

Markup and Discount

Markup

The equation used in markup problems is based on the following equation:

$$S = C + M$$

In this equation **S** is the selling price. This is the price the customer pays. **C** is the cost. This is the price the store owner pays. **M** is the amount of the markup.

The markup is calculated as a percentage of the cost. The percentage is called a rate.

$$\text{Markup} = \text{Markup Rate} \times \text{Cost}$$

Our equation can now be rewritten substituting Markup Rate \times Cost for Markup.

$$S = C + (r \times C) \quad S = C + rC \quad \text{Selling Price} = \text{Cost} + (\text{Markup Rate} \times \text{Cost})$$

EXAMPLE: A store owner buys a lawnmower for \$150 and sells it for \$225. What is the markup rate?

S, C and r are variables. We must know the values for two of them to solve the equation.

1. Selling price is given (\$225).
2. Cost is given (\$150).
3. Markup Rate (r) is not given.

$$\begin{array}{rcc} S & = & C + rC \\ \downarrow & & \downarrow \quad \downarrow \\ 225 & = & 150 + r(150) \\ 225 & = & 150 + 150r \end{array}$$

SOLVE:

$$\begin{array}{r} 225 = 150 + 150r \\ -150 + 225 = -150 + 150 + 150r \\ 75 = 150r \end{array}$$

$$\frac{75}{150} = \frac{150r}{150}$$

$$\begin{array}{ll} 0.5 = r & \text{Convert to a percent} \\ 0.5 (100\%) = 50\% & \text{The markup rate is 50\%.} \end{array}$$

EXAMPLE: The selling price of a book is \$15.90 and the markup rate is 20%. What is the cost of the book?

1. Selling price is given \$15.90.
2. Cost is not given.
3. Markup rate is given (20%).

$$\begin{array}{r}
 S = C + rC \\
 \downarrow \quad \downarrow \\
 15.90 = C + (20\%)C \\
 15.90 = C + 0.2C
 \end{array}$$

REMEMBER that the coefficients of C are 1 and 0.2. You must add these together.

$$\begin{array}{l}
 15.90 = 1C + 0.2C \\
 15.90 = (1 + .2)C \quad (1.0 + 0.2) \text{ is } 1.2 \\
 15.90 = 1.2C
 \end{array}$$

$$\frac{15.90}{1.2} = \frac{1.2C}{1.2}$$

$$13.25 = C$$

The cost is \$13.25.

EXAMPLE: The manager of a store buys a shirt for \$12 and applies a markup rate of 60%. What is the Selling Price?

1. The selling price is missing.
2. The cost is given (\$12).
3. The markup rate is given (60%)

$$\begin{array}{l}
 S = C + rC \\
 S = 12 + 60\%(12) \\
 S = 12 + 0.6(12) \\
 S = 12 + 7.2 \\
 S = 19.2 \quad \text{The selling price is } \$19.20.
 \end{array}$$

DISCOUNT:

The equation used in discount problems is based on the following equation.

$$S = R - D$$

In this equation **S** is the **Sale Price** of an item, **R** is the **Regular Price** of the item, and **D** is the amount of the **Discount**.

The discount is calculated as a percentage of the regular price.

$$\text{Discount} = \text{Discount Rate} \times \text{Regular Price}$$

$$\mathbf{D = r \times R}$$

Notice lower case letter is the rate and the uppercase R is the Regular Price.

Our equation can now be rewritten substituting Discount Rate \times Regular Price for Discount.

$$\mathbf{\text{Sale Price} = \text{Regular Price} - (\text{Discount Rate} \times \text{Regular Price})}$$

$$\mathbf{S = R - (r \times R)}$$

$$\mathbf{S = R - rR}$$

EXAMPLE: A coat regularly sells for \$60. It is on sale for \$45. Find the discount rate.

S, R and r are variables. We must know the values for 2 of the 3 before we can solve.

1. The Sale Price is given (\$45).
2. The Regular Price is given (\$60).
3. The Discount Rate is not given.

$$S = R - rR$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$45 = 60 - r60$$

$$45 = 60 - 60r$$

SOLVE:

$$-60 + 45 = -60 + 60 - 60r$$

$$-15 = -60r$$

$$\frac{-15}{-60} = \frac{-60r}{-60}$$

$$\frac{1}{4} = r$$

$$\frac{1}{4} = r \quad (\text{Note: Remember to convert Discount Rate to a percent})$$

$$\frac{1}{4} \times 100\% = \frac{100}{4} \% = 25\%$$

The discount rate is 25%

EXAMPLE: A car is on sale for \$11,000. If the discount rate is 15% . What was the regular price?

1. The Sale Price is given (\$11,000).

2. The Regular Price is missing.
3. The Discount Rate is given (15%).

$$\begin{array}{r}
 S = R - rR \\
 \downarrow \quad \downarrow \\
 11,000 = R - 15\%R \\
 11,000 = R - 0.15R
 \end{array}$$

REMEMBER that the coefficients of R are 1 and -0.15 . You must add these together. You could also say that you were subtracting 1 and 0.15.

$$\begin{array}{l}
 11,000 = 1R - 0.15R \\
 11,000 = (1 - 0.15) R \quad \text{Use } 1.00 - 0.15 \\
 11,000 = 0.85R
 \end{array}$$

$$\frac{11,000}{0.85} = \frac{0.85R}{0.85}$$

$$\$12,941.18 = R$$

The Regular Price was \$12,941.18 rounded to the nearest cent.

EXAMPLE: A pair of boots regularly sells for \$60. The store manager puts them on sale using a discount rate of 30%. What is the sale price?

1. The Sale Price is not given.
2. The Regular Price is given (\$60).
3. The Discount Rate is given (30%).

$$\begin{array}{r}
 S = R - rR \\
 \downarrow \downarrow \downarrow \\
 S = 60 - 30\%(60) \\
 S = 60 - 0.3(60)
 \end{array}$$

SOLVE:

$$\begin{array}{l}
 S = 60 - 18 \\
 S = 42
 \end{array}$$

The Sale Price is \$42.