

# Rate and Slope: Car Depreciation Activity

## Math Lab Instructor Notes

- Course Level/Topic: Beginning Algebra/Rates and Slope
- Purpose: Students use the concept of the rate of depreciation in a real world situation to investigate the relationship between rate and slope.
- Learning Goals:
  - Identify that slope of a line corresponds to a unit rate.
  - Convert real world data to points on a line.
  - Determine the equation of a line from its graph.
  - Using the equation of a graph, solve for both independent and dependent values in a real world setting.
- Pre-requisite knowledge:
  - Determining the rate of change given two values
  - Graphing a line given two points
  - Finding the slope of a line given two points
  - Finding the equation of the line given the slope and y-intercept
- Materials: Graph paper
- Time Required: 30 to 40 minutes
- Description: Students create ordered pairs, graph depreciating car values, and calculate rates of depreciation, then identify that the rate of depreciation = slope of the line. Using the equation they then solve for future values and times.
- Implementation:
  - This lab addresses a topic of concern for the students and hence engages them.
  - This lab can be used as an in-class follow-up activity after students have been introduced to the concepts.
  - This activity makes a good take-home quiz, however an explanation of how to set up the axis is needed if they have not had enough experience with graphing very large values.
- Follow Up/ Discussion Questions:
  - Students can look at the housing market to see whether single family home prices are increasing faster than condos.
  - Look at the price of computers or other technology to see the change in the market prices.

# Car Depreciation

Name(s): KEY

From the minute that a car is driven off dealership lot it begins to *depreciate* (drop in value over time). The N.A.D.A. Official Used Car Guide, or “blue book”, is a monthly listing of the trade-in values of used cars. The data below are taken from the N.A.D.A. guides for March 2008 and January 2009.

<b>CAR VALUES</b>	<b>Purchase Price In March 2008</b>	<b>Trade-in Value In January 2009</b>
<b>2008 Toyota Prius</b>	\$23,630	\$22,095
<b>2008 Honda Civic EX Coupe</b>	\$19,205	\$18,220
<b>2008 Ford Focus SE Coupe</b>	\$16,180	\$14,450

1. Let  $x=0$  represent March 2008 and one month be a unit. Let  $y$  represent the value of the car. For example:

Toyota Prius:  $(0,23630)$   
 $(10,22095)$

What are the ordered pairs for the other two cars in the table above?

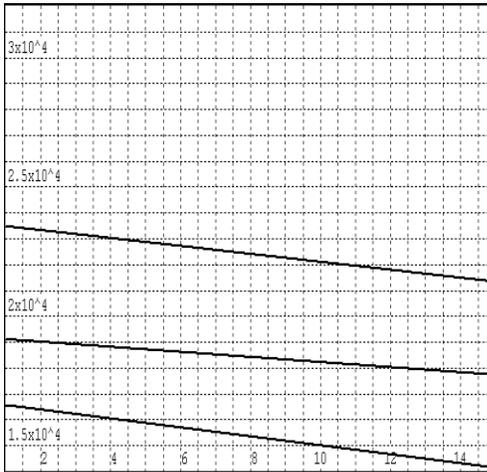
**Honda Civic:**  $(0,19205)$       **Ford Focus:**  $(0,16180)$   
 $(10,18220)$                        $(10,14450)$

2. Assuming that the values are depreciating in a *linear* pattern, plot each pair of points in #1 and then draw the corresponding line through that pair. This will give you three lines. Each line represents the trade-in value for a particular car over time.

Use the following scale:

**x-axis – let every other tic represent one month**

**y-axis – place a break at the beginning of the axis, start at \$10,000 and then let every tic mark represent \$500.**



3. At what rate (in dollars per month) is each car depreciating?

Toyota Prius: **-\$153.50 per month** Honda Civic: **-\$98.50 per month**

Ford Focus: **-\$173 per month**

4. Next to each line on the graph, put the line's slope. (Remember, if the value is decreasing over time, then the slope would be considered negative.)

5. What is the relationship between the rate of depreciation for each car and the corresponding slope or their line?

**They are the same**

6. Which car seems like the best one to keep long term and why?

***The Honda depreciates least each month***

7. If each car continues to depreciate at this constant rate, what is the equation of the line that describes the depreciation for each? (Note: you have the slope and the y-intercept)

Toyota Prius:  **$y = -153.5x + 23630$**

Honda Civic:  **$y = -98.5x + 19205$**

Ford Focus:  **$y = -173x + 16280$**

8. If you trade in your Toyota Prius in September 2010, what would the trade-in value be?

**September 2010 =>  $x = 18$**

**\$20,867**

9. When would you have to trade in your Honda Civic if you wanted to get \$12,000 for the car?

**X = 73 months = 6years and one month**

**April 2014**

10. Suppose your Ford Focus is totaled in an accident in July 2011, how much would you get from the insurance company if they agreed to give you the trade-in value?

**July 2011 => x = 40**

**\$9,360**