10 fits, but 35, 45, and 15 would end halfway between gridlines (35 is halfway between 30 and 40). With a scale of 5, every bar ends exactly on a gridline.

WATCH FOR • Some students count each bundle as 1 instead of 5. Others read a bar that ends halfway between 30 and 40 as 30 or 31 instead of 35.

TRANSFER • Squash is 65 and corn is 40, so $65 - 40 = 25$ more squash.

6. Fair-Share Ribbon Lengths

LEVEL 2

The total is 3 yd ($24/8$ yd), so each equal piece is $4/8 = 1/2$ yd. The two $1/4$ yd pieces gain $1/4$ yd each, and the $3/8$ yd piece gains $1/8$ yd. The $5/8$ yd piece loses $1/8$ yd, and the two $3/4$ yd pieces lose $1/4$ yd each.

WORKED REASONING • Use eighths. $1/4 = 2/8$, so the two pieces give $4/8$. The single pieces give $3/8$ and $5/8$. $3/4 = 6/8$, so the two pieces give $12/8$. Total: $4/8 + 3/8 + 5/8 + 12/8 = 24/8 = 3$ yd. Share: $24 \text{ eighths} \div 6 \text{ pieces} = 4 \text{ eighths}$, so each piece is $4/8$ yd = $1/2$ yd (the same as $3 \div 6$). Changes: $2/8$ to $4/8$ gains $2/8 = 1/4$; $3/8$ gains $1/8$; $5/8$ loses $1/8$; $6/8$ loses $2/8 = 1/4$. Check: the gains are $1/4 + 1/4 + 1/8 = 5/8$ and the losses are $1/8 + 1/4 + 1/4 = 5/8$, so they balance.

WATCH FOR • A common error is adding each length once ($1/4 + 3/8 + 5/8 + 3/4 = 2$ yd) instead of once per X. Another is dividing by 4, the number of different lengths, instead of 6, the number of pieces.

TRANSFER • The total is $1 \frac{1}{2} + 1 \frac{1}{2} + 3 = 6$ yd. Each piece is $6 \div 8 = 3/4$ yd.

7. Rainfall Week Summary

LEVEL 2

The total is 70 mm, so the mean is $70 \div 7 = 10$ mm. The median is 9 mm, the mode is 6 mm, and the range is 14 mm. The median (9 mm) best describes a typical day because Thursday's 20 mm pulls the mean up. Also accept the mode (6 mm) if the student explains that it was the most common amount (3 of 7 days). The mean (10 mm) is not typical, because 5 of the 7 days had less than 10 mm.

WORKED REASONING • Total: $6 + 14 + 6 + 20 + 9 + 6 + 9 = 70$ mm. Mean: $70 \div 7 = 10$ mm. Ordered: 6, 6, 6, 9, 9, 14, 20. The median is the 4th value, 9 mm. The mode is 6 mm, which appears 3 times (9 appears only twice). Range: $20 - 6 = 14$ mm. Five of the seven days had less than 10 mm, so the mean is higher than most days. The median sits in the middle of the ordered list.

WATCH FOR • Some students take the median from the unordered list. The 4th day, Thursday, had 20 mm, but the data must be put in order first.

TRANSFER • The total is 45 mm, so the mean is 9 mm. In order the data are 4, 8, 8, 10, 15, so the median is 8 mm and the mode is 8 mm. The range is $15 - 4 = 11$ mm.

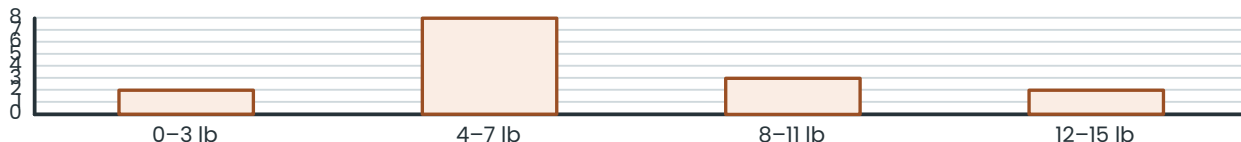
11. Squash Weight Histogram

LEVEL 3

Bin counts: 0–3 has 2, 4–7 has 8, 8–11 has 3, and 12–15 has 2 (total 15). The median is the 8th value, 6 lb, in the 4–7 lb bin. The claim is misleading. The 8–15 bar (5) is taller only because that bin covers 8 pounds, twice as many as the 0–3 bin. Split into equal 4-pound bins, 8–11 holds 3 and 12–15 holds 2, each about the same as the 0–3 bin (2). With equal bins (2, 8, 3, 2), heavy squash are not much more common than light squash.

CORRECTED HISTOGRAM: EQUAL 4-LB BINS

↑ Squash



WORKED REASONING • 0–3: 2, 3 → 2. 4–7: 4, 4, 5, 5, 6, 6, 6, 7 → 8. 8–11: 8, 9, 11 → 3. 12–15: 12, 14 → 2.

Check: $2 + 8 + 3 + 2 = 15$. With 15 values, the median is the 8th value. Running totals: 2 after the first bin and 10 after the second. The 8th value falls in 4–7 (it is 6 lb). The classmate's 8–15 bin holds 5 because it merges 8–11 (3) and 12–15 (2). That bin covers 8 pounds while the 0–3 bin covers 4, so the two bars compare unequal ranges. On equal 4-pound bins the heights are 2, 8, 3, and 2, and neither heavy bin is much taller than the light bin.

WATCH FOR • Some students pick the middle bin (8–11) as the median bin instead of the bin that holds the middle value. Others compare bar heights when the bins have different widths.

TRANSFER • There are 13 values, so the median is the 7th value. The running totals are 3, then 8, so the median is in the 20–29 bin.

12. Missing Value Mystery

LEVEL 3

Basket E weighs 20 lb ($90 - 70 = 20$). With Basket F, the mean rises from 18 lb to 23 lb, up 5 lb. The median moves from 19 lb to 19.5 lb, up only 0.5 lb. The mean changed more.

WORKED REASONING • Total for 5 baskets: $18 \times 5 = 90$ lb. Known sum: $16 + 21 + 14 + 19 = 70$ lb. Missing: $90 - 70 = 20$ lb. Old median: 14, 16, 19, 20, 21 $\rightarrow$ 19 lb. Add 48 lb: $90 + 48 = 138$ lb, and $138 \div 6 = 23$ lb. New order: 14, 16, 19, 20, 21, 48, so the median is $(19 + 20) \div 2 = 19.5$ lb. The mean uses the size of every value, so 48 raises it a lot. The median depends only on the middle position, which moved half a step.

WATCH FOR • Some students average the four known weights (17.5 lb) and call that the missing value. Others forget to multiply the mean by 5 to get the total.

TRANSFER • The total is $4 \times 12 = 48$. The known scores add to 34, so the fourth score is $48 - 34 = 14$.