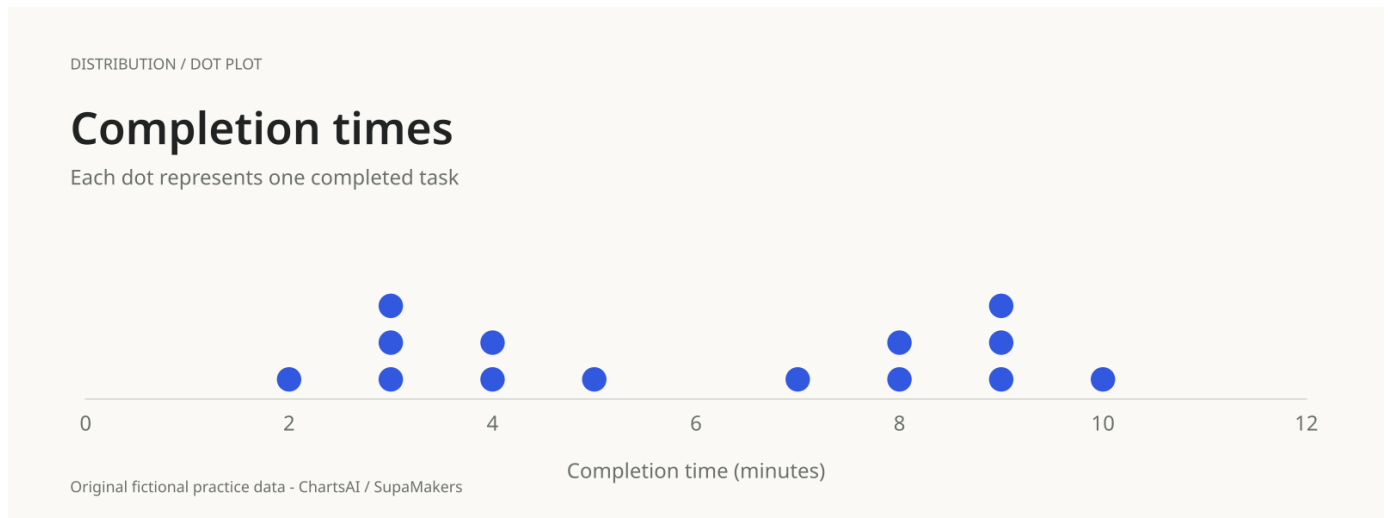


Read a dot plot

Count each dot once. The numbers on the horizontal axis are minutes, not frequencies.



Completion time (minutes): 2, 3, 3, 3, 4, 4, 5, 7, 8, 8, 9, 9, 9, 10. Fictional data.

1. How many completed tasks are shown? Explain how you counted.

14 tasks. Count all 14 dots, including repeated values.

2. Which completion times occur most often? Give each frequency.

3 and 9 minutes; each occurs 3 times.

3. What is the range? Include the unit.

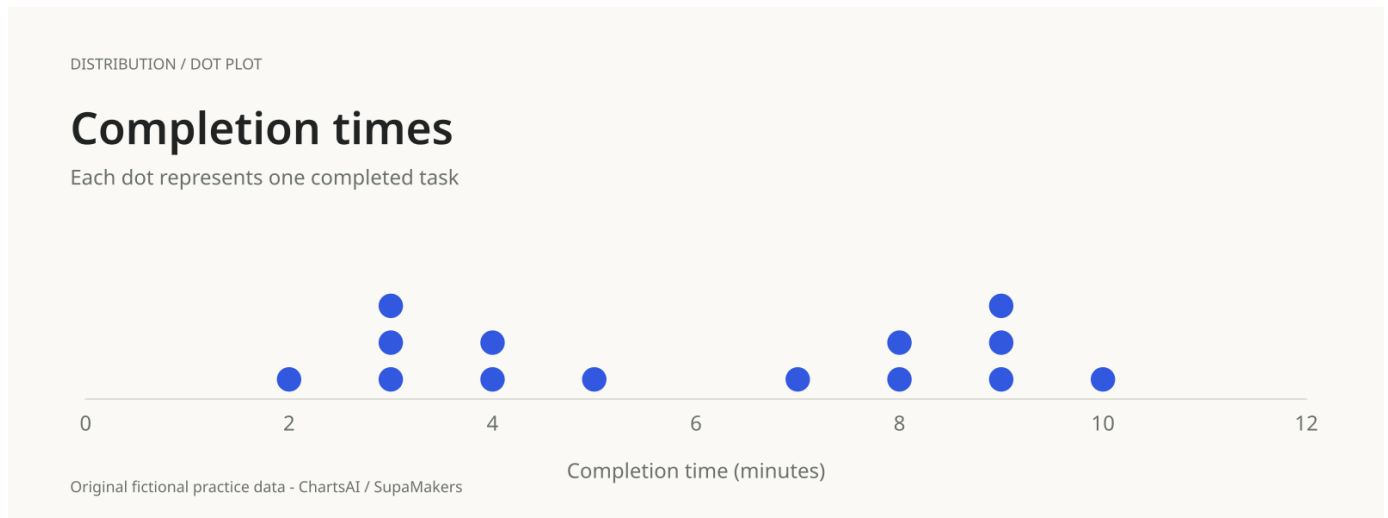
$10 - 2 = 8$ minutes.

