

# Travel Options – Florida

## Working with Linear Systems



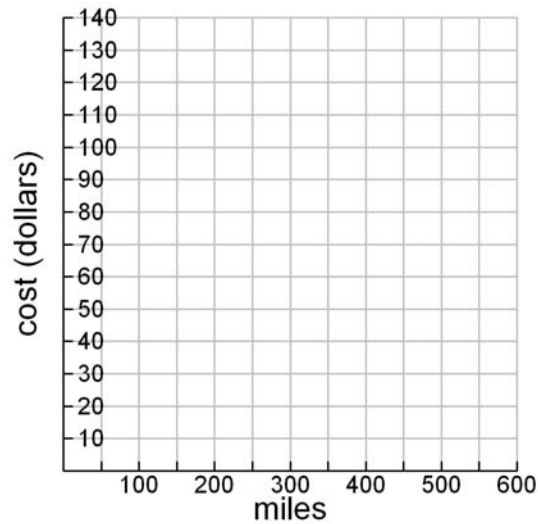
When am I ever going to use this? ”

Using the concepts in this worksheet, you will be able to determine if renting a car for a day trip will save you money.

On May 25, 2008, the average price for unleaded gasoline in Florida was \$3.939 per gallon (Source: [www.floridastategasprices.com](http://www.floridastategasprices.com)). A driver in Tallahassee, Florida, plans to drive to Orlando, Florida, a distance of roughly 515 miles round trip. The driver owns an SUV that gets 18 miles per gallon. Dollar Rent A Car, Inc., offers a Ford Focus car rental in Tallahassee for \$42.12 per day. It is estimated the car gets 35 miles per gallon on the highway. (Sources: [www.hertz.com](http://www.hertz.com), [www.ford.com](http://www.ford.com)).

1. What is the gasoline cost per mile for the SUV and for the Ford Focus?
2. Create a function for the fuel cost of driving the SUV  $m$  miles.
3. Create a function for the fuel plus rental cost of driving the Ford Focus  $m$  miles.

4. Graph each of the functions in (2) and (3) on the axes below.



5. Estimate the point of intersection of the graphs in (4). Then explain the real-world meaning for the point of intersection.

6. Set up a system of equations using the equations from (2) and (3). Then solve the system algebraically.

7. Explain how the solution to (5) and the solution to (6) are related.

8. Will it cost the driver more money to rent a Ford Focus to drive to Orlando or to drive the SUV?

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1. What is the gasoline cost per mile for the SUV and for the Ford Focus?

$$\begin{array}{l} \text{SUV} \\ \frac{3.939 \frac{\text{dollars}}{\text{gallon}}}{18 \frac{\text{miles}}{\text{gallon}}} = \left( 3.939 \frac{\text{dollars}}{\text{gallon}} \right) \left( \frac{1 \text{ gallon}}{18 \text{ mile}} \right) \\ \approx 0.219 \text{ dollars per mile} \end{array}$$

$$\begin{array}{l} \text{Ford Focus} \\ \frac{3.939 \frac{\text{dollars}}{\text{gallon}}}{35 \frac{\text{miles}}{\text{gallon}}} = \left( 3.939 \frac{\text{dollars}}{\text{gallon}} \right) \left( \frac{1 \text{ gallon}}{35 \text{ mile}} \right) \\ \approx 0.113 \text{ dollars per mile} \end{array}$$

2. Create a function for the fuel cost of driving the SUV  $m$  miles.

Let  $V$  be the fuel cost for driving the SUV  $m$  miles. We have  $V = 0.219m$ .

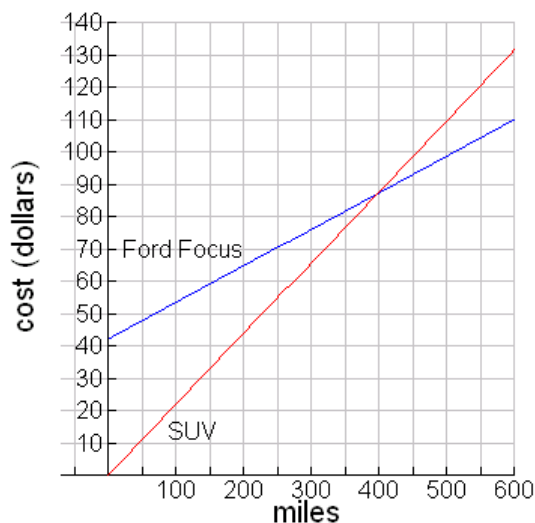
3. Create a function for the fuel plus rental cost of driving the Ford Focus  $m$  miles.

Let  $F$  be the fuel and rental cost for driving the Ford Focus  $m$  miles. We have

$$F = \text{fuel cost} + \text{rental cost}$$

$$F = 0.113m + 42.12$$

4. Graph each of the functions in (2) and (3) on the axes below.



5. Estimate the point of intersection of the graphs in (4). Then explain the real-world meaning for the point of intersection.

*It appears that the graphs intersect at about (400,88). This means that when 400 miles are driven the cost of driving each vehicle will be the same: \$88.*

6. Set up a system of equations using the equations from (2) and (3). Then solve the system algebraically. *Since we are interested in when the costs will be equal, we use the same variable,  $C$ , to represent the cost in the system of equations.*

$$C = 0.219m$$

$$C = 0.113m + 42.12$$

*Since both equations equal  $C$ , we set the right hand sides of the equations equal to each other and solve.*

$$0.219m = 0.113m + 42.12$$

$$0.106m = 42.12$$

$$m \approx 397$$

$$C = 0.219m$$

$$C = 0.219(397.4)$$

$$C \approx 87.0$$

*The solution to the system is  $m = 397$  and  $C = 87$ .*

7. Explain how the solution to (5) and the solution to (6) are related.

*The point of intersection of the graphs is the solution to the linear system of equations. Although we can estimate the solution from the graph, solving the system algebraically allows us to calculate the solution with more precision*

8. Will it cost the driver more money to rent a Ford Focus to drive to Orlando or to drive the SUV? Explain.

*Since the trip is more than 397 miles, it will cost the driver more money to drive the SUV than the Ford Focus. From the graph in (5), it appears that the driver will save about \$12 by renting the Ford Focus.*

<i>Worksheet Title</i>	Travel Options – Florida: Working with Linear Systems			<i>Filename:</i>	m3008
<i>Keywords</i>	Florida, Dollar Rent A Car, Ford, rental car, systems of equations, linear systems, graphing, intersection, independent system				
<i>NCTM Standard</i>		Content Standards			Process Standards
		Number and Operations		X	Problem Solving
	X	Algebra		X	Reasoning and Proof
		Geometry		X	Communication
		Measurement		X	Connections
	X	Data Analysis and Probability		X	Representations
<i>Grade Band</i>		PreK – 2			
		3 – 5			
		6 – 8			
	X	9 – 12			
<i>Data Type</i>	Words				

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