



## College Algebra Workshop 2



### Module 2 - Domains and Ranges of Functions Additional Practice Problems

1. Imani must check and adjust the pH level of her swimming pool each week. A pH level of 7.4 is considered ideal. If the pH level is above 7.6, the pool is too *alkaline* and Imani must add sodium bisulfate to lower the pH level. The amount of sodium bisulfate  $S$  that Imani must add is a function of the pH level  $p$ . Table 1 relates  $S$  to  $p$ .

$p$ (pH level)	$S$ (oz per 1000 gal)
From 7.2 to below 7.6	None
From 7.6 to below 7.8	0.5
From 7.8 to below 8.0	1.0
From 8.0 to below 8.4	2.0
8.4	2.4

**Table 1**

- Evaluate  $S(8.0)$  and then interpret this value using a complete sentence.
- Express the following information in function notation: Imani must add one-half ounce of sodium bisulfate per 1,000 gallons of water if the pH level is 7.6.
- What is the domain of the function  $S$ ?
- What is the range of the function  $S$ ?
- Show 0 is in the range of  $S$  by finding an input  $p$  such that  $S(p) = 0$ .
- Explain why 1.5 is not in the range of  $S$ .
- Is it correct to write  $S(7.0) = 0$ ? Why or why not?

**2.** A biologist is monitoring a population of fruit flies in an experiment. The number  $N$  of fruit flies in the population after  $t$  days of the experiment is given by the function

$$N(t) = -2(t + 1)(t - 20)$$

**a.** Evaluate  $N(0)$  and then interpret this value using a complete sentence.

**b.** What is the population of fruit flies after 5 days of the experiment? Express this information using function notation.

**c.** Is  $-5$  in the abstract domain of the function  $N$ ? Explain.

**d.** Is the value  $N(-5)$  meaningful? Explain.

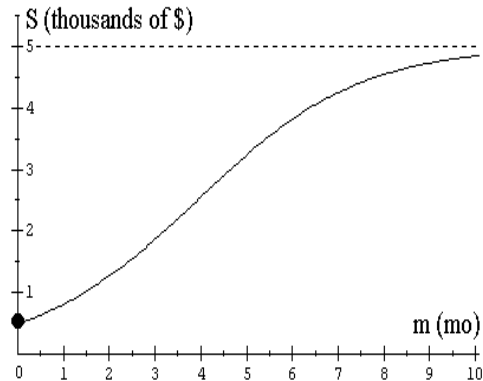
**e.** At what time(s) is the fruit fly population 216? Express this information using function notation.

**f.** Use part e to explain why 216 is in the range of the function  $N$ .

**g.** When does the fruit fly population first become extinct?

**h.** Use part g to write the application domain of the function  $N$ . Use interval notation.

3. The following graph depicts the daily sales  $S$  (in thousands of \$) of Granny Smith's Milky Rich Chocolate Bars,  $m$  months after a new advertising campaign is started.



**Table 2 Daily Sales Related to Time**

- a. Evaluate  $S(4)$  and then interpret this value using a complete sentence.
  
- b. What are the daily sales 9 mo after the advertising campaign begins? Express this information using function notation.
  
- c. How long after the advertising campaign begins do daily sales reach \$1,500?
  
- d. Show 4 is in the range of the function  $S$  by finding an input  $m$  such that  $S(m) = 4$ .
  
- e. Is the value  $S(0)$  meaningful? Explain.
  
- f. Is the value  $S(12)$  meaningful? Explain.
  
- g. Is 5 in the range of  $S$ ? Explain.
  
- h. Write the domain of the function  $S$ .
  
- i. The graph of  $S$  has a horizontal asymptote at  $y = 5$ . What does this asymptote suggest about the trend in daily sales?
  
- j. Write the range of the function  $S$ .