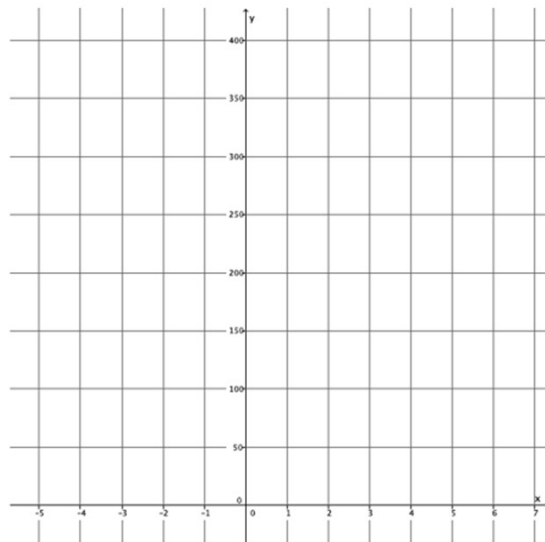# System of Equations Word Problems (Graphs)

Efrain and Fernie are on a road trip. Each of them drives at a constant speed. Efrain travels at 45 miles per hour for the entire trip. Fernie drives at 70 miles per hour throughout the trip. Fernie and Efrain left from the same location, but Efrain left at 8:00 a.m., and Fernie left at 11:00 a.m. Assuming they take the same route, will Fernie ever catch up to Efrain? If so, approximately when?

a) Write the linear equation that represents Efrain's constant speed. Make sure to include in your equation the extra time that Efrain was able to travel.

b) Write the linear equation that represents Fernie's constant speed.

c) Write the system of linear equations that represents this situation.

d) Sketch the graphs of the two linear equations.

e) Will Fernie ever catch up to Efrain? If so, approximately when?

System of Equations Word Problems (Graphs)

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a) Write the linear equation that represents Efrain's constant speed. Make sure to include in your equation the extra time that Efrain was able to travel.

Efrain's rate is $\frac{45}{1}$ miles per hour, which is the same as 45 miles per hour. If he drives y miles in x hours at that constant rate, then $y = 45x$. To account for his additional 3 hours of driving time that Efrain gets, we write the equation $y = 45(x + 3)$.
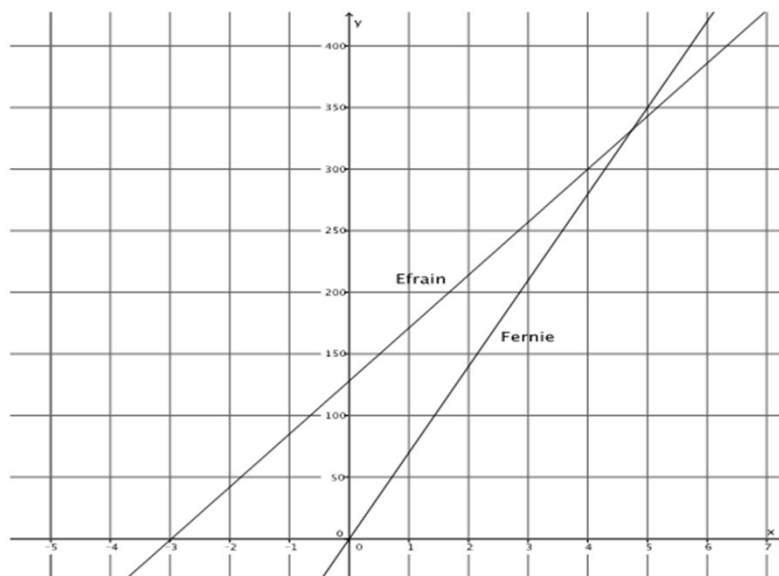
$$y = 45x + 135$$

b) Write the linear equation that represents Fernie's constant speed.

Fernie's rate is $\frac{70}{1}$ miles per hour, which is the same as 70 miles per hour. If he drives y miles in x hours at that constant rate, then $y = 70x$

c) Write the system of linear equations that represents this situation.

$$\begin{cases} y = 45x + 135 \\ y = 70x \end{cases}$$

d) Sketch the graphs of the two linear equations.

e) Will Fernie ever catch up to Efrain? If so, approximately when?

Yes, Fernie will catch up to Efrain after about $4\frac{1}{2}$ hours of driving or after traveling about 325 miles. (Approximately, where the above two lines meet)

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