

Modeling Systems of Equations Using Multiple Representations with the *fx-9750G PLUS* An Algebra Activity

NCTM's *Principles and Standards for School Mathematics* (2000) states that "Instructional programs from prekindergarten through grade 12 should enable all students to

Create and use representations to organize, record, and communicate mathematical ideas

Select, apply, and translate among mathematical representations to solve problems

Use representations to model and interpret physical, social, and mathematical phenomena"

Present the following problem to your class:

Cassie's family is planning a trip during the summer to Disney World in Orlando, Florida. The family plans to fly into Orlando and will need a rental car for a week. Cassie has been asked to determine which of two major car rental establishments would be best. Company A charges a flat rate of \$25 per day plus \$.27 per mile for a sedan. Company H charges a flat rate of \$35 per day plus \$.10 per mile. The family plans to spend 4 days at Disney World and then drive around the state to take in some additional sights. Help Cassie prepare a proposal for her family.

1. **To explore this problem verbally**, talk to your teammates – predict which company would best serve the family. Explain why you think so.

Which company should they choose if they plan to put about 300 miles on the car? How much would the family pay?

$25 \times 7 + .27 \times 300$	256
$35 \times 7 + .10 \times 300$	275

Which company should they choose if they plan to put about 600 miles on the car? How much would the family pay?

$25 \times 7 + .27 \times 600$	337
$35 \times 7 + .10 \times 600$	305

2. **To explore this problem symbolically**, work with your team to write an equation for the cost (c) of renting a car for a week from Company A.

Work with your team to write an equation for the cost (c) of renting a car for a week from Company H.

3. **To explore the problem numerically using a table**, choose TABLE from the menu screen, enter the cost of renting a car for a week from Company A in Y1 and the cost of renting a car for a week from Company B in Y2. Press F5 (RANG) to set up your table. Start with 0, end with 1000 and pitch 50. Press F6 to view the table. Move the cursor down the table noting the costs of the two companies. Where does it change from being cheaper with Company A to being cheaper with Company B?

Table Func :Y=	
Y1=	$25X + .27X$
Y2=	$35X + .10X$
Y3:	
Y4:	
Y5:	
Y6:	
[SEL] [DEL] [TYPE] [RANG] [TABL]	

Table Range	
X	
Start:	0
End :	1000
Pitch:	50

X	Y1	Y2
0	175	245
50	188.5	250
100	202	255
150	215.5	260

500

[FORM] [DEL] [ROW] [G-COM] [G-PLT]

X	Y1	Y2
350	269.5	280
400	283	285
450	296.5	290
500	310	295

500

[FORM] [DEL] [ROW] [G-COM] [G-PLT]

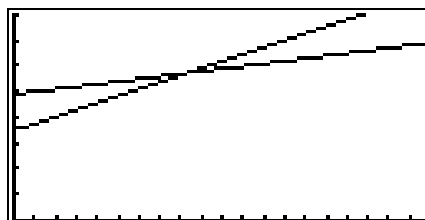
4. **To explore the problem graphically**, choose GRAPH from the menu screen. The functions that you used in the table will be in Y=. Press SHIFT F3 to set an appropriate view window.

Xmin : -1 (This will allow you to see the axis)
 Xmax : 1000
 scale : 50
 Ymin : -1
 Ymax : 400
 Scale : 50

```
Graph Func :Y=
Y1=25X+.27X
Y2=35X+.10X
Y3:
Y4:
Y5:
Y6:
SEL DEL TYPE ZMEM DRAW
```

```
View Window
Xmin : -1
max : 1000
scale:50
Ymin : -1
max : 400
scale:50
INIT TRIG STD STO RCL
```

Talk to your group about why this view window would work. Is it the only one which would work? Why or why not? Press F6 (DRAW) to draw the graph. Press SHIFT F1 to trace along the lines. Using the right and left arrow keys, trace along the line to the point where the two lines appear to intersect.

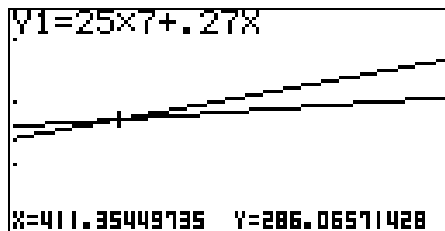
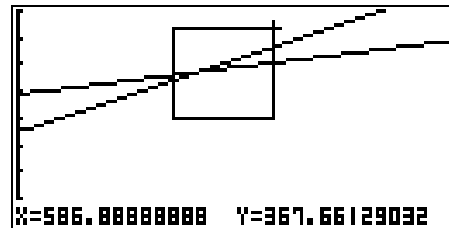
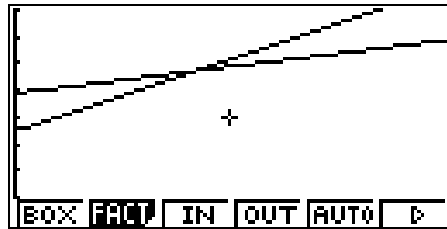


```
Y1=25X+.27X
X=412.11111111 Y=286.27
```

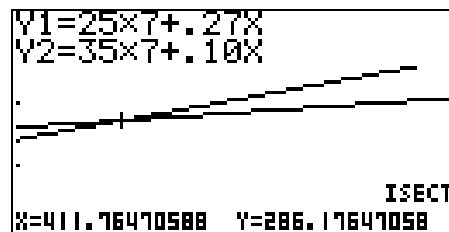
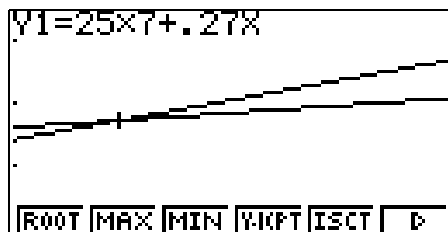
```
Y2=35X+.10X
X=412.11111111 Y=286.21111111
```

For a closer look at this point, press SHIFT F2 (ZOOM) and select F1 (BOX). Using the arrow keys, move the cursor to a point to the left and below the point of intersection of the lines. Press EXE. Move the cursor up to a point above and to

the left of the intersection. Do **not** press EXE. Move the cursor to a point above and to the right of the intersection. Press EXE.



To calculate the point of intersection, press SHIFT F5 (G-Solv), F5 (ISCT). Write a sentence about the meaning of the point of intersection in this problem.



5. Prepare a proposal with recommendations for Cassie's family about the cost of renting a car for a week at Disney World.