Name _____   Date _____

A Critical Look at Proportional Relationships

Alex skateboards at a constant speed from his house to school 3.8 miles away. It takes him 18 minutes.

   a.   What fraction represents his constant speed, C?

   b.   After school, Alex skateboards at the same constant speed to his friend's house. It takes him 10 minutes. Write the fraction that represents constant speed, C, if he travels a distance of y.

   c.   Write the fractions from part (a) and (b) as a proportion, and solve to find out how many miles Alex's friend's house is from school. Round your answer to the tenths place.

1. Eman walks from the store to her friend's house, 2 miles away. It takes her 35 minutes.

    a. What fraction represents her constant speed, C?

    b. Write the fraction that represents her constant speed, C, if she walks y miles in 10 minutes.

    c. Write a proportion using the fractions from parts (a) and (b) to determine how many miles she walks after 10 minutes. Round your answer to the hundredths place.

    d. Write a two-variable equation to represent how many miles Eman can walk over any time interval.

2. Erika drives from school to soccer practice 1.3 miles away. It takes her 7 minutes.

    a. What fraction represents her constant speed, C?

    b. What fraction represents her constant speed, C, if it takes her x minutes to drive exactly 1 mile?

    c. Write a proportion using the fractions from parts (a) and (b) to determine how much time it takes her to drive exactly 1 mile. Round your answer to the tenths place.

    d. Write a two-variable equation to represent how many miles Erika can drive over any time interval.

3. Darla drives at a constant speed of 45 miles per hour.

    a. If she drives for y miles and it takes her x hours, write the two-variable equation to represent the number of miles Darla can drive in x hours.

    b. Darla plans to drive to the market 14 miles from her house, then to the post office 3 miles from the market, and then return home, which is 15 miles from the post office. Assuming she drives at a constant speed the entire time, how long will it take her to get back home after running her errands? Round your answer to the hundredths place.

4. Aaron walks from his sister's house to his cousin's house, a distance of 4 miles, in 80 minutes. How far does he walk in 30 minutes?

5. Carlos walks 4 miles every night for exercise. It takes him exactly 63 minutes to finish his walk.

   a. Assuming he walks at a constant rate, write an equation that represents how many miles, y, Carlos can walk in x minutes.

   b. Use your equation from part (a) to complete the table below. Use a calculator and round all values to the hundredths place.

x (minutes)	Linear equation in y:	y (miles)
15		
30		
40		
60		
75		

Alex skateboards at a constant speed from his house to school 3.8 miles away. It takes him 18 minutes.

    a.   **What fraction represents his constant speed, C?**

$$\frac{3.8}{18} = C$$

    b.   **After school, Alex skateboards at the same constant speed to his friend's house. It takes him 10 minutes. Write the fraction that represents constant speed, C, if he travels a distance of y.**

$$\frac{y}{10} = C$$

    c.   **Write the fractions from part (a) and (b) as a proportion and solve to find out how many miles Alex's friend's house is from school. Round your answer to the tenths place.**

$$\frac{3.8}{18} = \frac{y}{10}$$
$$3.8(10) = 18y$$
$$38 = 18y$$
$$\frac{38}{18} = y$$
$$2.1 \approx y$$

Alex's friend lives about 2.1 miles from school.

Students practice writing and solving proportions to solve constant speed problems. Students write two variable equations to represent situations, generally.

1.   **Eman walks from the store to her friend's house, 2 miles away. It takes her 35 minutes.**

    a.   **What fraction represents her constant speed, C?**

$$\frac{2}{35} = C$$

    b.   **Write the fraction that represents her constant speed, C, if she walks y miles in 10 minutes.**

$$\frac{y}{10} = C$$

    c.   **Write a proportion using the fractions from parts (a) and (b) to determine how many miles she walks after 10 minutes. Round your answer to the hundredths place.**

$$\frac{2}{35} = \frac{y}{10}$$
$$35y = 20$$
$$\frac{35}{35}y = \frac{20}{35}$$
$$y = 0.57142\ldots$$

Eman walks about 0.57 miles after 10 minutes.

d.   Write a two-variable equation to represent how many miles Eman can walk over any time interval.

Let y represent the distance Eman walks in x minutes.

$$\frac{2}{35} = \frac{y}{x}$$
$$35y = 2x$$
$$\frac{35}{35}y = \frac{2}{35}x$$
$$y = \frac{2}{35}x$$

2.   Erika drives from school to soccer practice 1.3 miles away. It takes her 7 minutes.

a.   What fraction represents her constant speed, C?

$$\frac{1.3}{7} = C$$

b.   What fraction represents her constant speed, C, if it takes her x minutes to drive exactly 1 mile?

$$\frac{1}{x} = C$$

c.   Write a proportion using the fractions from parts (a) and (b) to determine how much time it takes her to drive exactly 1 mile. Round your answer to the tenths place.

$$\frac{1.3}{7} = \frac{1}{x}$$
$$1.3x = 7$$
$$\frac{1.3}{1.3}x = \frac{7}{1.3}$$
$$x = 5.38461 \ldots$$

It takes Erika about 5.4 minutes to drive exactly 1 mile.

d.   Write a two-variable equation to represent how many miles Erika can drive over any time interval.

Let y be the number of miles Erika travels in x minutes.

$$\frac{1.3}{7} = \frac{y}{x}$$
$$7y = 1.3x$$
$$\frac{7}{7}y = \frac{1.3}{7}x$$
$$y = \frac{1.3}{7}x$$

3.   Darla drives at a constant speed of 45 miles per hour.

a.   If she drives for y miles and it takes her x hours, write the two-variable equation to represent the number of miles Darla can drive in x hours.

$$\frac{y}{x} = 45$$
$$y = 45x$$

b. Darla plans to drive to the market 14 miles from her house, then to the post office 3 miles from the market, and then return home, which is 15 miles from the post office. Assuming she drives at a constant speed the entire time, how long will it take her to get back home after running her errands? Round your answer to the hundredths place.

Altogether, Darla plans to drive $14 + 3 + 15 = 32$ miles.

$$32 = 45x$$
$$\frac{32}{45} = \frac{45}{45}x$$
$$0.71111\ldots = x$$

It will take Darla about 0.71 hours to get home after running her errands.

4. Aaron walks from his sister's house to his cousin's house, a distance of 4 miles, in 80 minutes. How far does he walk in 30 minutes?

I cannot say for sure how far Aaron walks in 30 minutes because I do not know if he is walking at a constant speed. Maybe he stopped at his friend's house for 20 minutes.

5. Carlos walks 4 miles every night for exercise. It takes him exactly 63 minutes to finish his walk.

a. Assuming he walks at a constant rate, write an equation that represents how many miles, y, Carlos can walk in x minutes.

Since $\frac{4}{63} = C$ and $\frac{y}{x} = C$, then

$$\frac{4}{63} = \frac{y}{x}$$
$$63y = 4x$$
$$\frac{63}{63}y = \frac{4}{63}x$$
$$y = \frac{4}{63}x.$$

b. Use your equation from part (a) to complete the table below. Use a calculator and round all values to the hundredths place.

x (minutes)	Linear equation in y: $y = \frac{4}{63}x$	y (miles)
15	$y = \frac{4}{63}(15)$	0.95
30	$y = \frac{4}{63}(30)$	1.90
40	$y = \frac{4}{63}(40)$	2.54
60	$y = \frac{4}{63}(60)$	3.81
75	$y = \frac{4}{63}(75)$	4.76