# Percentiles

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# 1. Percentiles

You probably heard of percentiles, or percentile rank, before. **Percentile** is the same as a relative cumulative frequency, or the percent of data points in, or below, some other bin of data.

> **IN CONTEXT**
> You may have seen percentiles reporting standardized test scores. If you were in the 95th percentile on a standardized test, it doesn't mean you scored a 95 on the test. It means that your score was at least as good as 95% of test takers.

Often, large data sets are given in frequency tables, frequently with rounded values.

⇗ EXAMPLE Here is a table showing heights (in inches) of 333 sixth-grade students, along with the frequency, relative frequency, and relative cumulative frequencies.

| Height | Frequency | Relative Freq | Rel. Cum. Freq |
|--------|-----------|---------------|----------------|

| | | | |
|---|---|---|---|
| 55 | 11 | 3% | 3% |
| 56 | 23 | 7% | 10% |
| 57 | 33 | 10% | 20% |
| 58 | 36 | 11% | 31% |
| 59 | 54 | 16% | 47% |
| 60 | 51 | 15% | 62% |
| 61 | 43 | 13% | 75% |
| 62 | 32 | 10% | 85% |
| 63 | 30 | 9% | 94% |
| 64 | 13 | 4% | 98% |
| 65 | 7 | 2% | 100% |

> percentiles

How do we read this? Notice the first two rows have a relative frequency of 3% and 7%, respectively. Using these values, we can find the relative cumulative frequency of 10% in the second row by combining these two relative frequencies. You can also check this by dividing the cumulative amount of 11 and 23 students, which is 34, by the total amount of students, 333, you'll get a number close to 10%.

By the time we get to 65 inches, we will have accounted for all of the sixth graders in the data set.

TRY IT

You can use this chart to answer many questions:

| Question | Answer |
|---|---|
| *Which percentile will a student with a height of 62 inches fall into?* | From the chart, you can see that 62 inches falls in the 85th percentile. That means that a 62-inch student is at least as tall as 85% of his/her classmates. |
| *How tall is a student in the 94th percentile?* | They would be 63 inches tall. |
| *What is the median height for sixth graders?* | This question is a little tricky. By the time you finish counting up through all of the 59-inch students, you still haven't accounted for half the grade yet; only 47% of the students. However, by the time you're done counting all the 60-inch students, you've accounted for 62% of the grade.<br><br>That means that somewhere within that 60-inch range is the median |

| | height. So this tells us that half the students are at or above 60 inches, and half the students are at or below 60 inches. |
|---|---|

In the previous example, we summarized the data from hundreds of students in a table format. However, you can also calculate percentile in small datasets.

⇗ EXAMPLE  The following are the measurements (in inches) for the 12 fish caught at the annual Fishing Expo at Cam's local pond:

8, 12, 14, 10, 5, 4, 18, 22, 12, 12, 12, 11

Cam's fish measured 10 inches. What percentile does this represent?

First, order the values from smallest to largest:

4, 5, 8, 10, 11, 12, 12, 12, 12, 14, 18, 22

Cam's 10 inch fish is 4th of 12 values, so 4/12 = 0.33 or the 33rd percentile.

Everyone in the 75th percentile or above receives a trophy. What size fish represents the 75th percentile?

Again, we order the fish from smallest to largest:

4, 5, 8, 10, 11, 12, 12, 12, 12, 14, 18, 22

We have 12 values and are interested in the 75th percentile. 12*0.75 = 9 which tells us the 9th fish in the series, or 12 inches would be the 75 percentile.

📄 TERM TO KNOW

**Percentile**
  Relative Cumulative Frequency; the amount of data points at or below a particular value.

📋 SUMMARY

Percentiles are the same as relative cumulative frequency. They can be used to compare where individuals rank relative to their group. Percentiles measure what percent of data points fall in a bin or below that bin.

Good luck!

## 📄 TERMS TO KNOW

**Percentile**

Relative Cumulative Frequency; the amount of data points at or below a particular value.