

## Average Rate of Change and the Slope of a Line – Day 2

### 3.3 & 3.4

#### In Class Activity

- 1) A population of animals has 200 to start with and grows at a constant rate of 30 per year. Write a population equation. Be sure to state and define your variables.
  
- 2) An employer is having a dinner catered for employees. She must pay a dining hall rental fee of \$275 and an additional \$28 for each meal served. Write an equation. State and define your variables.
  
- 3) There are originally 255 foxes and 104 rabbits on a game reserve. The fox population grows at a constant rate of 33 foxes per year, and the rabbits increase at a rate of 53 rabbits per year. Under these conditions, how long does it take for the number of rabbits to catch up with the number of foxes? How many of each animal will be present at that time?

4) Each of the equations below represents the population of animals in a certain region, where  $t$  is the year. Describe in words what each of the equations tells you about the population of animals.

a.  $P = 750 + 45t$

b.  $P = 800 - 30t$

c.  $P = 40t + 900$

d. Which population starts out with the most animals? Which population is growing fastest?

5) The relationship between the amount of tax  $T$ (in dollars) owed to the state of Oklahoma and the adjusted gross Income  $I$ (in dollars), is said to be linear at least over a suitably restricted range of incomes. According to the 1994 Oklahoma income tax tables, a single Oklahoma resident tax pay with an adjusted gross income of \$15,000 owes \$780 Oklahoma income tax. If the adjusted gross income is \$15,500, then the tables show a tax liability of \$825. Calculate the rate of change of  $T$  with respect to  $I$  and explain in practical terms what it means?

- 6) An airplane begins descending towards O'Hare airport. After 6 minutes of descent, the altimeter reads 3500 meters. At 14 minutes, the altitude of the plane is 1500 meters.

- a. Put this information into the table below.

$x = \text{minutes}$	$y = \text{meters}$

- b. Find the slope. Give the meaning of the slope in the context of this situation.

- 7) Bruce received 120 hours of free Internet connect time as an introductory membership offer from loa.com. He spends 2 hours per day connected to the Internet.

- a. Write the equation for the amount of free connect time,  $t$ , that Bruce has left after  $d$  days. *Note: you may choose to complete the input-output table (part b) before writing the equation.*

- b. Complete an input-output table with values of  $d$  from 0 to 50 in steps of 10.

Input, $d$	Output, $t$

- c. Which fact in this situation gives you the slope?
- d. What is the practical meaning of the slope in the context of this situation?
- e. Find the vertical axis intercept point.
- f. What is the practical meaning of the vertical axis intercept point in this situation?  
Write your answer as a sentence, using both coordinates ( $t$  and  $d$ ).

8) A submarine, cruising at 160 meters beneath the surface of the ocean, begins to rise toward the surface at the rate of 12 meters per minute.

- a. Write the equation that gives the position,  $y$ , (output) after  $x$  minutes (input)

b. Identify and interpret the slope.

c. Identify and interpret the  $y$ -intercept.

d. Find and interpret the  $x$ -intercept.

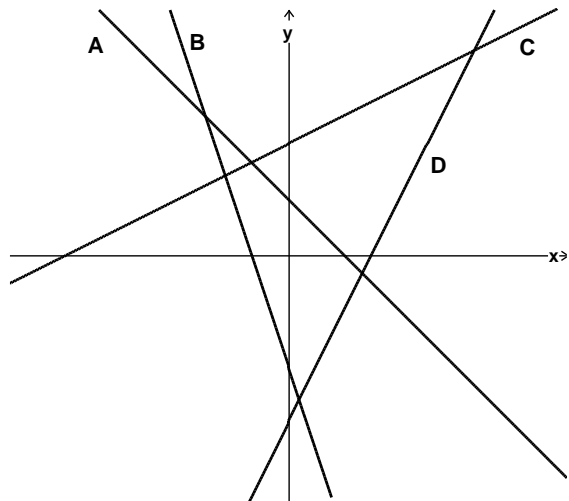
9) Each of the lines in the graph has one of the slopes given below. Use your understanding of slope to match each line with the correct slope.

a.  $m = 2$

b.  $m = \frac{1}{2}$

c.  $m = -1$

d.  $m = -3$

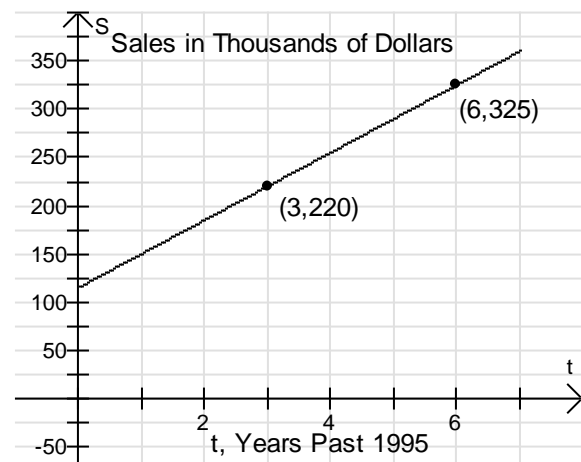


10. On Memorial Day weekend, Minalan drives from his home to a cabin on Lake Erie. His distance from the lake after  $x$  hours of driving is given by the equation  $y = 450 - 50x$

- a. What are the slope and the  $y$  - intercept of the graph of this equation?
- b. What do the slope and the  $y$  -intercept tell you about the problem situation?
- c. Find the  $x$ -intercept and interpret in the context of the problem.

11. The graph gives sales information at Baybrook Industries from 1995 to 2002. The output,  $S$ , is the sales in **thousands of dollars**  $t$  years past 1995. That is,  $t = 0$  represents 1995,  $t = 1$  represents 1996 etc.

- a. What is the practical meaning of the point  $(3, 220)$  ?



- b. Find the slope of this line.

- c. What is the practical meaning of this slope?