Date: 4-13-12 Topic: ***7-8 Work Problems***	Essential Question: **How do you use fractional equations to solve work problems?**
Objective	To solve work problems. You can use the following formula to solve work problems: work rate × time = work done "Work rate" means the fractional part of a job done in a given unit of time.
Example 1	Sheri can rake the lawn in 2 h. Her work rate is the part of the job she can do in 1 h. ∴ her work rate is ½ job per hour.
Exercise 1	a. Beatrice can wallpaper a room in 8 h. What is her work rate? b. Marty read a novel in 10 h. What is his work rate? c. Annie can wax her car in 45 min. What is her work rate? To finish a job, the sum of the fractional parts of the work done must be 1.
Summary	

Example 2

Josh can split a cord of wood in 4 days. His father can split a cord in 2 days. How long will it take them to split a cord of wood if they work together?

Solution

Step 1

The problem asks for the number of days the job will take them.

Step 2

Let x = the number of days needed to do the job together.

Josh and his father will each work x days.

Since Josh can do the whole job in 4 days, his work rate is $\frac{1}{4}$ job per day.

His father's work rate is $\frac{1}{2}$ job per day.

	Work rate	× Time	= Work done
Josh	$\frac{1}{4}$	x	$\frac{x}{4}$
Father	$\frac{1}{2}$	x	$\frac{x}{2}$

Step 3

Josh's part of the job + Father's part of the job = Whole job

$$\frac{x}{4}+\frac{x}{2}=1$$

Step 4

$$4\left(\frac{x}{4}+\frac{x}{2}\right)=4\cdot 1$$

$$x+2x=4$$

$$3x=4 \qquad x=\frac{4}{3}$$

Step 5

$$\frac{1}{4}\cdot\frac{4}{3}+\frac{1}{2}\cdot\frac{4}{3}=1$$

$\therefore$ They would finish the job in $1\frac{1}{3}$ days.

Exercise 2 ***Solution*** ***Step 1*** ***Step 2*** ***Step 3*** ***Step 4*** ***Step 5***	Using a new lawn mower, Abby can mow the lawn in 2 h. Her sister Carla uses an older mower and takes 3 h to mow the same lawn. How long will it take them if they work together?

Example 3

Robot A takes 6 min to weld a fender. Robot B takes only $5\frac{1}{2}$ min. If they work together for 2 min. how long will it take Robot B to finish welding the fender by itself?

Solution

Step 1

The problem asks for the amount of time it will take Robot B to finish welding the fender.

Step 2

Let x = the number of minutes needed for Robot B to finish.

Robot B's work rate is $\frac{1}{5\frac{1}{2}} = \frac{1}{\frac{11}{2}} = \frac{2}{11}$

	Work rate ×	Time =	Work done
Robot A	$\frac{1}{6}$	2	$\frac{1}{3}$
Robot B	$\frac{2}{11}$	$2 + x$	$\frac{2}{11}(2+x)$

Step 3

A's part of job + B's part of job = Whole job

$$\frac{1}{3} + \frac{2}{11}(2+x) = 1$$

Step 4

$$33\left[\frac{1}{3} + \frac{2}{11}(2+x)\right] = 33(1)$$

$$11 + 6(2+x) = 33$$

$$11 + 12 + 6x = 33$$

$$6x = 10$$

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

Step 5

$\frac{1}{6} \cdot 2 + \frac{2}{11}\left(2 + \frac{5}{3}\right) = 1$ 

$\therefore$ it will take $1\frac{2}{3}$ min for Robot B to finish welding.

Exercise 3 ***Solution*** ***Step 1*** ***Step 2*** ***Step 3*** ***Step 4*** ***Step 5***	Phil can paint the garage in 12 h, and Rick can do it in 10 h. They work together for 3 h. How long will it take Rick to finish the job alone?