

## Ratios and Proportions

A ratio is a comparison of two numbers by division. A rate compares measurements of different quantities. A proportions shows that two ratios are equivalent.

$$a:b, a \text{ to } b, \frac{a}{b}$$

Write a ratio comparing 8 hours to 3 days.

We need to get equivalent units since it is a ratio!

$$\frac{1}{3} : 3$$

$$\frac{1}{3} \div \frac{1}{3} = \frac{3}{3} = 1$$

$$\frac{1}{3} \div \frac{1}{3} = \frac{1}{9}$$

$$3 \text{ days} \rightarrow 72 \text{ hr}$$

$$\frac{8}{72} = \left( \frac{1}{9} \right)$$

Which costs less per ounce: 12 ounces of Oatsies for \$2.79 or

17.2 ounces for \$3.33?

$$\frac{12 \text{ oz}}{\$2.79} = \frac{1 \text{ oz}}{x} \quad \left[ \frac{2.79}{12} = x \right]$$

$$x = 0.23$$

$$\frac{17.2}{\$3.33} = \frac{1}{y}$$

$$y = 0.19$$

Nathan attends college in Australia. He bicycles from his apartment, which is 12 km from the college. (1 mile = 1.6 km).

a. If it takes him  $x$  minutes, what is his average speed in miles per hour?

b. If it takes him 40 minutes, what is his average speed in miles per hour?

a.  $\frac{12 \text{ km}}{x \text{ min}} \cdot \frac{1 \text{ mi}}{1.6 \text{ km}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = \frac{720 \text{ mi}}{1.6x \text{ hr}}$

b.  $\frac{450 \text{ mi}}{\frac{2}{3} \text{ hr}} =$

$$\frac{40}{60} = \frac{2}{3} \text{ hr}$$

$$450 \div \frac{2}{3} = \left[ \frac{450 \cdot 3}{2} \right]$$

$$\frac{450 \text{ mi}}{x \text{ hr}} = \frac{675 \text{ mi}}{2 \text{ hr}}$$

$$\frac{\cancel{\text{km}}}{\cancel{\text{min}}} \cdot \frac{\text{hr}}{\cancel{\text{min}}} \cdot \frac{\cancel{\text{mi}}}{\cancel{\text{km}}} = \frac{\text{mi}}{\text{hr}}$$

Maria can read about 160 words per minute. She has an assignment to read a book that is 300 pages long.

- If a typical book has about  $x$  words per page, how many minutes should she set aside for this reading?
- If a typical books has about 360 words per page, how many hours and minutes should she set aside for this reading.

$$\frac{x \cancel{\text{ words}}}{1 \cancel{\text{ page}}} \cdot \frac{1 \cancel{\text{ min}}}{160 \cancel{\text{ words}}} \cdot \frac{300 \cancel{\text{ pages}}}{1} = \frac{300x}{160} \text{ min}$$

$$1.875x \text{ min}$$

$$\text{b. } 1.875(360) = 675 \text{ min}$$

$$\frac{675}{60} = 11.25 \text{ hrs}$$

$$11 \text{ hrs } 4 \frac{1}{5} \text{ mins}$$

Solve the following proportions:

~~$$\frac{4x}{9} = \frac{2(x+4)}{3}$$~~

$$12x = 18(x+4)$$

$$12x = 18x + 72$$

$$-6x = 72$$

$$x = -12$$

$$\frac{2x}{5} = \frac{15}{3}$$

Find the ratio of a:x  $\frac{a}{x}$ 

$$\frac{5a-x}{a} = \frac{-1}{5}$$

$$-a = 5(5a-x)$$

$$-a = 25a - 5x$$

$$-26a = -5x$$

$$\frac{-26a}{-26} = \frac{-5x}{-26}$$

$$\frac{a}{x} = \frac{5}{26}$$

HW: p. 64 #s 2, 6, 10, 14 and pp. 67-68 #s 2, 5, 17d, e, 22b, c