Unit 41 Word Problems Using Ratios, Rates, and Proportions

1. A blueprint uses 1 inch to represent 8 feet. A room on this blueprint is represented as 2.5 inches by 2.5 inches. Carpet costs $5.00 per square foot. What would it cost to carpet this room?

Unknown:
total cost to carpet room

Given:
blueprint room is 2.5" by 2.5"
1 inch = 8 feet
carpet costs $5.00/square foot

This answer makes sense because $2,000/$5 = 400 and (400 sq. ft.)/(20 ft.) = 20 ft.

Solution:
length of room in feet $\frac{1 \text{ inch}}{2.5 \text{ inches}} = \frac{8 \text{ feet}}{x \text{ feet}}$

$x = (2.5)(8)$

$x = 20$ feet

area of room

$A = lw = (20\,\text{ft.})(20\,\text{ft.}) = 400$ sq. ft.

cost of carpet

$C = (\text{cost per sq. ft.})(\text{sq. ft.}) = \$5.00(400) = \boxed{\$2{,}000}$

2. Last week Bill earned $210 for a 30-hour week. What was his pay rate? What would he have earned for a 40-hour week?

Unknown:
rate of pay
earnings for 40 hours

Given:
earnings = $210
hours worked = 30 hours

These answers make sense because 10 more hours at $7 per hour is an additional $70 and $280 - $210 is $70.

Solution:
pay rate = $\frac{\text{dollars earned}}{\text{hours worked}} = \frac{\$210}{30\,\text{hours}}$

$= \$7$ per hour

earnings = rate x hours worked

$= (7)(40)$

$= \$280$

3. Two students washed 5 cars in one hour. How much would 6 students earn in an hour charging $5.00 to wash a car?

Unknown:
cars washed by 6 students
total money earned

Given:
2 students wash 5 cars in 1 hour
washing earns $5.00 per car

The answer makes sense because
3 times as many students (6/2 = 3) washed three times as many cars (15/5 = 3)

Solution:
cars washed: $\frac{2 \text{ students}}{6 \text{ students}} = \frac{5 \text{ cars}}{x \text{ cars}}$

$2x = (6)(5)$

$x = 15$ cars

money earned = price x quantity

$= \$5.00 \times 15 = \boxed{\$75.00}$

Look at the proportions on this page. Note how the numerator and denominator of each of its fractions have the same label.