

Histogram Detectives

Follow the data cycle from question to conclusion

GRADE 7 • 7.PS.2

7.PS.2 "Excerpt: The student will apply the data cycle"

NAME _____

DATE _____

Build understanding

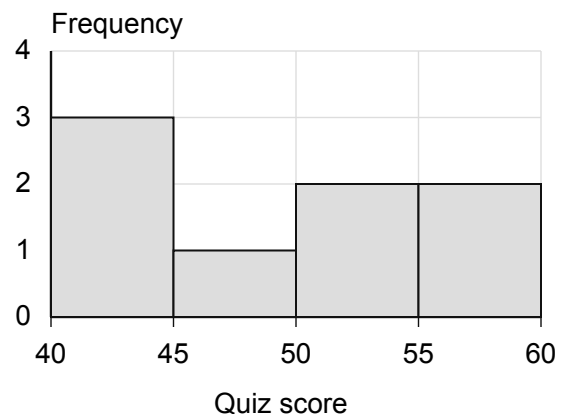
A data cycle begins with a question that expects varying numerical answers. Collect measurements or acquire records with a shared unit and time frame. Organize them into equal-width intervals, construct a histogram, then describe patterns and limits. A histogram groups values; it does not preserve each exact value.

Worked example

Eight recorded quiz scores are 41, 42, 44, 47, 51, 53, 56, 59. How are they grouped in this histogram?

Use equal-width intervals $[40,45)$, $[45,50)$, $[50,55)$, $[55,60)$. Each interval includes its left endpoint and excludes its right; adjacent bars show numerical groups. Frequencies are 3, 1, 2, 2; the total is 8.

Sample quiz scores



Intervals include the left endpoint and exclude the right endpoint.

Complete Tasks 1-4 as one data cycle. Use all 12 supplied records exactly once. Use a ruler for the histogram.

1. Formulate

Formulate a statistical question about how long grade-seven students read on a specified evening. Name the population, unit and data to acquire. Explain why answers may vary.

2. Acquire and organize

Acquire the 12 measurements from the simulated reading log below. Tally every record into the table and check the total. Each interval includes its left endpoint and excludes its right.

Simulated reading log: minutes for 12 students			
1. 1	2. 2	3. 3	4. 4
5. 6	6. 8	7. 22	8. 24
9. 25	10. 26	11. 27	12. 28

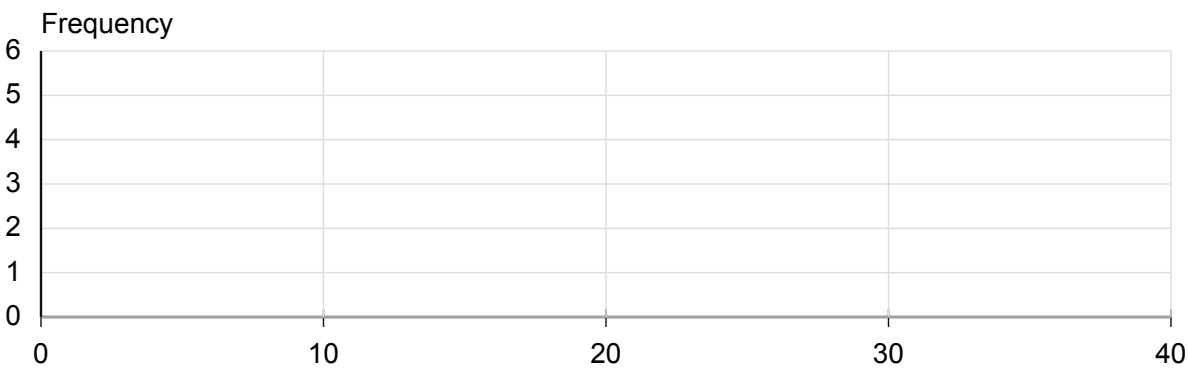
Reading log frequencies

Minutes	Frequency
0 to <10	
10 to <20	
20 to <30	
30 to <40	

3. Represent

Construct a histogram from Task 2. Add a title and horizontal-axis label. Draw adjacent bars using the intervals and frequency scale shown; leave zero-frequency intervals empty.

Plot title: _____



Horizontal axis: _____

Intervals include the left endpoint and exclude the right endpoint.

4. Analyze and communicate

Use your histogram. Identify the occupied groups and the gap between them. Report how many students read for at least 20 minutes. Write a conclusion limited to the recorded sample.

