Check Your Answers on Percent Change!

To calculate percent change, compare the change in some quantity to the original amount. To find the change in values, subtract the original value from the new value. Divide the change in values by the absolute value of the original value, producing a decimal. Rewrite the decimal as a percentage because a percent is the number of parts per hundred.

$$\frac{\text{change in values}}{\text{original value}} = \frac{(\text{new value} - \text{original value})}{\text{original value}} = \text{decimal to be rewritten as percent}$$

Note: Formulas for percent change typically include multiplying by 100 to convert the decimal to a percentage. To simplify the process, that conversion is shown as a separate step and absolute value bars have not been included in the following exercises with positive original values.

1) 40% increase

Find the change in values: New value – Original value = 140 – 100 = 40
Compare the change in values to the original value: $\frac{40}{100}$
Rewrite this fraction as a decimal: 0.40
Convert to a percent by moving the decimal point two place values to the right: 0.40 = .40%
The percent change is a 40% increase.

(Recall that a percent is the number of parts per hundred.)

2) 100% increase

Although the process in the above solution could be used, note that the original amount 40 *doubled* (an increase of 40 – the original amount!) to the new amount of 80. This indicates an increase of 100%.

3) 50% decrease

Find the change in values: New value – Original value = 45 – 90 = –45
Compare the change in values to the original value: $\frac{-45}{90}$
Rewrite this fraction as a decimal: –0.50

(***Percent change*** is always shown as a positive number where a ***positive result*** indicates a ***percent increase*** and a ***negative result*** indicates a ***percent decrease***.)

Convert to a percent by moving the decimal point two place values to the right: 0.50 = .50%
The percent change is a 50% decrease.

(Recall that a percent is the number of parts per hundred.)

4) 57% decrease approximately

Find the change in values: New value – Original value = 24 – 56 = –32
Compare the change in values to the original value: $\frac{-32}{56}$
Rewrite this fraction as a decimal: $-0.\overline{571428}$ (The ***negative*** indicates a ***percent decrease***.)
Convert to a percent by moving the decimal point two place values to the right: 0.57.1428…
The percent change is approximately a 57% decrease.

(Recall that a percent is the number of parts per hundred.)

5) 30% increase

Simplify the process by using the equation above to determine the percent change:

$$\frac{\text{change in values}}{\text{original value}} = \frac{(\text{new value} - \text{original value})}{\text{original value}} = \frac{(3250 - 2500)}{2500} = \frac{750}{2500} = 0.30 = .30\%$$

(Again, percent is the number of parts per hundred.)

6) 60% increase

Use the above equation to determine the percent change:

$$\frac{\text{change in values}}{\text{original value}} = \frac{(\text{new value} - \text{original value})}{\text{original value}} = \frac{(240 - 150)}{150} = \frac{90}{150} = 0.60 = .60\%$$

(Again, percent is the number of parts per hundred.)

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7) 66.6% decrease approximately

Again, simplify the process by using the given equation to determine the percent change.

$$\frac{\text{change in values}}{\text{original value}} = \frac{(\text{new value} - \text{original value})}{\text{original value}} = \frac{(15-18)}{18} = \frac{-3}{18} = -0.666\overline{6} = -.66.66\ldots\%$$

(The ***negative*** indicates a ***percent decrease***.)

(Again percent is the number of parts per hundred.)

8) 46 students

In this case, the percent increase is provided and the unknown is the new value. It is possible to use the equation provided (as shown below), letting x represent the new value and rewriting the percent change as a decimal.

Use the equation: $\frac{(\text{new value} - \text{original value})}{\text{original value}} =$ percent change (*rewritten as a decimal*)

Substitute values: $\frac{x-40}{40} = 0.15$ (*Represent 15% increase as a decimal.*)

Multiply both sides by 40: $x - 40 = 6$

Add 40 to both sides: $x = 46$

The projected enrollment is 46 students.

9) 2.7 GPA

Let x represent the new value and rewrite the percent change as a decimal. Because the percent change is a ***percent decrease***, the decimal should be ***negative***.

Use the equation: $\frac{(\text{new value} - \text{original value})}{\text{original value}} =$ percent change (*rewritten as a decimal*)

Substitute values: $\frac{x-3.6}{3.6} = -0.25$ (*Represent 25% decrease as a decimal.*)

Multiply both sides by 3.6: $x - 3.6 = -0.9$

Add 3.6 to both sides: $x = 2.7$

The expected GPA in her final semester is 2.7 (although she could work hard to maintain or improve that grade point average!).

10) 20°C

In this case, the original value is unknown. So let x represent the original value and again, rewrite the ***percent decrease*** as a ***negative*** decimal.

Use the equation: $\frac{(\text{new value} - \text{original value})}{\text{original value}} =$ percent change (*rewritten as a decimal*)

Substitute values: $\frac{18-x}{x} = -0.10$ (*Represent 10% decrease as a decimal.*)

Multiply both sides by x: $18 - x = -0.10x$

Add x to both sides: $18 = -0.10x + x$

Combine like terms: $18 = 0.90x$

Divide both sides by 0.9: $20 = x$

The original temperature was 20°C.

Note: If the original value could have been a negative number, it would have been necessary to include absolute value bars in the denominator and solve appropriately.

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