

Percents, Percent of Increase/Decrease

Dr. Robert J. Rapalje
Seminole Community College--Hunt Club Center
Tech Prep Integrations

One of the most basic and important concepts in math relevant to the world of business is that of **percent**. By using percents, comparisons can be made to indicate increases/decreases in sales, profit, and volume of business. Whatever the quantities to be measured, percent is the basic unit of comparison.

Definition: Percent means “per hundred.”

Percent of Increase/Decrease

Percent of increase (or decrease) is simply defined as the amount of increase (or decrease) divided by the original amount.

Example 1: Suppose a class has 20 students, and it increases to 25 students. Find the percent of increase.

Solution: First, find the amount of increase. Because the number of students increased from 20 to 25, there was an increase of 5 students. Now, this increase of 5 students is compared to (that is, divided by) the original number of students, which is 20. The percent of increase is $5/20$, which reduces to $1/4$ or **25%**.

Example 2: Suppose a class has 25 students, and it decreases to 20 students. Find the percent of decrease.

Solution: At first glance, you might think this is the same as the previous example. The amount of decrease in this example, as the increase of the previous example, is 5. However, you must always divide by the original amount. In this case, the original amount is 25. Therefore, the percent of decrease is $5/25$, which reduces to $1/5$ or **20%**.

Example 3: Suppose a corporation has revenue for the fiscal year of \$19,347,600. The income from the previous fiscal year is \$18,974,995. Find the percent of increase or decrease in revenue.

Solution: First, find the amount of increase or decrease in revenue. There was an increase of \$372,605. Now, divide this number by the original amount (that is \$18,974,995): $\$372,605 / \$18,974,995$, which is approximately 0.0196 or about **1.96% increase**.

Example 4: Suppose the corporation in the previous example had revenue for the fiscal year of \$18,974,995, compared to the previous year, in which revenue for the corporation was \$19,347,600.

Solution: Now, there was a decrease in revenue of \$372,605. For comparison purposes, now the original amount of revenue is \$19,347,600. The percent of decrease is $\$372,605 / \$19,347,600$, approximately 0.01926 or 1.93%.

Example 5: A young boy earned \$5 last week selling newspapers on the street corner. This week he earned \$12. Find the percent of increase in his earnings.

Solution: First, the amount of increase is $\$12 - \5 , or \$7. Now, divide \$7 by his original earnings of \$5: $\$7 / \$5 = 1.40$, which is **140% increase**.

Reflections: In the previous examples, notice that the corporation had an increase of \$372,605, but the percent of increase was only 1.96%. The boy on the street corner had an increase of only \$7, yet the percent of increase was a whopping 140%. An amount of increase or decrease is significant only when it is compared to something—that is, the original amount.

Example 6: A baby weighs 5 pounds at birth. Three months later the baby weighs 8 pounds. What is the percent of increase in body weight after three months?

Solution: The increase in weight is $8 - 5$ or 3 pounds, which must be compared (divided by) the original weight of 5 pounds. The percent of increase is $3/5$, which converts to the decimal 0.60, or a **60% increase**.

Example 7: It is normal for a baby to lose weight in the days immediately after birth. A baby that weights 5 pounds at birth drops to a low of 4.5 pounds before beginning to gain weight normally. What was the percent of decrease in weight?

Solution: The decrease in weight was $5.0 - 4.5$ or 0.5 pounds. This must be compared to the original weight of 5 pounds. The percent of decrease is $0.5/5$, which is 0.10, or a **10% decrease**.

Example 8: A child weighs 65 pounds at her annual checkup at the doctor's office. If she weighed 50 pounds at last year's visit, what was her percent of increase?

Solution: The amount of increase was $65 - 50$ or 15 pounds. Remember that the original weight was last year's weight, which was 50 pounds. The percent of increase was $15/50$, which is 0.30, or a **30% increase**.

Example 9: Business A, with revenue this year of \$386,547, posted an increase over last year's revenue \$354,962. Business B also experienced an increase in revenue from \$176,758 last year to \$196,824 this year. Although both businesses had an increase in revenue, which business had the greater increase in revenue, and which had the higher percent of increase?

Solution: The increase in revenue for Business A was $\$386,547 - \$354,962$ or \$31,585. The percent of increase was $\$31,585 / \$354,962$, which is 0.08898 or **8.90% increase**.

The increase in revenue for Business B was $\$196,824 - 176,758$ or \$20,066. The percent of increase was $\$20,066 / \$176,758$, which is 0.11352 or **11.35% increase**.

Business A had the greater increase in revenue, but Business B had the higher percent of increase.

Example 10: A computer system that retails for \$2000 is marked down by 25%. At checkout, an additional discount of 25% is marked off the price of the computer. Find the final sale price of the computer. Is this the same as a single 50% mark down?

Solution: The first mark down is 25% or 0.25 of \$2000 or \$500. The price after the first mark down is $\$2000 - \500 or \$1500. The second mark down is 25% of the \$1500, or 0.25 of \$1500, which is \$375. Therefore, the final sale price is $\$1500 - \375 or **\$1125**. A single mark down of 50% would be 0.50 of \$2000 or \$1000, leaving a sale price of \$1000, clearly a better buy.

EXERCISES

1. There are 16 students registered for a math class a week before the semester begins. A week later there are 20 students registered for the class. What is the percent of increase/decrease?
2. On the first day of the semester 20 students are attending in a class. At the end of the semester, there are only 16 students in the class. What is the percent of increase/decrease?
3. A student who makes a 90 on his first test in a class makes a 75 on the second test. Find the percent of increase/decrease.
4. A student who makes a 75 on the first test in a class makes a 90 on the second test. Find the percent of increase/decrease.
5. A man working for Company A is earning \$8 per hour. If he gets a raise of a dollar per hour, find the percent of increase?
6. A man working for Company B is earning \$12 per hour. If he gets a raise of a dollar per hour, find the percent of increase?
7. An executive, who is earning \$40,000 per year, receives an increase in salary of \$2,500 per year. What is her percent of increase in salary?
8. An executive, who is earning \$40,000 per year, receives an increase in salary of \$25,000 per year. What is her percent of increase in salary?
9. An executive, who is earning \$40,000 per year, is promoted to Chief Executive Officer whose salary will now be \$100,000 per year. What is her percent of increase in salary?
10. A dress that retails for \$160 is on sale for 60% off. What is the sale price of the dress?
11. A dress that retails for \$160 is on sale for 40% off, followed by an additional 20% reduction at check out. Find the sale price of the dress.
12. A dress that retails for \$160 is on sale for 20% off, followed by an additional 40% reduction at check out. Find the sale price of the dress.
13. Compare the sale prices of the previous 3 exercises. Which is the best sale?

ANSWERS TO EXERCISES

- 1.** 25%; **2.** 20%; **3.** 16.67%; **4.** 20%; **5.** 12.5%; **6.** 8.33%; **7.** 6.25%; **8.** 62.5%;
9. 150%; **10.** \$64; **11.** \$76.80; **12.** \$76.80;
- 13.** The single 60% mark down is the best sale (for the buyer!). In fact, if two consecutive discounts (or markups) are taken, it can be shown that the order of the discounts does not matter. That is, a 40% mark down followed by a 20% discount is the same as a 20% mark down followed by a 40% discount.