

## Chapter 14 Project

## Let's Be Rational Here!

An activity to demonstrate the use of rational expressions in real life.

You may be surprised to learn how many different situations in real life involve working with rational expressions and rational equations. Hopefully after spending the day with Meghan and her friends you'll be convinced of their importance.

It's Saturday and Meghan has a list of things to accomplish today: revise her budget, paint the walls in the spare bedroom, travel to the lake with her friends and then ski on the lake for the rest of the day, provided the weather stays nice.

1. Meghan decides to tackle the budget first. After reviewing her budget, she decides that she really needs to get a part-time job to earn some extra money. She is remodeling the living room and would like to buy some new furniture. Letting  $x$  represent her new monthly combined salary, she estimates that  $\frac{1}{4}$  of her new salary will be used for bills and approximately  $\frac{1}{5}$  for her car payment. She would like to have \$1100 left over each month, of which \$100 will be saved for the new furniture. What must her new monthly salary be?
  - a. Let the variable  $x$  represent Meghan's new monthly salary. Write an expression to represent the amount of her new salary used for bills. (Remember that the word **of** implies multiplication.)
  - b. Write an expression to represent the amount of Meghan's new monthly salary used for her car payment.
  - c. Write an equation that sums the expenditures and leftover balance and set this sum equal to the new monthly salary of  $x$ .
  - d. Find the LCD of the rational expressions from Part c. and multiply it by each term in the equation to remove the fractions.
  - e. Solve the equation from Part d. to determine what Meghan's new monthly salary needs to be.
  - f. Approximately how much of Meghan's new salary will be used to pay her car payment?
2. With the budget done, Meghan prepares to paint the spare bedroom. She just finished painting her bedroom last week and it took her about 4 hours. Her roommate Ashley painted her bedroom a couple of weeks ago and it took her 6 hours. All the bedrooms are similar in size. Meghan realizes that if she gets Ashley to help her with the painting, it will take them less time and they can get to the lake sooner. How long will it take Meghan and Ashley working together to paint the spare bedroom? Use the table below to help you set up the problem.

Person	Time (in hours)	Part of Work Done in 1 Hour
Meghan	4	—
Ashley	6	—
Together	$x$	$\frac{1}{x}$

- a. Fill in the missing information in column three of the table.

- b. Use the entries in the last column of the table to set up an equation to represent the sum of the amount of work done by both Meghan and Ashley in an hour.
- c. Solve the equation to determine how long it will take the two girls to paint the spare bedroom when working together. Express the result as a decimal to the nearest tenth. Convert this measurement to hours and minutes.
3. With the spare bedroom painted, the girls call Lucas to let him know they are ready to head to the lake. While he is preparing the boat for the lake, Lucas is trying to decide which route they should travel to get there. If he travels the highway, he can travel 20 mph faster than the scenic route. However, the highway is 30 miles longer than the scenic route, which is 60 miles long. Lucas thinks it should take him the same amount of time to get there using either route. Use the following table to help you organize the information for this problem.

	Distance (miles)	÷	Rate (mph)	=	Time (hours)
Highway	90		$x + 20$		_____
Scenic Route	60		$x$		_____

- a. Fill in the missing information in the table. (**Hint:** Recall that the formula that involves distance, rate, and time is  $d = r \cdot t$ .)
- b. Since Lucas expects the time to be the same for each route, create an equation from the time column and solve for  $x$ .
- c. How fast must Lucas travel on the highway to get to the lake in the same amount of time as traveling the scenic route?