

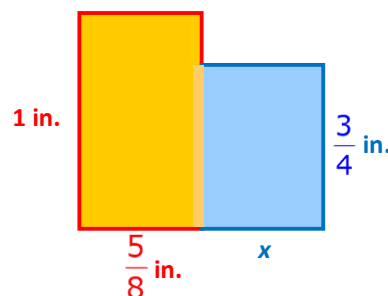
Name: \_\_\_\_\_

## Using Multiplicative Inverses to Solve Equations

1) The figure shown is composed of two rectangles. The area of the figure is 1 square inch.

a. Find the area of the yellow rectangle.

b. Write an expression for the area of the blue rectangle.



c. Write an equation relating the sum of the area in part (a) and (b) to the total area of the figure. Solve the equation to find the value of  $x$ .

2) Locks on the Panama Canal are used to move a ship from a higher elevation to a lower elevation. When a ship enters a lock chamber on the canal, water is allowed to spill out of the lock chamber into the next lock chamber until the water levels in the two chambers are equal. Suppose the water level in one lock chamber is 72 feet. As water spills out of the chamber, the depth changes at a rate of about  $-3\frac{1}{2}$  feet per minute until the water level is 41 feet.



How many minutes does it take for the depth to change from 72 feet to 41 feet?

3) Suppose you want to solve the equation  $(-2\frac{1}{2})x = \frac{8}{15}$  by using the multiplicative inverse of  $-2\frac{1}{2}$ . What is the multiplicative inverse of  $-2\frac{1}{2}$ ?

4) The following is based on a famous problem about Diophantus, a Greek mathematician from the third century. Let  $x$  be the number of years Diophantus lived. Find how long he lived by using the following facts about him to write and solve an equation.

ONE SIXTH OF HIS LIFE WAS SPENT IN BOYHOOD.  
 ONE TWELFTH OF HIS LIFE WAS SPENT AS A YOUTH.  
 AFTER  $\frac{1}{7}$  MORE OF HIS LIFE PASSED, HE GOT MARRIED.  
 FIVE YEARS AFTER GETTING MARRIED, HE HAD A SON.  
 HIS SON LIVED  $\frac{1}{2}$  AS LONG AS DIOPHANTUS LIVED.  
 THE SON DIED FOUR YEARS BEFORE DIOPHANTUS DIED.