Basic Percent Calculation

• A customer paid \$54.00 for a jacket, which included an 8% sales tax. What was the price of the jacket before tax?

Solution:

Let x be the original price of the jacket. The total price is the original price plus 8% of the original price:

$$x + 0.08x = 54.00$$

$$1.08x = 54.00$$

Divide both sides by 1.08:

$$x = \frac{54.00}{1.08} = 50$$

Final Answer: 50

• A store is having a sale. A jacket originally costs \$85. It is marked down by 20%. What is the sale price of the jacket?

A. \$60

B. \$63

C. \$68

D. \$72

Solution
Calculate the discount:

$$\text{Discount} = 20\% \times 85 = 0.20 \times 85 = \$17$$

Subtract from the original price:

$$\text{Sale Price} = 85 - 17 = \$68$$

Answer: C) \$68

Percent Increase or Decrease

• The population of a town increased from 12,500 in 2010 to 15,000 in 2020. What was the percent increase in the population?

Solution:
The formula for percent change is $\frac{\text{New}-\text{Old}}{\text{Old}} \times 100\%$:

$$\text{Increase} = 15,000 - 12,500 = 2,500$$

$$\text{Percent Increase} = \frac{2,500}{12,500} = 0.2$$

Convert to percentage: $0.2 \times 100 = 20\%$.
Final Answer: 20%

• A town's population was 24,000 in 2010 and grew to 30000 by 2020. What was the percent increase in population?

A. 20%

B. 25%

C. 30%

D. 35%

Solution
Use the percent change formula:

$$\%\ \text{Change} = \frac{\text{New} - \text{Original}}{\text{Original}} \times 100$$

$$\%\ \text{Increase} = \frac{30{,}000 - 24{,}000}{24{,}000} \times 100 = \frac{6{,}000}{24{,}000} \times 100 = 25\%$$

Answer: B) 25%

• A smartphone's price dropped from \$960 to \$720. By what percentage did the price decrease?

A. 20%

B. 25%

C. 28%

D. 33%

Solution

$$\%\ \text{Decrease} = \frac{960 - 720}{960} \times 100 = \frac{240}{960} \times 100 = 25\%$$

Answer: B) 25%

Percent Decrease (Sale Price)

• An item is on sale for 30% off the list price of \$80.00. If there is a 5% sales tax on the discounted price, what is the total cost?

Solution:
First, calculate the sale price:

$$\text{Sale Price} = 80 \times (1 - 0.30) = 80 \times 0.70 = 56$$

Next, add the 5% tax to the sale price:

$$\text{Total Cost} = 56 \times (1 + 0.05) = 56 \times 1.05 = 58.80$$

Final Answer: 58.80

Percent of a Percent

• In a certain group, 40% of the members are engineers. If 20% of the engineers have a master's degree, what percent of the total group are engineers with a master's degree?

Solution:

Multiply the two percentages (expressed as decimals):

$$0.40 \times 0.20 = 0.08$$

Convert back to a percentage: $0.08 \times 100 = 8\%$. *Final Answer:* 8%

Algebraic Percentages

• The number k is 150% of the number m. The number m is what percent of k?

Solution:

Write the relationship as an equation:

$$k = 1.5m$$

To find what percent m is of k, solve for m:

$$m = \frac{k}{1.5} = \frac{1}{1.5}k$$

$$\frac{1}{1.5} = \frac{2}{3} \approx 0.6667$$

Convert to percentage: 66.7% (or $66\frac{2}{3}\%$).
Final Answer: 66.7% (or 2/3)

Successive Percent Changes

• A stock's value increased by 20% on Monday and then decreased by 20% on Tuesday. What is the total percent change from the start of Monday to the end of Tuesday?

Solution:

Let the starting value be 100.
After Monday:

$$100 \times 1.20 = 120$$

After Tuesday:

$$120 \times 0.80 = 96$$

Total change:

$$96 - 100 = -4$$

A decrease of 4 from 100 is a 4% decrease.

Final Answer: 4% decrease

• A laptop costs \$800. Its price increases by 10% one year, then decreases by 10% the following year. What is the final price of the laptop?

A. \$792

B. \$800

C. \$808

D. \$816

Solution After a 10% increase:

$$800 \times 1.10 = \$880$$

After a 10% decrease:

$$880 \times 0.90 = \$792$$

Note: Successive percent changes do ***not*** *cancel out — the base changes each time.*

Answer: A) \$792

Exponential Growth (Percent Rate) and Compounded

• The value of an investment is modeled by the function $V(t) = 5000(1.04)^t$, where t is the number of years since the investment was made. By what percentage does the investment grow each year?

Solution:

In the exponential growth formula $A = P(1 + r)^t$, the growth rate is r.

Here, $1 + r = 1.04$, so $r = 0.04$.

Convert 0.04 to a percentage: 4%.

Final Answer: 4%

• A savings account has a balance of \$2,000. It earns 5% interest compounded annually. Which expression represents the account balance after t years?

A. $2{,}000 + 0.05t$

B. $2{,}000(1.05)^t$

C. $2{,}000(0.05)^t$

D. $2{,}000(1 + 5t)$

Solution The compound interest formula is:

$$A = P(1 + r)^t$$

where $P = 2{,}000$ and $r = 0.05$:

$$A = 2{,}000(1 + 0.05)^t = 2{,}000(1.05)^t$$

Answer: B) $2{,}000(1.05)^t$

Proportions and Percentages

• If 25% of a number n is 40, what is 15% of n?

Solution:

First, find n:

$$0.25n = 40 \implies n = \frac{40}{0.25} = 160$$

Next, find 15% of 160:

$$0.15 \times 160 = 24$$

Final Answer: 24

• 40 is what percent of 160?

A. 20%

B. 25%

C. 30%

D. 40%

Solution
Let p be the percent:

$$\frac{p}{100} \times 160 = 40$$

$$p = \frac{40}{160} \times 100 = 25\%$$

Answer: B) 25%

Percent Increase in Geometry

• If the side length of a square is increased by 10%, by what percent does the area of the square increase?

Solution:

The area of a square is $A = s^2$. If the side length s increases by 10%, the new side length is $1.1s$. The new area is:

$$A_{\text{new}} = (1.1s)^2 = 1.21s^2$$

The area increased from $1s^2$ to $1.21s^2$, which is a 0.21 increase, or 21%. *Final Answer:* 21%

Percentage and Data Tables

• In a survey of 200 people, 120 said they prefer coffee, and the rest said they prefer tea. Of those who prefer coffee, 30% add sugar. How many people in the survey prefer coffee and add sugar?

Solution:

Start with the number of people who prefer coffee: 120.
Calculate 30% of that group:

$$120 \times 0.30 = 36$$

Final Answer: 36

• The table below shows the results of a survey of 400 students about their preferred subject.

Subject	**Number of Students**
Mathematics	120
Science	100
English	80
History	60
Art	40
Total	400

What percent of students preferred Mathematics or Science?

A. 45%

B. 50%

C. 55%

D. 60%

Solution

$$\text{Mathematics} + \text{Science} = 120 + 100 = 220$$

$$\text{Percent} = \frac{220}{400} \times 100 = 55\%$$

Answer: C) 55%

Problems adapted from the College Board SAT Question Bank and released SAT practice tests.