

MRS21-HW#13

1)

$$\frac{1}{2.5} + \frac{1}{x} = \frac{1}{1.5}$$

We find that $x = 3.75$; therefore, it takes 3 hours and 45 minutes for the second pipe to fill the pool by itself.

2)

$$\frac{1}{2} - \frac{1}{x} = \frac{1}{2.5}$$

We find that $x = 10$; therefore, it takes 10 hours for the drain to empty the pool by itself.

3)

$$\frac{120}{t-36} = \frac{120}{t} + \frac{1}{6}$$

We find that $t = 180$. The time it takes to travel 120 miles by car at night is 180 minutes, which is 3 hours. Since $\frac{120}{3} = 40$, the average speed in the daytime is 40 miles per hour.

5)

$$\frac{80}{x+0.70} = \frac{80}{x} - 7$$

The solution to this equation is 2.50, so the average price in December is \$2.50. Thus the school subscribed to 32 magazines in December.

$$G = \frac{Fr^2}{m_1 m_2}$$

7)

8) a)

When simplified, we find that $t = 2$; therefore, the value of t does not depend on the value of a .

If a is 0, then x has no meaning. If $a = -2$, then y has no meaning.

b)

$$\frac{1}{R} = \frac{1}{2/5} + \frac{1}{3/4}$$

$$\text{So } R = \frac{6}{23}.$$

9) a)

b)

There are two approaches to solve this equation for R .

The first way is to perform the addition on the right:

$$\begin{aligned}\frac{1}{R} &= \frac{1}{x} + \frac{1}{y} \\ &= \frac{y}{xy} + \frac{x}{xy} \\ &= \frac{x+y}{xy}.\end{aligned}$$

The second way is to take reciprocals of both sides and then simplify:

$$\begin{aligned}R &= \frac{1}{1/x + 1/y} \\ &= \frac{1}{y/xy + x/xy} \\ &= \frac{1}{(x+y)/xy}.\end{aligned}$$

In either case, we find that $R = \frac{xy}{x+y}$.