

1.9 Describing Location in a Distribution (Part 2)

There are some interesting graphs that can be made with percentiles. One of the most common starts with a frequency table for a quantitative variable.

Age	Frequency
40-44	2
45-49	7
50-54	13
55-59	12
60-64	7
65-69	3

For instance, this frequency table summarizes the ages of the first 44 US presidents when they took office.

Let's expand this table to include columns for relative frequency, cumulative frequency, and cumulative relative frequency.

To fill the *cumulative frequency* column, add the counts in the frequency column for the current interval and all intervals with smaller values of the variable.

For the *cumulative relative frequency* column, divide the entries in the cumulative frequency column by the total number of data.

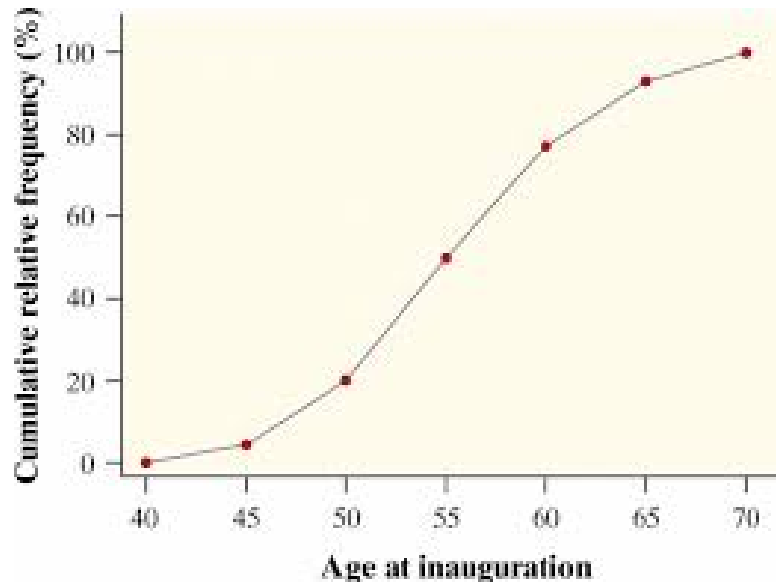
Multiply by 100 to convert to a percent.

Here is the original frequency table with the others added to it.

Age	Frequency	Relative frequency	Cumulative frequency	Cumulative relative frequency
40-44	2	$2/44 = 4.5\%$	2	$2/44 = 4.5\%$
45-49	7	$7/44 = 15.9\%$	9	$9/44 = 20.5\%$
50-54	13	$13/44 = 29.5\%$	22	$22/44 = 50.0\%$
55-59	12	$12/44 = 27.3\%$	34	$34/44 = 77.3\%$
60-64	7	$7/44 = 15.9\%$	41	$41/44 = 93.2\%$
65-69	3	$3/44 = 6.8\%$	44	$44/44 = 100\%$

Now we can make a **cumulative relative frequency graph**.

A **cumulative relative frequency graph** plots a point corresponding to the cumulative relative frequency in each interval at the smallest value of the next interval, starting with a point at a height of 0% at the smallest value of the first interval. Consecutive points are then connected with a line segment to form the graph.



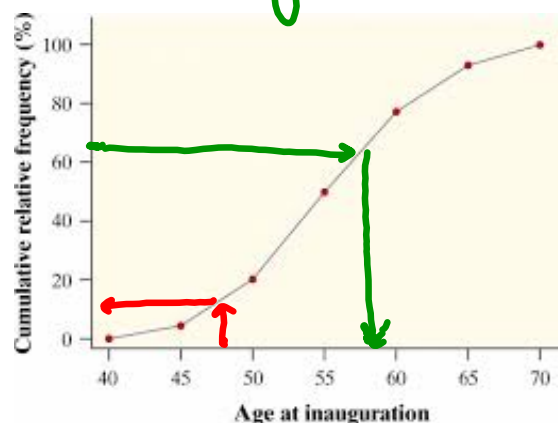
Example: Use the graph below to answer each question.

- a.) Was Barack Obama, who was first inaugurated at age 47, unusually young?

Yes, because he is at about the 15th percentile

- b.) Estimate and interpret the 65th percentile of the distribution.

≈ 57 years old

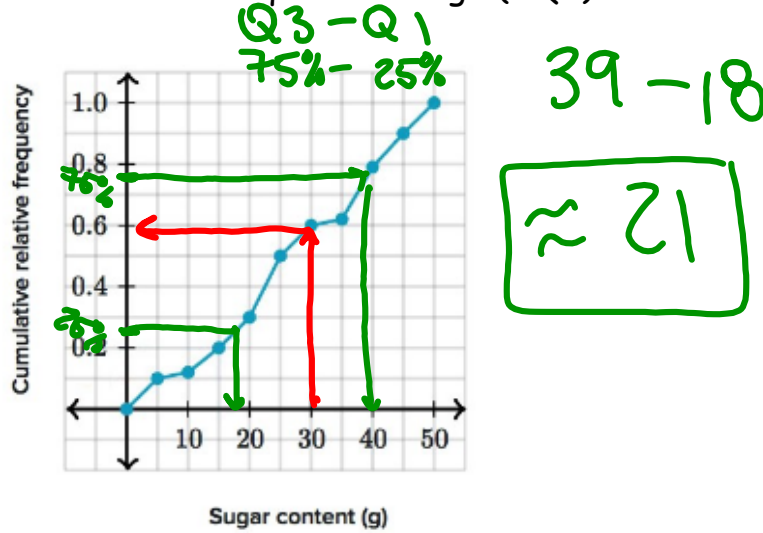


Example: Use the graph below to answer each question.

- a.) About what percent of drinks contain 30 or more grams of sugar?

at 60th percentile

- b.) Estimate the interquartile range (IQR) of the distribution.



Example: Use the graph below to answer each question.

- a.) About what percent of SAT scores were at least 600?

\approx at 78-79th percentile

- b.) Estimate the interquartile range (IQR) of the distribution.

