



Summarizing numerical data in context

GRADE 6 MATH

Answer keys for the exit ticket, practice worksheet, and homework, plus notes for the lesson slides. Each answer shows the steps and the most likely wrong answer (“If wrong”), so you can tell what a mistake means, not just that it is one. Questions go from **fluency** to **application** to **reasoning**.

Exit Ticket — answer key

Use: End of the summarizing lesson, closing G6 Statistics. 5–8 min, independent. Item 4 is the whole standard in one question.

Timing: 5–8 min · independent. Mark item 4 on the JUSTIFICATION and the sentence, not on whether the numbers are right — those were already tested in items 2 and 3.

1. How many observations, and what was measured? **FLUENCY**

Answer: **12 observations; minutes spent reading last night, measured in minutes**

1. Count the values: there are 12.
2. The attribute is time spent reading, measured in minutes, for one night.
3. Naming the units matters: ‘20’ is meaningless, ‘20 minutes’ is not.

If wrong: Answered ‘12’ with nothing else. The count alone does not say what was counted or in what units.

2. Mean and median? **APPLICATION**

Answer: **Mean $28\frac{1}{3}$ minutes; median $22\frac{1}{2}$ minutes**

1. Sum: 340. Mean = $340 \div 12 = \frac{85}{3} = 28\frac{1}{3}$ minutes.
2. Median: 12 values, average the 6th and 7th: $(20 + 25) \div 2 = 22\frac{1}{2}$ minutes.
3. The mean is about 6 minutes higher than the median — a sign something is pulling it up.

If wrong: Dropped the units. Both answers are in minutes and should say so.

3. Range and IQR? APPLICATION

Answer: **Range 85 minutes; IQR 12½ minutes**

1. Range: $95 - 10 = 85$ minutes.
2. Split into halves of six. Lower half 10, 15, 15, 20, 20, 20 $\rightarrow Q1 = (15 + 20) \div 2 = 17\frac{1}{2}$.
3. Upper half 25, 25, 30, 30, 35, 95 $\rightarrow Q3 = (30 + 30) \div 2 = 30$.
4. IQR = $30 - 17\frac{1}{2} = 12\frac{1}{2}$ minutes.
5. The range is nearly seven times the IQR, which tells you the extremes are far from the middle.

If wrong: Reported only the range. On this data the range is dominated by one value and badly overstates the typical spread.

4. Which measures, and why? Write the summary REASONING

Answer: **Median 22½ minutes and IQR 12½ minutes, because the data is skewed right by a 95-minute outlier**

1. The mean ($28\frac{1}{3}$) sits well above the median ($22\frac{1}{2}$), and the largest value, 95 minutes, is 60 minutes clear of the next highest at 35. That is a striking deviation.
2. One long reading session drags the mean up, so the mean overstates what a typical student did.
3. The median ignores the size of that value and stays with the bulk of the data.
4. The range of 85 has the same problem, so report the IQR of $12\frac{1}{2}$ instead.
5. Usable summary: "Twelve students read last night. A typical student read about $22\frac{1}{2}$ minutes, with the middle half falling between $17\frac{1}{2}$ and 30 minutes. One student read 95 minutes, far more than anyone else."
6. Note the summary names n, the units, the center, the spread AND the outlier.

If wrong: Chose the mean because it is the familiar average, or gave the numbers with no sentence. The justification and the context are the skill here, not the arithmetic.

Quick answers for fast checking:

#	Level	Answer
1	fluency	12 observations, minutes
2	application	mean $28\frac{1}{3}$, median $22\frac{1}{2}$ min
3	application	range 85, IQR $12\frac{1}{2}$ min
4	reasoning	median and IQR, data is skewed right

Practice Worksheet — answer key

Use: During the lesson after the deck. Items 8 and 9 are the assessment-worthy pair: one produces a summary, the other justifies the choice behind it.

Timing: 15–25 min · pairs or independent · circulate on 8 and 9. Read two or three item 8 summaries aloud and have the class check all five parts are present.

1. How many, and what was measured? **FLUENCY**

Answer: **10 observations; quiz scores in points, out of 15**

1. There are 10 values.
2. The attribute is quiz performance, measured in points on a 15-point quiz.
3. Saying ‘out of 15’ matters — a score of 10 means something quite different out of 100.

If wrong: Gave ‘10’ only, or omitted the maximum possible score, which is part of the units here.

2. Mean? **FLUENCY**

Answer: **10.2 points**

1. Sum: 102. Mean = $102 \div 10 = 10.2$ points.

If wrong: Dropped the units.

3. Median? **FLUENCY**

Answer: **10 points**

1. Ten values, average the 5th and 6th: both 10, so the median is 10 points.

If wrong: Picked 10 by spotting the repeated value. It is correct here, but the method must be the middle pair.

