NS7-73 Using Proportions to Solve Percent Problems

If 5 subway tickets cost $4, how much do 20 tickets cost? Write the ratio of tickets to dollars as a fraction, then find an equivalent fraction by multiplying.

Step 1: $\dfrac{4}{5} = \dfrac{?}{20}$	Step 2: $\dfrac{4}{5} \overset{\times 4}{\underset{\times 4}{=}} \dfrac{}{20}$	Step 3: $\dfrac{4}{5} \overset{\times 4}{\underset{\times 4}{=}} \dfrac{16}{20}$

1. Solve the ratio. Draw arrows and show what you multiply by.

   a) $\dfrac{3}{4} = \dfrac{}{20}$

   b) $\dfrac{1}{5} = \dfrac{}{15}$

   c) $\dfrac{3}{5} = \dfrac{}{35}$

   d) $\dfrac{4}{7} = \dfrac{}{49}$

   e) $\dfrac{3}{8} = \dfrac{}{24}$

   f) $\dfrac{2}{3} = \dfrac{}{18}$

   g) $\dfrac{13}{20} = \dfrac{}{100}$

   h) $\dfrac{5}{9} = \dfrac{}{72}$

2. Solve the ratio as you did in Question 1. Note: The arrows will point from right to left.

   a) $\dfrac{15}{} = \dfrac{3}{4}$

   b) $\dfrac{12}{} = \dfrac{2}{5}$

   c) $\dfrac{15}{} = \dfrac{3}{7}$

   d) $\dfrac{12}{18} = \dfrac{}{3}$

3. For each question, you will have to reduce the fraction given before you can find the equivalent fraction. The first one has been started for you.

   a) $\dfrac{8}{10} = \dfrac{4}{5} = \dfrac{}{15}$

   b) $\dfrac{4}{6} = \dfrac{}{} = \dfrac{}{15}$

   c) $\dfrac{40}{100} = \dfrac{}{} = \dfrac{}{45}$

   d) $\dfrac{15}{18} = \dfrac{}{} = \dfrac{}{30}$

   e) $\dfrac{70}{100} = \dfrac{}{} = \dfrac{}{90}$

   f) $\dfrac{50}{75} = \dfrac{}{} = \dfrac{}{36}$

4. Write a proportion to represent the percent problem. Solve the proportion.

   a) What percent of 20 is 4? part ____   whole ____   percent ____ $\dfrac{}{} = \dfrac{}{100}$

   b) If 6 is 25%, what is 100%? part ____   whole ____   percent ____ $\dfrac{}{} = \dfrac{}{100}$

   c) What is 17% of 10? part ____   whole ____   percent ____ $\dfrac{}{} = \dfrac{}{100}$

   d) What is 17% of 50? part ____   whole ____   percent ____ $\dfrac{}{} = \dfrac{}{100}$

   e) 4 is what percent of 5?

   f) 6 is 25% of what number?

   g) 24 is 80% of what number?

5. Explain why the proportion $\frac{3}{25} = \frac{x}{100}$ will be easy to solve.

6. Write a proportion $\frac{a}{b} = \frac{x}{100}$ to represent each problem. Solve by first writing $\frac{a}{b}$ in lowest terms.

a) What percent of 15 is 3?   b) What percent of 24 is 6?   c) What percent of 30 is 12?

7. Write a proportion to represent the percent problem. Find an equivalent ratio to rewrite the proportion. Solve the new proportion.

a) If 6 is 40%, what is 100%?   part __6__   whole __?__   percent __40__ $\frac{6}{?} = \frac{40}{100}$ $\frac{6}{?} = \frac{2}{5}$

Hint: Start by writing $\frac{40}{100}$ as an equivalent ratio with numerator 2.

b) What is 75% of 48?   part ____   whole ____   percent ____ $\frac{}{} = \frac{}{100}$ $\frac{}{} = \frac{}{}$

Hint: Start by writing 75% as an equivalent ratio with denominator 4.

c) What percent of 60 is 45?   part ____   whole ____   percent ____ $\frac{}{} = \frac{}{100}$ $\frac{}{} = \frac{}{}$

Hint: Start by writing $\frac{45}{60}$ as an equivalent ratio with denominator 20.

d) What is 64% of 15?   part ____   whole ____   percent ____ $\frac{}{} = \frac{}{100}$ $\frac{}{} = \frac{}{}$

Hint: Start by writing $\frac{64}{100}$ as an equivalent ratio with denominator 5.

8. Explain why the proportions in Question 7 were more challenging to solve than those in Question 4, parts a)–e).

9. Solve.

a) 9 is 60% of what number?   b) What is 75% of 24?
c) 16 is 80% of what number?   d) What percent of 360 is 72?

10. If 5 of 20 cars are red, what percent of the cars are red? What percent are not red?

11. If 35% of 120 students use an MP3 player, how many of the students use an MP3 player?

12. Ten students in a class (40% of the class) bike to school. How many students are in the class?

NS7-74 Percent Problems

1. Calculate.

   a) 90% − 75% + 34% = _____
   b) 39% + _____ = 100%
   c) 86% − _____ = 14%

2. What is the sales tax where you live? _____

   Calculate the amount of tax you would pay on each price.

   a) $20 _____
   b) $35 _____
   c) $82.75 _____
   d) $93.24 _____

3. In the school elections, $\frac{3}{5}$ of the students voted for Laura and 12% voted for Zamir.
   The rest voted for Shaw-Han. What percent voted for Shaw-Han?

4. A painter spent $500.00 on art supplies. Complete the chart.

Item	Money spent		
	Fraction	Percent	$ Amount
Brushes			$125.00
Paint	$\frac{3}{10}$		
Canvas		45%	

5. A student hopes to raise $200 for his favourite charity. He has already raised $60
   by having a garage sale. What percent of the $200 does he still need to raise?

6. Complete the chart.

Item	Regular Price	Discount (percent)	Discount ($ amount)	Sale Price
Sweater	$52.00	10%	$5.20	$52.00 − $5.20 = $46.80
Boots	$38.96	25%		
Book	$9.80	30%		

7. Simone bought a bass guitar at a 20% discount. She paid $600. How many dollars
   did she save by buying the guitar at a discount?

8. Stephen spent $670 on furniture. He spent 25% on a chair, $234.50 on a table, and the
   rest on a sofa. What fraction and what percent of the $670 did he spend on each item?

9. A lake has about 1 200 fish, 12% of them sturgeon. As part of a conservation program,
   200 more sturgeon are released into the lake. How many sturgeon are now in the lake?
   What percent and what fraction of the fish in the lake are sturgeon?