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About Percentages & Percentiles

Percentages

If a student received a mark of 32 out of a possible 40 points on a statistics test, we could say that they received 80% on the test.

\[
\frac{32}{40} \times 100 = 80\%
\]

This indicates the proportion of answers (relative to 100) that the student gave correctly on the test.

We could say that there was a 15% increase in the price of gas sold in the tri-city area during the month of May; however, for this to make sense, we would need to interpret the increase in relation to the price of gas just before May started.

In this vein, let’s say that regular unleaded gas in the tri-city area cost $1.20/litre at the start of May. There was a 15% increase in the price over the course of the month of May. As such, the cost of regular unleaded gas in the tri-city area at the end of the month was $1.38/litre.

The following examples were taken from the article "Follow-up Study for Graduates" that was in The Daily on May 2, 2007.

"Two out of five graduates from the class of 2000, who had left school owing money to government student loans, had completely repaid their debt five years after graduation.”

What does this mean?

2 out of 5 is a proportion representing graduates in 2000 who had paid off their government loans by 2005.

Expressed another way: \((2/5) \times 100 = 40\%\)
Therefore, 40% of students who graduated in 2000 and left school owing government student loans, paid off their loans by 2005.

Why is 2 the numerator and 5 the denominator? 2 represents a part of the total quantity of interest (5).

“Graduates from master’s and doctoral programs were most likely to have repaid their loans, with 46% having done so, compared to 42% for those from bachelor programs and 36% from college programs”

What does this mean?

This section compares graduates, who left school with government loans, by level of study.

Percentages allow us to make comparisons.

By looking at these percentages, we can see that, of the 3 groups, master’s and doctoral program graduates in 2000 were the most likely to have paid off their loans by 2005; whereas, college graduates were the least likely of the 3 groups to have paid off their loans in 5 years.

“…the total income in 2004 for graduates who had paid off their loans was 20% higher than that of their fellow graduates who still owed money. This relative difference was the same for bachelor graduates and for those with master’s degrees or doctorates, but much lower (13%) for college graduates.”

The income of the students who had paid off their loans was 20% higher than that of the students who had not paid off their loans.

What does this mean?

The numerator is the average income in 2004 of graduates who left school owing money for student loans.

The denominator is the average income, in 2004, of the graduates who left school without government loans. When multiplied by 100, we obtain a percentage. This percentage is subtracted from 100 to get the percentage of difference between the two incomes.
We can also investigate percentage decreases, in which we determine what percentage of the original total was lost or eliminated. For example, let’s say that the average life expectancy in Mexico has dropped from 78 years of age to 64 years of age since the turn of the century. To calculate the percentage decrease, subtract the new total from the old total (i.e. \(78 - 64 = 14\)). Now, express the difference as a percentage of the old total:

\[
\frac{14}{78} \times 100 = 17.9\%
\]

Therefore, the average life expectancy in Mexico has dropped by 17.9% since the turn of the century.

**Percentiles**

**Percentiles**

The 42\(^{nd}\) percentile is the score at or below which 42% of the scores fall.

The 20\(^{th}\) percentile is the score at or below which 20% of the scores fall.

The 93\(^{rd}\) percentile is the score at or below which 93% of the scores fall.

Joan and Alice each completed a language test and an arithmetic test. Both tests were graded out of 100.
Joan obtained a score of 75 on her arithmetic test, which put her in the 50th percentile.

This means that 50% of the class scored 75 or below on the test.

Alice scored 77 on the arithmetic test and was in the 60th percentile.

Therefore, 60% of the class scored 77 or below on the arithmetic test.

Joan obtained a score of 86 on the language test, and Alice scored 96 on the test, putting them in the 90th and 99th percentiles, respectively.

This means that 90% of the class scored 86 or lower on the test and that 99% of the class scored 96 or lower on the test.