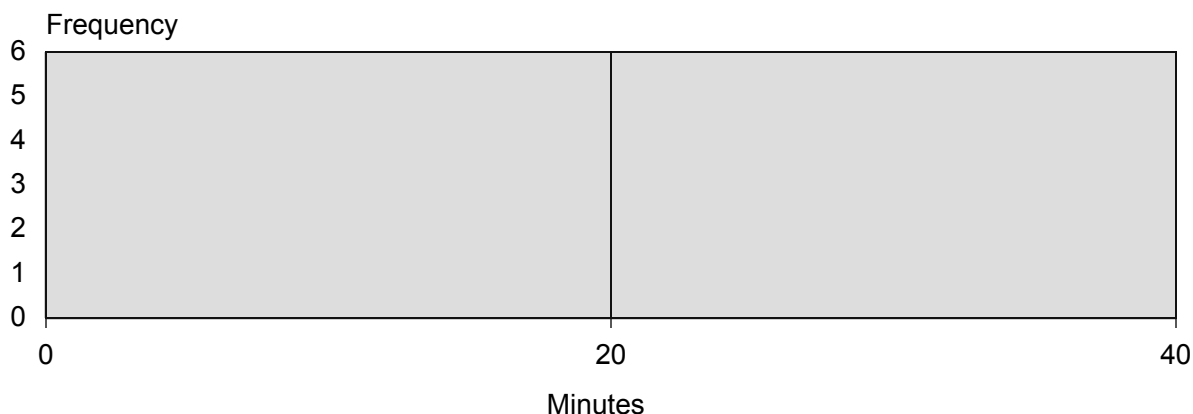
5. Evaluate collection

To study the grade, choose reading-club volunteers or a random sample from the full roster. Explain your choice, how a larger random sample can help, and one remaining limitation.

6. Compare intervals

Compare this wider-bin histogram with your Task 3 graph of the same 12 records. What detail disappears, and why?

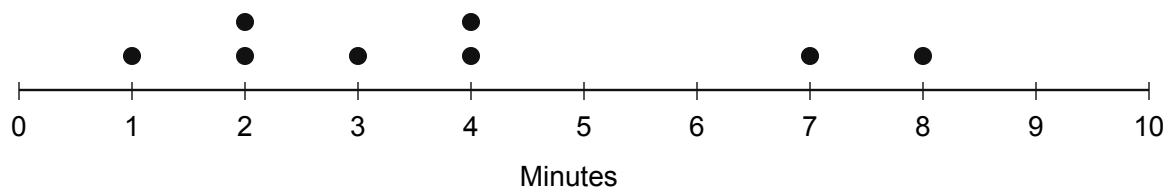
Reading minutes: wider bins



Intervals include the left endpoint and exclude the right endpoint.

7. Choose a display

This separate dot plot shows exact reading-session lengths. Which display is better for finding how many sessions lasted exactly 4 minutes: this plot or a histogram grouping 0 to under 5 and 5 to under 10? Give the count and justify.

Short reading log

Key: one dot = one recorded session

TEACHER NOTES

The reading log is simulated, not claimed new survey data. Require question, completed frequency table, actual student histogram and a sample-limited conclusion. Task 5 addresses representative collection and limitations. Task 6 changes only interval width; Task 7 compares exact-value and grouped displays.

TASK 1

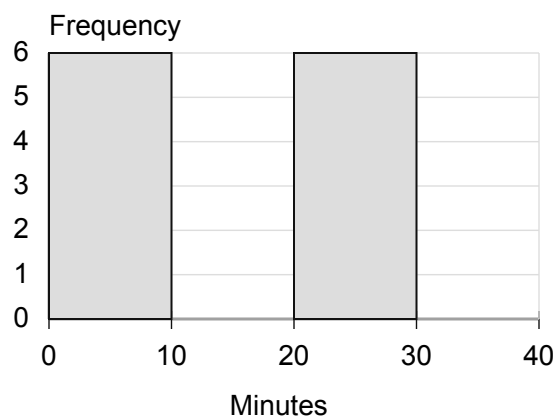
Example: How many minutes did grade-seven students read last Tuesday evening? Population: the grade; unit: minutes per student. Students may read different amounts.

TASK 2

Counts: 0-<10: 6; 10-<20: 0; 20-<30: 6; 30-<40: 0.
Total 12.

TASK 3

Reading minutes: bar heights 6, 0, 6, 0 for successive 10-minute intervals.

Reading minutes

Intervals include the left endpoint and exclude the right endpoint.

TASK 4

Six students read below 10 minutes and six read 20 to under 30; the gap is 10 to under 20. Six read at least 20 minutes. These describe the sample.

TASK 5

Choose a random sample from the full roster to reduce volunteer bias. A larger random sample usually reduces chance variation. A large biased sample is still biased. Nonresponse and inaccurate recall can remain; report sample size and limits, not guaranteed grade-wide facts.

TASK 6

Both wider bars have frequency 6. The empty 10-to-under-20 interval is merged with 0-to-under-10, hiding the internal gap. Changing to width 20 preserves the 12 observations but conceals the separate low and high clusters seen with width 10.

TASK 7

The dot plot: exactly 4 minutes occurred twice. A histogram bin from 0 to under 5 minutes groups those sessions with shorter sessions, hiding the exact count at 4.