Write

In your own words, explain how you use rational expressions to solve work, mixture, distance, and/or cost problems.

Remember

A work problem is a type of problem that involves the rates of several workers and the time it takes to complete a job.

A mixture problem is a type of problem that involves the combination of two or more liquids and the concentrations of those liquids.

A distance problem is a type of problem that involves distance, rate, and time.

A cost problem is a type of problem that involves the cost of ownership of an item over time.

Practice

1. Moe and Curly have been hired to paint the interior of a school during summer break. Moe can paint the entire school in 80 hours by himself. Working together, it takes Moe and Curly 50 hours to paint the entire school. Write and solve an equation to determine how long it would take Curly to paint the interior of the school by himself. Show your work.

2. Trey buys a 500 mL bottle of rubbing alcohol. The bottle contains a solution of 70% alcohol and 30% water. The instructions for his toy train set say he should use a solution of 40% alcohol and 60% water to clean the tracks. Write and solve an equation to determine how much water Trey must add to the solution he purchased to have the correct solution for cleaning the tracks. Show your work.

3. Matthew is an aerial photographer. He photographs a 200-mile long oil pipeline that runs straight from east to west. He flies the 200 miles from west to east with an eastward tailwind. He returns over the same route and flies 200 miles against an eastward headwind. The total time of the 400-mile flight is 180 minutes. The plane travels at a speed of 150 miles per hour without a tailwind or headwind. Assume the wind speed is constant during the entire flight. Write and solve an equation to determine the wind speed during Matthew's flight. Show your work.

4. Ramona is trying to decide between 2 satellite Internet providers. ProSat Internet charges a $250 installation fee and a monthly fee of $50. SuperSat Internet charges a $90 installation fee and a monthly fee of $58. Write and solve an equation to determine when the average monthly cost (including installation and monthly fees) of each service would be the same. Show your work.

5. To balance a lever (seesaw), the weight must vary inversely with the distance of the object from the fulcrum.
   a. Write an inverse variation equation relating weight w and distance d. Use the variable k for the constant of variation.

b. Juanita, who weighs 60 pounds, is 6 feet from the fulcrum on a seesaw. Use her weight and distance from the fulcrum in the inverse variation equation to find the value of k.

c. Write an inverse variation equation relating weight and distance using the value of k found in part (b).

d. Determine how far Maria should sit from the fulcrum in order to balance the seesaw with Juanita. Maria weighs 80 pounds.

e. Determine how far Carlos, who weighs 50 pounds, should sit from the fulcrum to balance the seesaw with Juanita.

f. Write a general statement about how weight relates to where a person should sit on the seesaw to balance it with Juanita.

Stretch

Three friends own a lawnscape service. One of their biggest clients is a museum. When Kayden, Jaylen, and Zion work together they can mow the museum lawn in 3 hours. When Kayden works alone, he can mow the lawn in 6 hours. It takes Jaylen an hour more than Zion to mow the lawn. Write and solve an equation to determine how long it would take Jaylen and Zion to mow the lawn on their own. Show your work.

Review

1. Krish plays chess online. So far, Krish has won 325 out of 464 games. In order to move up to the next skill level his winning percent must be 75%. Estimate the number of consecutive games Krish will need to win to move up to the next skill level. Show all of your work and explain your reasoning.

2. Claudina is going to join a yoga studio. The Peaceful Zen studio costs $480 for the year and $5 for each class that she takes. The Ohm Tree studio cost $375 for the year and $7 for each class that she takes.

   a. Write a function to represent the average cost of each class per year for the two studios.

   b. Which studio will have a lower average cost per class over the next year if she takes two classes a week? Show all of your work and explain your reasoning.

3. DeMarcus has 340 out of 400 points possible in his biology class. He needs an 80% in the class in order to be on the Dean's List for the semester. The only remaining graded items will be class participation points worth 1 point each. Estimate the number of consecutive class participation points DeMarcus can miss and have his grade be an 80%. Show all of your work and explain your reasoning.

4. Write a function $h(x)$ with a vertical asymptote $x = 0$ and with a removable discontinuity at $x = -1$. Explain your reasoning. Explain how to sketch the graph of the function $h(x)$ without using technology.