

MAT 104 Quiz 1

Friday, January 28, 2005

1. Simplify the following expression:

$$2(x - y) - 4(x + y)$$

$$\begin{aligned} 2(x - y) - 4(x + y) &= 2x - 2y - 4x - 4y && \text{distribute the 2 and the -4} \\ &= -2x - 6y && \text{combine like terms} \end{aligned}$$

2. Solve the following linear equation:

$$-3(1 - 4x) - 2(2x - 1) = 12x$$

$$\begin{aligned} -3(1 - 4x) - 2(2x - 1) = 12x &\implies -3 + 12x - 4x + 2 = 12x \\ &\implies -1 + 8x = 12x && \text{combine like terms} \\ &\implies -1 = 4x && \text{subtract } 8x \text{ from both sides} \\ &\implies x = -\frac{1}{4} && \text{divide by } 4 \end{aligned}$$

3. Solve for x in

$$y + 2x = 4x - 3y - 6$$

$$\begin{aligned} y + 2x = 4x - 3y - 6 &\implies y - 2x = -3y - 6 && \text{subtract } 4x \\ &\implies -2x = -4y - 6 && \text{subtract } y \\ &\implies x = 2y + 3 && \text{divide by } -2 \end{aligned}$$

4. Skippy leaves Utica at a rate of 60 miles per hour towards Syracuse which is 50 miles away. 15 minutes later, Noodle leaves Utica towards Syracuse. Noodle wants to arrive in Syracuse at the same time as Skippy.

- (a) How long does it take for Skippy to drive to Syracuse?

Skippy drives at a rate of 60 miles per hour over a distance of 50 miles. So plugging these values into $D = rt$, we have

$$\begin{aligned}D = rt &\implies 50 = 60t \\ &\implies t = \frac{50}{60} \text{ hours} \\ &\implies t = \frac{50}{60} \text{ hours} \cdot \frac{60 \text{ minutes}}{\text{hour}} \\ &\implies t = 50 \text{ minutes}\end{aligned}$$

- (b) How much time does Noodle have to drive to Syracuse?

Skippy has a 15 minute head start on Noodle, who is going to take 50 minutes to get there. So in order to reach Syracuse at the same time as Skippy, Noodle will have to get there in

$$50 - 15 = 35 \text{ minutes.}$$

- (c) How fast does Noodle have to drive in order to arrive in Syracuse at the same time as Skippy?

We have to watch our units on this one. Noodle needs to get there in 35 minutes, which we convert to

$$\frac{35}{60} = \frac{7}{12} \text{ hours}$$

He needs to cover a distance of 50 miles in $7/12$ of an hour. So, using our trusty $D = rt$ formula for Uniform Motion Problems, we get

$$\begin{aligned}D = rt &\implies 50 = r \frac{7}{12} \\ &\implies r = \frac{50 \cdot 12}{7} \\ &\implies r = \frac{600}{7} \text{ mph} \\ &\implies r \approx 85.7 \text{ mph}\end{aligned}$$