Modeling with Linear Functions

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

1) If an object is dropped from a tower, then the velocity, V (in feet per second), of the object after t
   seconds can be obtained by multiplying t by 32 and adding 10 to the result. Find the function
   V(t) relating the velocity to the number of seconds, t. Use this function to find the velocity of the
   object at time t = 6.3 seconds.
   A) 211.6 ft/sec   B) 210.9 ft/sec   C) 209.6 ft/sec   D) 212.9 ft/sec

1) _____

2) A faucet is used to add water to a large bottle that already contained some water. After it has
   been filling for 4 seconds, the gauge on the bottle indicates that it contains 11 ounces of water.
   After it has been filling for 11 seconds, the gauge indicates the bottle contains 25 ounces of water.
   Let f(x) be the amount of water in the bottle x seconds after the faucet was turned on. Write a
   linear function that models the amount of water in the bottle in terms of x.
   A) $f(x) = \frac{1}{2}x + 9$ B) $f(x) = -2x + 19$ C) $f(x) = 2x + 3$ D) $f(x) = 2x + 14$

2) _____

3) Regrind, Inc. regrinds used typewriter platens. The variable cost per platen is $1.60. The total
   cost to regrind 110 platens is $300. Find the linear cost function to regrind platens. If reground
   platens sell for $9.50 each, how many must be reground and sold to break even?
   A) C(x) = 1.60x + 124; 12 platens   B) C(x) = 1.60x + 300; 38 platens
   C) C(x) = 1.60x + 300; 27 platens   D) C(x) = 1.60x + 124; 16 platens

3) _____

4) A lumber yard has fixed costs of $5980.60 per day and variable costs of $0.61 per board–foot
   produced. Lumber sells for $2.31 per board–foot. How many board–feet must be produced and
   sold daily to break even?
   A) 2345 board–feet   B) 3518 board–feet
   C) 2048 board–feet   D) 9804 board–feet

4) _____

5) Persons taking a 30–hour review course to prepare for a standardized exam average a score of
   620 on that exam. Persons taking a 70–hour review course average a score of 757. Find a linear
   function S(t), which fits this data, and which expresses score as a function of time.
   A) S(t) = –3.425t + 517.25   B) S(t) = 3.425t + 517.25
   C) S(t) = 3.0825t + 521.25   D) S(t) = 3.0825t – 521.25

5) _____

6) Northwest Molded molds plastic handles which cost $0.30 per handle to mold. The fixed cost to
   run the molding machine is $1231 per week. If the company sells the handles for $1.30 each,
   how many handles must be molded and sold weekly to break even?
   A) 1231 handles   B) 820 handles   C) 4103 handles   D) 769 handles

6) _____

7) Northwest Molded molds plastic handles which cost $0.40 per handle to mold. The fixed cost to
   run the molding machine is $4935 per week. If the company sells the handles for $3.40 each,
   how many handles must be molded and sold weekly to break even?
   A) 1645 handles   B) 1096 handles
   C) 1298 handles   D) 12,337 handles

7) _____

8) A vendor has learned that, by pricing caramel apples at $1.00, sales will reach 132   8) _____
caramel apples per day. Raising the price to $2.00 will cause the sales to fall to 80 caramel apples
per day. Let f(x) be the number of caramel apples the vendor sells at x dollars each. Write a
linear function that models the number of caramel apples sold per day when the price is x
dollars each.

A) $f(x) = -\dfrac{1}{52}x + \dfrac{6863}{52}$ B) $f(x) = -52x - 184$

C) $f(x) = -52x + 184$ D) $f(x) = 52x + 80$

Write an equation for the linear function and use it to answer the given question.

9) Normaltown High School's pool record for the 100–yard freestyle was 47.8 in 1990. Assume that   9) _____
the record falls at a constant rate of 0.03 second per year. What does the model predict for the
record in 2010?

A) $R = 47.8 + 0.03t$; 48.40 seconds   B) $R = 47.8t - 0.03$; 955.97 seconds
C) $R = 47.8t + 0.03$; 956.03 seconds   D) $R = 47.8 - 0.03t$; 47.20 seconds

Solve the problem.

10) In 1880 the population of a midwest city was 19,000. By 1920 it had grown to 20,000. If it   10) _____
continues to grow at the same rate, what will the population be in 1939? Give your answer to the
nearest whole number.

A) 19,476   B) 20,475   C) 20,000   D) 21,000

Solve.

11) When making a telephone call using a calling card, a call lasting 5 minutes cost $1.70. A call   11) _____
lasting 14 minutes cost $3.95. Let y be the cost of making a call lasting x minutes using a calling
card. Write a linear equation that models the cost of a making a call lasting x minutes.

A) $y = 0.25x + 0.45$ B) $y = 0.25x - 10.05$

C) $y = -0.25x + 2.95$ D) $y = 4x - \dfrac{183}{10}$

Write an equation for the linear function and use it to answer the given question.

12) You can rent time on computers at the local copy center for a $7 setup charge and an additional $ 12) _____
4 for every 5 minutes. How much time can you rent for $16?

A) $r = 7 - 0.8t$; 28.75 minutes   B) $r = 7t + 0.8$; 2.17 minutes
C) $r = 7 + 0.8t$; 11.25 minutes   D) $r = 7t - 0.8$; 2.4 minutes

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Answer Key
Testname: MODELING WITH LINEAR FUNCTIONS

1) A
2) C
3) D
4) B
5) B
6) A
7) A
8) C
9) D
10) B
11) A
12) C