4. Compare mean and median — what shape? **APPLICATION**

Answer: **Mean 10.2, median 10 — almost equal, so roughly symmetric**

1. The mean exceeds the median by only 0.2 points.
2. When mean and median are that close, no long tail is pulling the mean away.
3. So the distribution is roughly symmetric, with no striking deviation.
4. Compare the reading data, where the gap was nearly 6 minutes.

If wrong: Declared it skewed right because the mean is slightly larger. A gap of 0.2 out of a range of 4 is negligible; look at the size of the gap relative to the spread.

5. Range? APPLICATION

Answer: **4 points**

1. $12 - 8 = 4$ points.

If wrong: Omitted units.

6. IQR? APPLICATION

Answer: **2 points**

1. Split into halves of five: 8, 9, 9, 10, 10 and 10, 11, 11, 12, 12.
2. Q1 is the middle of the lower half = 9. Q3 is the middle of the upper half = 11.
3. $IQR = 11 - 9 = 2$ points.

If wrong: Used the whole data set's median again instead of each half's median.

7. Q1 and Q3? APPLICATION

Answer: **Q1 = 9 points, Q3 = 11 points**

1. Lower half 8, 9, 9, 10, 10 has middle value 9.
2. Upper half 10, 11, 11, 12, 12 has middle value 11.

If wrong: Averaged pairs unnecessarily. Each half has five values, so the middle one is taken directly.

8. Write a complete summary REASONING

Answer: **e.g. "Ten students took a 15-point quiz. The mean score was 10.2 points and scores ranged from 8 to 12, so the class performed consistently." Mean and range chosen because the data is roughly symmetric with no outliers.**

1. State n and the attribute with units: ten students, quiz scores out of 15.
2. Center: the mean of 10.2 points is appropriate, since mean and median nearly agree.
3. Variability: a range of 4 points, or an IQR of 2 points, both reasonable here because no outlier distorts them.
4. Shape: roughly symmetric, no striking deviations.
5. Justification: with no outlier and a near-symmetric shape, the mean uses all the data and is the more informative choice.
6. A summary that says only 'the mean was 10.2' is incomplete — it gives no n, no units, and no sense of spread.

If wrong: Reported the numbers with no sentence, or gave a sentence with no justification. Both halves are required.

9. Why did the reading data need the median but this does not? REASONING

Answer: **Because the reading data had an outlier and was skewed; the quiz data is symmetric with none**

1. Reading: values ran from 10 to 95 minutes, and 95 was 60 minutes clear of the next highest. Mean $28\frac{1}{3}$ against median $22\frac{1}{2}$ — a wide gap.
2. Quiz: values run 8 to 12 points with no gaps, and mean 10.2 against median 10 — almost identical.
3. An outlier drags the mean but barely moves the median, so when one is present the median is the honest center.
4. With no outlier, the mean uses every value and is the better summary.
5. The choice of measure is not a matter of preference; it follows from the shape of the data and the context.

If wrong: Answered that reading data always needs the median because it is about time. The subject matter is irrelevant — the shape decides.

Quick answers for fast checking:

#	Level	Answer
1	fluency	10 observations, points out of 15
2	fluency	10.2 points
3	fluency	10 points
4	application	roughly symmetric
5	application	4 points
6	application	2 points
7	application	Q1 9, Q3 11
8	reasoning	full summary with justification
9	reasoning	outlier and skew decide

Homework — answer key

Use: Closes G6. The homework is built as a single investigation: remove the outlier, watch what moves, and draw the conclusion that justifies the choice made in the exit ticket.

Timing: ~15 min at home · independent · review items 6–7 together as the next-day warm-up; the two shift sizes side by side make the argument better than any explanation.

1. Median of the reading data? **FLUENCY**

Answer: **$22\frac{1}{2}$ minutes**

1. Twelve values; average the 6th and 7th: $(20 + 25) \div 2 = 22\frac{1}{2}$ minutes.

If wrong: Picked 20 or 25 without averaging.

2. IQR of the reading data? **FLUENCY**

Answer: **$12\frac{1}{2}$ minutes**

1. Lower half 10, 15, 15, 20, 20, 20 $\rightarrow Q1 = 17\frac{1}{2}$.
2. Upper half 25, 25, 30, 30, 35, 95 $\rightarrow Q3 = 30$.
3. $IQR = 30 - 17\frac{1}{2} = 12\frac{1}{2}$ minutes.

If wrong: Gave the range of 85 instead.

3. Remove 95 — does the mean go up or down? No calculation **APPLICATION**

Answer: **Down**

1. 95 is far above every other value and far above the current mean of $28\frac{1}{3}$.
2. Removing a value that sits well above the mean must pull the mean down.
3. You can reason this out without computing anything, which is a useful check on the arithmetic that follows.

If wrong: Said it stays the same because only one value was removed. A single extreme value has a large effect on the mean.

