## Activity Overview

In this activity, students will identify what a variable is, construct a table of values, graph the ordered pairs from the table, and use the TI-73 to graph the equation.

Topic: Algebraic Thinking

- Writing number sentences
- Using variables to represent changing quantities
- Creating ordered pairs, tables, and graphs


## Teacher Preparation and Notes

- Students should be familiar with ordered pairs and graphing ordered pairs.
- For more connection to the scenario used in this activity, students can set the calculator to always display two decimal places by pressing MODE, use the arrow keys to highlight the number 2 to the right of the word Float and press ENTER.
- Before beginning the activity, students should turn off all plots and functions.
- TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.
- To download the student worksheet and TI-Navigator files, go to education.ti.com/exchange and enter "13642" in the quick search box.


## Associated Materials

- MGAct22_Video_worksheet_TI73.doc
- MGAct22_Video_Nav_TI73.act


## Suggested Related Activities

To download the activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- Linear Equations: Using Graphs and Tables (TI-73 Explorer) - 4415
- Making Cents of Density (TI-73 Explorer) - 8525
- Going for the Gold (TI-73 Explorer \& TI-Navigator) — 12599
- The Best Cell Phone Plan (TI-30XS MultiView) -8605


## Problem 1 - Number Sentences

In the first part of this lesson, students will look at the rental scenario using number sentences. Students first insert a specific number of hours to find the total cost of the rental.

## Questions 1-2

Students can type the number sentence on the home screen of the $\mathrm{TI}-73$. For the first example, students will
 they can either retype the equation or you can press 2nd ENTER (for Entry) and then just change the number of hours.


## Questions 3-6

These questions are to help students identify what part of their number sentence is variable and to represent the changing quantity with a variable. Students may have had previous experience with variables or even with symbols (a box or triangle) that represented the changing quantity.

## Problem 2 - Creating a Graph

Next, students will explore the data in the form of a scatter plot.

## Question 7

First, students will write the $x$ - and $y$-values as ordered pairs. They should have previous experience with ordered pairs and graphing ordered pairs. If needed, students can start out by graphing the ordered pairs on graph paper if this is something they are familiar with and more comfortable doing initially.

If needed, students can use the ClearAllLists command to empty L1 and L2. From the Home screen, press 2nd 0 (mem) and choose option 6. Press ENTER to execute the command and the word Done will appear on the home screen.

Then, press LIST and enter the ordered pairs in L1 and L2. Press ENTER after each value to move to the next element in the list.

## Questions 8-9

After the data is input in the lists, set up the scatter plot as shown at the right. Press 2nd $Y=$ to access the scatter plots. Move the cursor to each row and press ENTER on the item you need to select. To enter L1 and L2, press 2nd LIST 1 or 2nd LIST 2 .


To view the graph, you will need to set an appropriate viewing window as well. Work with students to identify what will be best for viewing the data. This is a good experience to have them look at the data to determine minimum and maximum values and an appropriate scale.
After the plot is drawn, students can use a straight edge to draw a line of fit that goes through all the points.


## Problem 3 - Graphing the Equation

## Question 10

For students to graph the equation, they can press $Y=$ and then clear any equations that may be present. Then, press 0 Q 2 区 x $+1 \square 50$ ENTER. To view the graph, they will then press GRAPH. The function along with the scatter plot will appear.

## Questions 11-12

Finally, students look at the table of values to compare to the ordered pairs from earlier in the activity. Students can see how each value they had is mirrored here.


## Extension - TI-Navigator ${ }^{\text {TM }}$

1. You can use MGAct22_Video_Nav_TI73.act to allow students to each give one data point for analysis in either the main problem or any of the extension problems. To reuse the file between problems, make sure to clear the data before starting the activity again.
2. Use Screen Capture throughout to monitor student progress.
3. Use QuickPoll to have students determine the $y$-value given a specific $x$-value. Call out an $x$-value and have students submit what the $y$-value should be.

## Extensions

Here are additional problems that you can assign to small groups and then have them share what they discover with the rest of the class.

1. You are going to take a taxi to the mall. The going rate is $\$ 2.00$ for the first mile and $90 \$$ for each additional mile. How much will it cost to travel the 15 miles to the mall? Write a number sentence. How much would it cost to go to a friend's house 21 miles away?
2. You can buy a family season golf package for $\$ 350$. This entitles all members of your immediate family to unlimited golf privileges from March 15 through October 15. The standard golf fees are $\$ 6.50$ for juniors (through age 16) and $\$ 8.50$ for adults. How often would a family of four have to golf to justify buying a season pass?
3. You get a job as a car salesman at the new Ford dealership in town. Your boss tells you that you can work by commission or salary. If you work on commission basis, you would make $1 \%$ of your sales. If you chose to work on salary, you would make $\$ 500$ per week. (The average Ford sells for $\$ 21,000$.) Write an equation that shows how much you would make if you worked on a commission basis and sold 1 car, 2 cars, 3 cars, n cars. At what point do you start making more money by commission?
4. Question 3 extended: A third option is offered whereby you would make $0.5 \%$ commission and $\$ 200$ salary. Explain which of the three options you would choose and why. Support your opinion with a graph.
5. You have been invited to go biking in the backcountry. Claude's Classy Wheels rents mountain bikes for $\$ 4.00$ an hour, but Claude insists you also rent a lock for a $\$ 1.35$ flat fee for each bike rented. Write a number sentence to show how much it would cost to rent a bike for 7 hours. If you had $\$ 13.50$, for how many hours could you rent the bike? What if you had $\$ 16.00$ ? Tell how you would find this answer.

## Solutions - student worksheet

1. $0.25 * 4+1.50$
2. $0.25 * 6+1.50,0.25 * 8+1.50$
3. the part after 0.25 , and it represents the number of hours
4. $0.25 x+1.50$
5. the total cost changes as well
6. $y=0.25 x+1.50$
7. $(1,1.75),(2,2.00),(3,2.25),(4,2.50),(5,2.75),(10,4.00)$
8. 


9.


This line represents all values of hours, not just the individual ones calculated.
10. See the graph in Question 9 above.
11. The values found in the table will be the same as the ordered pairs. There will, however, be more values in the table than just the 6 ordered pairs.
12. The scatter plot is a discreet function while the equation is a continuous function. The scatter plot is discreet because you can only trace the specific values that were input in the lists, not all values along the line.

