

Definition:

- **Percent:** means “per hundred.”

Percent Formulas:

- Sales tax amount

$$\text{sales tax amount} = \text{tax rate} \times \text{item's cost.}$$

- Discount amount

$$\text{discount amount} = \text{discount rate} \times \text{original cost.}$$

- Sale Price

$$\text{sale price} = \text{original price} - \text{discount amount.}$$

- Percentage increase

$$\text{percentage increase} = \frac{\text{amount of increase}}{\text{original amount}}.$$

- Percentage decrease

$$\text{percentage decrease} = \frac{\text{amount of decrease}}{\text{original amount}}.$$

Important Properties:

- To change a percent to a fraction: place the percentage over 100. For example $42\% = \frac{42}{100}$
- To change a percent to a decimal: move the decimal two places to the left. For example, $56\% = .56$
- To change a decimal to a percent: move the decimal two places to the right. For example, $.32 = 32\%$ and $1.13 = 113\%$.
- The word “of” indicates multiplication.
- Always change a percentage into a decimal before placing it in the mathematical equation.

PROBLEMS

1. 34 is what percent of 50?

Let $x =$ the percentage

$$\begin{aligned} 34 &= 50x \\ \frac{34}{50} &= x \\ .68 &= x \end{aligned}$$

34 is 68% of 50

2. 32% of 94 is what?

Let $x =$ the number

$$\begin{aligned} .32(94) &= x \\ 30.08 &= x \end{aligned}$$

32% of 94 is 30.08

3. A mathematics test had 80 questions, each worth the same value. Wendy answered 55 of the questions correctly. What percent of the questions did she answer correctly?

Let $x =$ the percentage of questions answered correctly.

$$\begin{aligned} 55 &= 80x \\ \frac{55}{80} &= x \\ .6875 &= x \end{aligned}$$

68.75% of the questions answered correctly

4. A basketball team wins 105 games, which is 70% of the games played. How many games were played?

Let $x =$ the total number of games played.

$$\begin{aligned} .70x &= 105 \\ x &= \frac{105}{.70} \\ x &= 150 \end{aligned}$$

There were 150 total games.

5. If a dress that originally sold for \$35 is on sale for \$28, what is the discount rate?

Let $x =$ discount rate of the dress.

$$\begin{aligned} \text{percentage discount} &= \frac{\text{amount of decrease}}{\text{original amount}} \\ x &= \frac{35 - 28}{35} \\ x &= \frac{7}{35} \\ x &= .2 \end{aligned}$$

The dress is discounted 20%

6. A house that sells for \$94,000 requires a 20% down payment. What is the amount of the down payment?

Let x = amount of the down payment.

$$x = .20(94,000)$$

$$x = 18,800$$

\$18,800 is the required down payment

7. If a suit originally priced at \$452 is offered on sale for 35% off, find the sale price of the suit.

Let x = sale price of the suit.

sale price = original price – discount amount

$$x = 452 - .35(452)$$

$$x = 452 - 158.20$$

$$x = 293.80$$

The sale price of the suit is \$293.80

8. If a dress is on sale for \$36.80 and this is 25% off the original price, find the original price of the dress.

Let x = the original price of the dress.

sale price = original price – discount amount

$$36.80 = x - .20x$$

$$36.80 = .80x$$

$$\frac{36.80}{.80} = x$$

$$46 = x$$

The original price of the dress is \$46

9. A round-trip ticket costs \$340 without tax. If the tax rate is $5\frac{1}{2}\%$, what is the total cost of the ticket?

Let x = the total cost of the ticket.

NOTE: $5\frac{1}{2}\% = 5.5\% = .055$.

total cost = cost of ticket + sales tax

$$x = 345 + .055(340)$$

$$x = 345 + 18.7$$

$$x = 363.7$$

The total cost is \$363.70

10. Jim paid \$330 for a bench to sell at his antique shop. He wants to price it so that he can offer a 10% discount and still make 20% profit off the price he paid for it. At what price should the bench be marked?

Let x = the price the bench should be marked.

Profit Jim wants to make = $.20(330) = \$66$.

Price willing to sell the bench:

$$\$330 + \$66 = \$396.$$

NOTE: \$396 is the price after Jim offers a 10% discount.

$$396 = x - .10x$$

$$396 = .90x$$

$$440 = x$$

Jim should mark the bench at \$440

11. If income tax is \$3,502 plus 28% of taxable income over \$28,000, how much is the income tax on a taxable income of \$35,000?

Let x = income tax on \$35,000.

$$x = 3502 + .28(35,000 - 28,000)$$

$$x = 3502 + .28(7,000)$$

$$x = 3502 + 1960$$

$$x = 5462$$

Income tax is \$5,462.

12. In 1999, the number of households on-line was 56.7 million. In 2000, the number jumped to 66.6 million. What is the percentage increase of on-line households from 1999 to 2000?

Let x = percentage increase of on-line households.

$$\text{percentage increase} = \frac{\text{amount of increase}}{\text{original amount}}$$

$$x = \frac{66.6 - 56.7}{56.7}$$

$$x = \frac{9.9}{56.7}$$

$$x = .1746301$$

17.46% increase of on-line households.