4. Mean of the remaining 11 values? **APPLICATION**

Answer: **$22\frac{5}{11}$ minutes**

1. New sum: $340 - 95 = 245$. Divide by 11: $\frac{245}{11} = 22\frac{5}{11}$ minutes.
2. Down from $28\frac{1}{3}$, as predicted in the previous question.

If wrong: Divided by 12 instead of 11. Removing a value changes the count as well as the sum.

5. Median of the remaining 11 values? APPLICATION

Answer: **20 minutes**

1. Eleven values, so the median is the 6th: 10, 15, 15, 20, 20, [20], 25, 25, 30, 30, 35.
2. The median is 20 minutes.

If wrong: Assumed the median would not change at all. It moved slightly, because removing a value shifts every position.

6. How much did each change? REASONING

Answer: **Median fell by $2\frac{1}{2}$ minutes; mean fell by about $5\frac{2}{3}$ minutes**

1. Median: $22\frac{1}{2} \rightarrow 20$, a fall of $2\frac{1}{2}$ minutes.
2. Mean: $28\frac{1}{3} \rightarrow 22\frac{5}{11}$, a fall of about $5\frac{2}{3}$ minutes.
3. The mean moved more than twice as far as the median.

If wrong: Compared the two new values to each other instead of measuring how far each one moved.

7. What do those changes show? REASONING

Answer: **The median is far more resistant to outliers than the mean**

1. The mean fell by roughly $5\frac{2}{3}$ minutes; the median by only $2\frac{1}{2}$.
2. The mean uses the SIZE of every value, so removing a very large one changes the total a great deal.
3. The median uses only POSITION, so removing one value simply shifts which observation sits in the middle.
4. This is exactly why the median is reported when a data set contains an outlier — it describes the bulk of the data without being dragged by the extreme.
5. It is also why the original summary should use the median: with the 95 present, the mean of $28\frac{1}{3}$ is higher than 9 of the 12 actual values.

If wrong: Concluded the mean is wrong. Neither is wrong — the mean is correctly computed, but it is a poor description of a typical value here.

8. Write a complete summary of the original 12 values REASONING

Answer: e.g. “Twelve students recorded their reading time. A typical student read about $22\frac{1}{2}$ minutes, with the middle half between $17\frac{1}{2}$ and 30 minutes. One student read 95 minutes, far more than anyone else.” Median and IQR chosen because the data is skewed right by that outlier.

1. n and attribute with units: twelve students, minutes spent reading last night.
2. Center: median $22\frac{1}{2}$ minutes.
3. Variability: IQR $12\frac{1}{2}$ minutes, or the middle half running from $17\frac{1}{2}$ to 30 minutes.
4. Shape: skewed right, with a striking deviation at 95 minutes.
5. Justification: the outlier pulls the mean to $28\frac{1}{3}$, above 9 of the 12 values, so the median describes a typical student better. The range of 85 has the same distortion, so the IQR is reported instead.
6. Mentioning the outlier explicitly is part of the summary, not an optional extra — hiding it would misrepresent the data.

If wrong: Reported the median and IQR but never mentioned the 95-minute reader. A striking deviation must be named; the standard asks for it directly.

Quick answers for fast checking:

#	Level	Answer
1	fluency	$22\frac{1}{2}$ minutes
2	fluency	$12\frac{1}{2}$ minutes
3	application	down
4	application	$22\frac{5}{11}$ minutes
5	application	20 minutes
6	reasoning	median $-2\frac{1}{2}$, mean $-5\frac{2}{3}$
7	reasoning	the median resists outliers
8	reasoning	full summary naming the outlier

Lesson slides — teaching notes & timing

Mini-lesson deck: ~12–15 min, then the practice sheet. Closes G6 Statistics and the whole G6 inventory. Draws on SP-02 (shape) and SP-03 (center and variability).

Slide	~Time	Note
1/8	0:00	Frame it: everything from this domain now gets used at once, on real data.
2/8	1:00	Hook — poll for a typical value. Do NOT resolve. Some will say around 20, some will compute 28. Both are defensible until you look at the shape.

3/8	3:00	The five parts. Write them on the board and leave them up for the practice sheet.
4/8	5:00	WE1 — resolve the hook. The line that lands: the mean is CORRECT but MISLEADING. Correct arithmetic can still be a poor description.
5/8	7:30	WE2 — the choice rule. Stress that it follows from the shape, not from preference or from what the data is about.
6/8	10:00	CFU — all-student response. Answer: the mean, since mean 10.2 and median 10 nearly agree. Watch for students who now say ‘always median’.
7/8	12:00	Model the sentence. Require the outlier to be named — reporting striking deviations is part of the standard, not an optional flourish.
8/8	14:00	Launch the in-class practice sheet. This closes G6 Statistics.