

Chapter 2 Extra Lesson #3 PERCENT OF CHANGE

You purchase a pair of shoes that originally cost \$40 for only \$30.

a) How much did you save?

$$\begin{array}{r} \$40 \\ - 30 \\ \hline \$10 \leftarrow \text{change} \end{array}$$

b) Change your answer from part (a) to a percent (money saved/original cost).

$$\frac{10}{40} = \frac{p}{100}$$

$$\begin{aligned} 40 \cdot p &= 10 \cdot 100 \\ 40p &= 1000 \\ \frac{40p}{40} &= \frac{1000}{40} \\ p &= 25\% \end{aligned}$$

Finding the percent of change is using the **ratio** of the **amount of change** to the **original amount**.

Example 1 $\frac{\text{change}}{\text{original}} = \frac{p}{100}$

A retailer changed the price of ballpoint pens from \$0.40 to \$0.45 each. What was the percent of change? Is this a percent of increase or decrease?

$$\begin{array}{r} \$0.45 \\ - 0.40 \\ \hline .05 \leftarrow \text{change} \end{array}$$

$$\begin{aligned} \frac{.05}{.40} &= \frac{p}{100} \\ .40p &= .05 \cdot 100 \\ \frac{.40p}{.40} &= \frac{5}{.40} \\ p &= 12.5\% \end{aligned}$$

$$p = 12.5\% \text{ of increase}$$

Example 2

A pair of pants that originally cost \$40 are now on sale for \$28. Find the percent of change. Is this a percent of increase or decrease?

$$\begin{array}{r} \$40 \\ -28 \\ \hline \$12 \leftarrow \text{change} \end{array}$$

change $\frac{12}{40}$ \leftrightarrow $\frac{p}{100}$
 orig.

$$40 \cdot p = 12 \cdot 100$$

$$\frac{40p}{40} = \frac{1200}{40}$$

$$p = 30\% \text{ decrease}$$

Sometimes an increase or decrease is given as a percent, rather than an amount.

Two applications of percent of change are

discounts and sales tax.

price goes down

price goes up

Example 3

Amy bought a television that had an original price of \$600. Because she worked at the store, she received a 15% discount. What was the discounted price?

$$\begin{array}{r} \frac{x}{600} = \frac{15}{100} \\ 100x = 9000 \\ \frac{100x}{100} = \frac{9000}{100} \end{array}$$

x = \$90 discount

$$\begin{array}{r} \$600 \text{ orig.} \\ - 90 \text{ disc.} \\ \hline \end{array}$$

$$\$510 \text{ disc. price}$$

Example 4

Luke wants to purchase a new TI-84 graphing calculator at Staples. It costs \$130^{orig.}, and there is a sale for 25% off. What is the price that Luke will pay? ^p

$$\frac{x}{130} = \frac{25}{100}$$

$$100 \cdot x = 130 \cdot 25$$

$$\frac{100x}{100} = \frac{3250}{100}$$

$$x = 32.50 \leftarrow \text{discount}$$

$$\begin{array}{r} \$130.00 \\ - 32.50 \\ \hline \boxed{\$97.50} \end{array}$$

Example 5

Tim bought a pair of running shoes for \$75^{orig.}. There was a 6%^p sales tax. Find the tax and the total price that Tim paid.

$$\frac{x}{75} = \frac{6}{100}$$

$$100 \cdot x = 75 \cdot 6$$

$$\frac{100x}{100} = \frac{450}{100}$$

$$\boxed{x = \$4.50 \leftarrow \text{tax}}$$

$$\begin{array}{r} \$75.00 \\ + 4.50 \\ \hline \boxed{\$79.50 \text{ total price}} \end{array}$$

Example 6 ✖ ✖

Allie is purchasing a new laptop that originally costs \$599. She is getting a 15% student discount and has to pay a 7% sales tax.

What is the total price?

discount

$$\begin{array}{r} \text{orig} = 599 \\ p = 15 \\ \hline \begin{array}{r} x \quad \nearrow \quad 15 \\ 599 \quad \nwarrow \quad 100 \end{array} \\ \hline 100 \cdot x = 599 \cdot 15 \\ 100x = 8985 \\ \hline 100 \quad 100 \\ x = 89.85 \leftarrow \text{disc.} \end{array}$$

$$\begin{array}{r} \$599.00 \\ - 89.85 \\ \hline \$509.15 \\ \text{disc. price} \end{array}$$

sales tax

$$\begin{array}{r} \text{orig} = 509.15 \\ p = 7 \\ \hline \begin{array}{r} x \quad \nearrow \quad 7 \\ 509.15 \quad \nwarrow \quad 100 \end{array} \\ \hline 100 \cdot x = 509.15 \cdot 7 \\ 100x = 3564.05 \\ \hline 100 \quad 100 \\ x = 35.6405 \\ \text{tax} = 35.64 \end{array}$$

$$\begin{array}{r} \$509.15 \\ + 35.64 \\ \hline \boxed{\$544.79} \\ \text{total price} \end{array}$$

Example 7

customers = 100% + 25% = 125% ← markup

Old Navy prices their clothes 25% above the wholesale price. If the retail price of a jacket is \$49, what was the wholesale price?

we pay retail = markup / 100
store pays wholesale

$$\begin{array}{r} 49 \quad \nearrow \quad 125 \\ x \quad \nwarrow \quad 100 \end{array}$$

$$125 \cdot x = 49 \cdot 100$$

$$\begin{array}{r} 125x = 4900 \\ \hline 125 \quad 125 \end{array}$$

$$\boxed{x = \$39.20 \leftarrow \text{wholesale price}}$$

Example 8

$$100\% + 18\% = 118\%$$

A store owner marks her goods 18% above the wholesale price. If the retail price of an item is \$28.60, what is the item's wholesale price?

$$\frac{\text{retail}}{\text{wholesale}} = \frac{\text{markup}}{100}$$

$$\frac{28.60}{x} = \frac{118}{100}$$

$$118 \cdot x = 28.60 \cdot 100$$

$$\frac{118x}{118} = \frac{2860}{118}$$

$$x = 24.2372... \rightarrow$$

\$24.24 = wholesale price

Example 9

$$\frac{\text{change}}{\text{original}} = \frac{p}{100}$$

Fill out the chart below.

$$\frac{25}{200} = \frac{p}{100}$$

$$\frac{\text{change}}{200} = \frac{2500}{200}$$

$p = 12.5$

Original Amount	Later Amount	Increase or Decrease?	Amount of Increase or Decrease	Percent of Increase or Decrease
\$200	\$175 ↓	decrease	$\frac{200}{-175}$ \$25	12.5%
\$500	$\frac{500}{+110}$ \$610	Increase	\$110	22%
$\frac{63.75}{-11.25}$ \$75	\$63.75	Decrease	\$11.25	15%

$$\frac{x}{500} = \frac{22}{100}$$

$$\frac{100x}{100} = \frac{11000}{100}$$

$x = 110$
change

$$\frac{11.25}{75} = \frac{p}{100}$$

$$\frac{75p}{75} = \frac{1125}{75}$$

$p = 15\%$