

## Lesson Plan

### Course

Math 115: College Algebra for Precalculus.

### Background for the Exercise.

This lesson focuses on analyzing word problems using mathematical methods. It is crucial for students to be able to understand the question and data given within the text of the problem. Solutions to these problems are part of daily work in various industries. Students find working with mathematical methods challenging especially when converting word problem to numerical data. Prior to this lesson, mathematical methods are introduced: finding slope of the line given two points and learning basic characteristics of the line.

### Exercise

A business purchased a car in 2008 for \$35,950. For tax purposes, the value of the car in 2011 was \$20,550. If the business is using straight line depreciation, write the equation of the line that gives the value of the car based on the age of the car in years.

### Learning Objectives

Student must be able to convert word problem into a numerical data.

Student must be able to identify the variables.

Student must be able to define slope, vertical intercept and linear equation.

Student must be able to apply the data given to obtain the slope either via manual calculation or through the use of a calculator when necessary.

Student must be able to recognize vertical intercept.

Student must correctly apply above obtained numerical data to formulate equation of a line.

Students must be able to verify obtained results via substitution.

### Time Required for Instruction.

One lesson (75 min).

### Written Instructions.

Prior Lesson: basics characteristics of a line, finding slope of the line using two points.

Topic: Finding Equations of Lines

Once you have a the slope, you can use either the slope-intercept form  $y = mx + b$

or the point-slope formula  $y - y_1 = m(x - x_1)$

Steps to find the equation of a line using the slope-intercept form  $y = mx + b$

- o Use any two points to calculate the slope.
- o Substitute in the slope and a point to find the value of b.
- o Write the equation in slope-intercept form.

- o Check the equation by plugging in the points to make sure they are solutions.

Steps to find the equation of a line using the point-slope formula  $y - y_1 = m(x - x_1)$ .

- - o Use any two points to calculate the slope.
  - o Substitute in the slope and a point into the point-slope formula.
  - o Write the equation in slope-intercept form.
  - o Check the equation by plugging in the points to make sure they are solutions.
- Exercise 1, 2, 3: Finding equation of a line.
- Word Problem: A business purchased a car in 2008 for \$35,950. For tax purposes, the value of the car in 2011 was \$20,550. If the business is using straight line depreciation, write the equation of the line that gives the value of the car based on the age of the car in years.
- Step 1: Define the variables that we will use.
  - o  $a$  = age of the car in years
  - o  $v$  = value of the car, for tax purpose, in dollars.

A point  $(a,v)$  will determine value of the car at a certain age.

- Step 2: Write down the two examples of the value of the car from the problem
  - o In 2008 the car was 0 years old and worth \$35,950.00
  - o In 2011 the car was 3 years old and worth \$20,550.00

These two quantities represent the points  $(0, 35950)$  and  $(3, 20550)$

- Step 3: Use these two points to calculate the slope of the equation

$$m = \frac{20550 - 35950}{3 - 0} = \frac{-15400}{3} \approx -5133.33$$

o

Step 4: From previous lesson we know that the first point we were given is the vertical intercept. So we have the value of  $b$ . Therefore our equation is  $v = -5133.33a + 35950$ .

Step 5: Check the equation:  $35950 = -5133.33(0) + 35950$ .

Practice more exercises from the book.

#### Materials Required for Assignment or Exercise & Format.

Printed instructions via textbook, calculator.

#### Assessment Plan & Instruments.

- Pre and post-test.
- Homework assignments.
- Quiz and Exam.

