

# Displaying Data with Histograms

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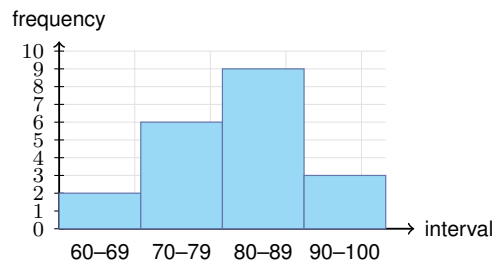
## Q Quick Review

A **histogram** displays numerical data grouped into equal-width intervals. The bars touch because the intervals cover a continuous number scale. The height of each bar is the frequency in that interval. Use histograms to describe shape: clusters, peaks, gaps, spread, and skew. Always check the interval labels and the vertical scale before answering a question from a histogram.

## PRACTICE

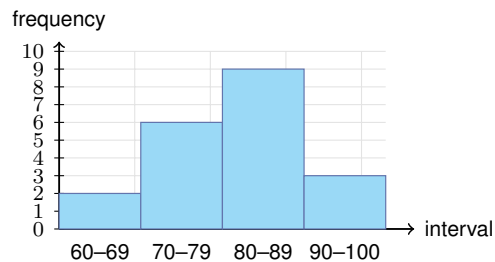
Use the tables and histograms to answer each question.

1. The histogram shows quiz scores. How many students are represented in all?



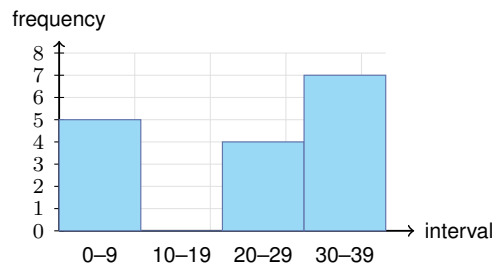
Answer: \_\_\_\_\_

2. Using the histogram, which score interval has the greatest frequency?



Answer: \_\_\_\_\_

3. Which interval is a gap in the histogram?

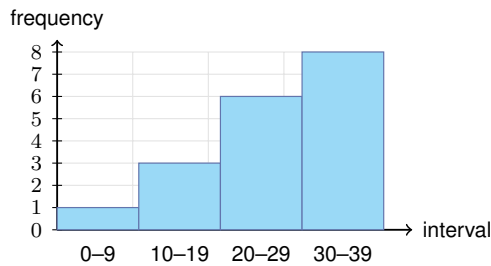


Answer: \_\_\_\_\_



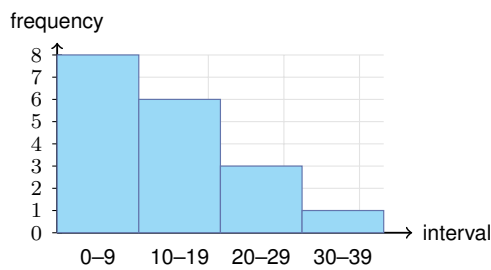
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4. Describe the shape of the distribution.



Answer: \_\_\_\_\_

5. Describe the shape of the distribution.



Answer: \_\_\_\_\_

6. Complete the frequency row for the data 10, 12, 13, 14, 15, 17, 18, 21, 22, 26, 27, 29.

Interval	10-14	15-19	20-24	25-29
Frequency				

Answer: \_\_\_\_\_

7. Data run from 3 to 47. Using width 10 starting at 0, list the intervals.

Answer: \_\_\_\_\_

8. Find the relative frequency for the 20-29 interval.

Interval	0-9	10-19	20-29	Total
Frequency	5	7	8	20

Answer: \_\_\_\_\_

9. Which interval contains the median?

Interval	0-9	10-19	20-29	30-39
Frequency	2	5	10	3

Answer: \_\_\_\_\_

10. Should favorite colors be displayed with a histogram?

Answer: \_\_\_\_\_



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11. Should student heights be displayed with a histogram?

Answer: \_\_\_\_\_

12. Complete the frequency row for scores 61, 67, 81, 83, 87, 88, 89, 90, 98, 100.

Interval	60–69	70–79	80–89	90–100
Frequency				

Answer: \_\_\_\_\_

13. Which class has more scores in the 80–89 interval?

Class	60–69	70–79	80–89	90–99
A	2	5	8	4
B	1	4	6	7

Answer: \_\_\_\_\_

14. What does it mean if two histogram bars touch?

Answer: \_\_\_\_\_

15. Find the total in the first two intervals.

Interval	0–4	5–9	10–14	15–19
Frequency	6	4	3	2

Answer: \_\_\_\_\_

16. Which interval is the mode interval?

Interval	0–9	10–19	20–29	30–39
Frequency	4	4	9	1

Answer: \_\_\_\_\_

17. Which histogram would show more detail: width 5 bins or width 20 bins?

Answer: \_\_\_\_\_

18. Which histogram would be easier to summarize quickly: width 5 bins or width 20 bins?

Answer: \_\_\_\_\_

19. A histogram has bar heights 1, 3, 3, 1. Describe the shape.

Answer: \_\_\_\_\_

20. A histogram has two separated peaks. What word describes this?

Answer: \_\_\_\_\_



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◆ Word Problems

21. A teacher groups quiz times into intervals with frequencies 3, 7, 6, 4. How many students are represented?

Answer: \_\_\_\_\_

22. A reading histogram has its tallest bar at 40–59 pages. What does that interval tell you?

Answer: \_\_\_\_\_

23. A histogram of commute times has most bars on the low end and a long tail to the right. Describe the skew.

Answer: \_\_\_\_\_

24. A data set has no values from 30–39 minutes, but values appear before and after that interval. What should the histogram show?

