**Definition**:

- **Percent:** means "per hundred."

**Percent Formulas**:

- Sales tax amount

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

- Discount amount

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

- Sale Price

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

- Percentage increase

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

- Percentage decrease

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

**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

$$34 = 50x$$
$$\frac{34}{50} = x$$
$$.68 = x$$

34 is 68% of 50

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2. 32% of 94 is what?

Let $x$ = the number

$$.32(94) = x$$
$$30.08 = x$$

32% of 94 is 30.08

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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.

$$55 = 80x$$
$$\frac{55}{80} = x$$
$$.6875 = x$$

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.

$$.70x = 105$$
$$x = \frac{105}{.70}$$
$$x = 150$$

There were 150 total games.

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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.

$$\text{percentage discount} = \frac{\text{amount of decrease}}{\text{orginial amount}}$$
$$x = \frac{35 - 28}{35}$$
$$x = \frac{7}{35}$$
$$x = .2$$

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.

$$x = .20(94,000)$$
$$x = 18,800$$

$\boxed{\$18{,}800 \text{ is the required down payment}}$

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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
$$x = 452 - .35(452)$$
$$x = 452 - 158.20$$
$$x = 293.80$$

$\boxed{\text{The sale price of the suit is } \$293.80}$

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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
$$36.80 = x - .20x$$
$$36.80 = .80x$$
$$\frac{36.80}{.80} = x$$
$$46 = x$$

$\boxed{\text{The original price of the dress is } \$46}$

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
$$x = 345 + .055(340)$$
$$x = 345 + 18.7$$
$$x = 363.7$$

$\boxed{\text{The total cost is } \$363.70}$

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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.

$$396 = x - .10x$$
$$396 = .90x$$
$$440 = x$$

$\boxed{\text{Jim should mark the bench at } \$440}$

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.