4. Describe the shape. Does it prove there are two different groups of people?

Two separated concentrations make this a bimodal example. The plot alone does not establish two populations or explain why the peaks occur.

What can an average hide?

Use the same completion times as lesson 1. Show your calculation before interpreting it.



Completion time (minutes): 2, 3, 3, 3, 4, 4, 5, 7, 8, 8, 9, 9, 9, 10. Fictional data.

1. Calculate the mean completion time. Show the total and divisor.

Total = 84 minutes; mean = $84 / 14 = 6$ minutes.

2. Calculate the median. Which two ordered positions do you use?

Use positions 7 and 8: 5 and 7. Median = $(5 + 7) / 2 = 6$ minutes.

3. Did anyone take exactly the mean time? What does this tell you about averages?

No observation is 6 minutes. An average need not be an observed value; here it lies in the gap between the concentrations.

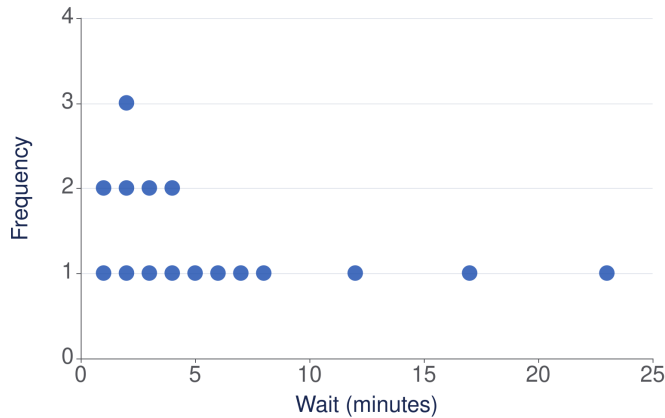
4. Write one sentence that communicates more than the mean alone.

One possible answer: The 14 completion times have peaks at 3 and 9 minutes, although both mean and median are 6 minutes. Other accurate descriptions of the two concentrations are acceptable.

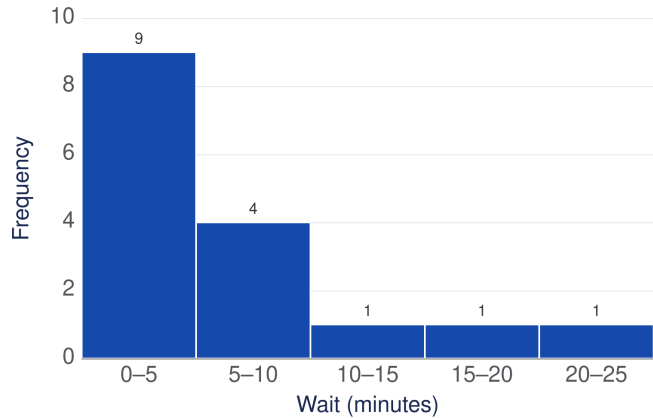
From dots to histogram bins

New dataset: waiting times. Both plots use all the same waits. Bins start at 0 and have width 5 minutes; include the left edge, exclude the right edge, except the last bin includes its right edge.

Individual waiting times



Waiting times grouped into intervals



Wait (minutes): 1, 1, 2, 2, 2, 3, 3, 4, 4, 5, 6, 7, 8, 12, 17, 23. Fictional data.

1. How many observations are in each chart? Did grouping add or remove any?

16 in each. Grouping changes the display, not the observations.

2. How many waits are from 0 up to (but not including) 5 minutes? How many are exactly 2 minutes?

9 are in the first interval; 3 are exactly 2 minutes. These are different questions.

3. Which interval contains a wait of exactly 5 minutes?

The interval from 5 up to 10 minutes, because the left boundary is included and the right boundary is excluded.

4. Could the histogram alone recover every exact wait? Explain.

No. Many different lists can have the same interval counts. Keep the raw observations if exact values matter.