Answer: \_\_\_\_\_



## Answer Keys

- |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. 20</li> <li>2. 80–89</li> <li>3. 10–19</li> <li>4. left-skewed</li> <li>5. right-skewed</li> <li>6. 4, 3, 2, 3</li> <li>7. 0–9, 10–19, 20–29, 30–39, 40–49</li> <li>8. 0.40 or 40%</li> <li>9. 20–29</li> <li>10. no</li> <li>11. yes</li> <li>12. 2, 0, 5, 3</li> </ol> | <ol style="list-style-type: none"> <li>13. Class A</li> <li>14. the intervals are adjacent on a number scale</li> <li>15. 10</li> <li>16. 20–29</li> <li>17. width 5</li> <li>18. width 20</li> <li>19. roughly symmetric</li> <li>20. bimodal</li> <li>21. 20</li> <li>22. it is the most common page range</li> <li>23. right-skewed</li> <li>24. a gap at 30–39</li> </ol> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

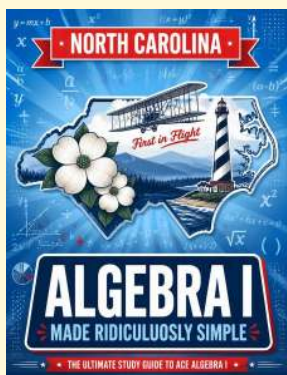
### Step-by-Step Tutor Notes

1. Keep the order of operations in view, then simplify without skipping the sign check. Add the bar heights:  $2 + 6 + 9 + 3 = 20$  students. After simplifying, the answer is 20.
2. Read the table by matching the correct row and column first, then use the count or total that fits the question. The tallest bar is the 80–89 interval, with frequency 9. This gives 80–89.
3. Read the table by matching the correct row and column first, then use the count or total that fits the question. A gap has frequency 0. The 10–19 interval has no bar. This gives 10–19.
4. Start with the definition the problem is testing, then apply it directly. Most values are in the higher intervals, with a tail toward the lower intervals. So the answer is left-skewed.
5. Start with the definition the problem is testing, then apply it directly. Most values are in the lower intervals, with a tail toward the higher intervals. So the answer is right-skewed.
6. This is a good place to slow down, check the notation, and simplify cleanly. Count the values in each interval: 4, 3, 2, 3. So the answer is 4, 3, 2, 3.
7. Take it one clear step at a time and keep the original question in mind. Start at 0 and keep equal widths of 10 until the maximum is included. So the answer is 0–9, 10–19, 20–29, 30–39, 40–49.
8. For a table question, slow down and locate the exact row, column, or cell before calculating. Relative frequency is  $8/20 = 0.40$ . This gives 0.40 or 40%.
9. There are 20 values, so the middle is around the 10th and 11th values; both fall in 20–29.
10. Start with the definition the problem is testing, then apply it directly. Favorite color is categorical, so a bar graph is better than a histogram. So the answer is no.
11. Start with the definition the problem is testing, then apply it directly. Heights are numerical measurements that can be grouped into intervals. So the answer is yes.
12. Count carefully: two in the 60s, none in the 70s, five in the 80s, and three from 90 to 100.
13. This is a good place to slow down, check the notation, and simplify cleanly. Class A has 8 values in that interval; Class B has 6. So the answer is Class A.
14. This is a good place to slow down, check the notation, and simplify cleanly. Histogram bars touch because the data intervals are continuous. So the answer is the intervals are adjacent on a number scale.
15. Work one inverse operation at a time and keep both sides balanced. Add the first two frequencies:  $6 + 4 = 10$ . After simplifying, the answer is 10.
16. For a table question, slow down and locate the exact row, column, or cell before calculating. The mode interval has the tallest bar, frequency 9. This gives 20–29.
17. Focus on the main idea of the problem, then simplify carefully. Smaller bins usually show more detail, though too many bins can look noisy. So the answer is width 5.
18. Focus on the main idea of the problem, then simplify carefully. Wider bins give a simpler big-picture view. So the answer is width 20.
19. Use the clue in the question first, then let the arithmetic finish the job. The heights rise and fall in a balanced way. So the answer is roughly symmetric.
20. Start with the definition the problem is testing, then apply it directly. Two clear peaks means the distribution is bimodal. So the answer is bimodal.
21. Read the table by matching the correct row and column first, then use the count or total that fits the question. Add every interval frequency:  $3 + 7 + 6 + 4 = 20$  students. This gives 20.
22. The tallest bar is the interval with the greatest frequency, so more students read 40–59 pages than any other listed range.
23. A long tail toward larger values is right skew, even if most data are on the left.
24. Set up the model from the story, then calculate carefully. An interval with no data gets a bar height of 0, creating a visible gap.



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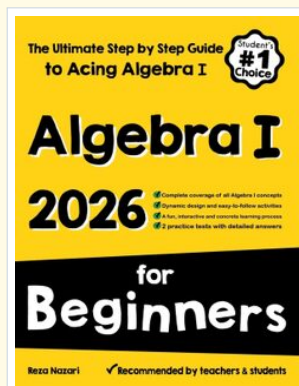
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