# Word Problems Using Proportions

"It costs $3.00 for 5 litres of cola. How much does it cost to purchase 20 litres of cola?"

1.  Set Up a Proportion

    Comparing Two Ratios or Rates Directly
    $$\frac{\$3.00}{5\,\text{litres}}=\frac{\$\text{cost}}{20\,\text{litres}}$$

    Comparing Same Quantities Across Both Ratios
    $$\frac{\$3.00}{\$\text{cost}}=\frac{5\,\text{litres}}{20\,\text{litres}}$$

2.  Look For a Pattern or Use Cross-Multiplication To Solve

    Using a Pattern
    $$\text{since } 5\times4 = 20$$
    $$\text{therefore } 3\times4 = 12$$

    Cross-Multiplication
    $$5c = 3\times20$$
    $$\frac{5c}{5} = \frac{60}{5}$$
    $$c = 12$$

3.  Answer the Question

    "It costs $12.00 to purchase 20 litres of cola."

4.  Examples

A.  "The ratio of cats to dogs in a pet store is 3:2. If there are 18 cats in the store, how many dogs are there?"

    Set up a proportion comparing the number of cats to dogs, $\frac{3\,\text{cats}}{2\,\text{dogs}}=\frac{18\,\text{cats}}{d\,\text{dogs}}$ .

    Since $3\times6=18$ , therefore $2\times6=12$ . There are 12 dogs in the store.

B.  "The exchange rate for Canadian/US dollars is $100CDN for $83USD. If you exchange $350CDN for US funds, how much do you have to spend?"

    Set up a proportion comparing the value of $CDN to $USD, $\frac{100\,\text{CDN}}{83\,\text{USD}}=\frac{350\,\text{CDN}}{d\,\text{USD}}$ .

    Cross-multiply to solve for *n*.
    $$100d = 83\times350$$
    $$\frac{100d}{100} = \frac{29\,050}{100}$$
    $$d = 290.5$$
    You can spend $290.50USD.

C.  "It takes a team of construction workers 5 days to pave 2 km of road. At this rate, how many kilometres of road can they pave in two weeks?"

    Set up a proportion comparing the length of road to the number of days, $\frac{2\,\text{km}}{5\,\text{days}}=\frac{n\,\text{km}}{14\,\text{days}}$ .

    Cross-multiply to solve for *n*.
    $$5n = 2\times14$$
    $$\frac{5n}{5} = \frac{28}{5}$$
    $$n = 5.6$$
    The workers can pave 5.6 km in two weeks.