

Modeling with Linear Functions

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

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

- 1) Normaltown High School's pool record for the 100-yard freestyle was 47.8 in 1990. Assume that the record falls at a constant rate of 0.03 second per year. What does the model predict for the record in 2010? 1) _____
- A) $R = 47.8 + 0.03t$; 48.40 seconds
B) $R = 47.8 - 0.03t$; 47.20 seconds
C) $R = 47.8t + 0.03$; 956.03 seconds
D) $R = 47.8t - 0.03$; 955.97 seconds
- 2) You can rent time on computers at the local copy center for a \$7 setup charge and an additional \$4 for every 5 minutes. How much time can you rent for \$16? 2) _____
- A) $r = 7 - 0.8t$; 28.75 minutes
B) $r = 7 + 0.8t$; 11.25 minutes
C) $r = 7t + 0.8$; 2.17 minutes
D) $r = 7t - 0.8$; 2.4 minutes

Solve.

- 3) When making a telephone call using a calling card, a call lasting 5 minutes cost \$1.70. A call 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. 3) _____
- A) $y = 0.25x - 10.05$
B) $y = 0.25x + 0.45$
C) $y = -0.25x + 2.95$
D) $y = 4x - \frac{183}{10}$

Solve the problem.

- 4) Re grind, 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? 4) _____
- A) $C(x) = 1.60x + 300$; 27 platens
B) $C(x) = 1.60x + 124$; 16 platens
C) $C(x) = 1.60x + 300$; 38 platens
D) $C(x) = 1.60x + 124$; 12 platens
- 5) Northwest Molded molds plastic handles which cost \$0.70 per handle to mold. The fixed cost to run the molding machine is \$7131 per week. If the company sells the handles for \$3.70 each, how many handles must be molded and sold weekly to break even? 5) _____
- A) 1620 handles
B) 10,187 handles
C) 2377 handles
D) 1584 handles
- 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? 6) _____
- A) 4103 handles
B) 820 handles
C) 1231 handles
D) 769 handles
- 7) 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? 7) _____
- A) 3518 board-feet
B) 9804 board-feet
C) 2345 board-feet
D) 2048 board-feet

- 8) 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. 8) _____
A) $S(t) = 3.0825t + 521.25$ B) $S(t) = -3.425t + 517.25$
C) $S(t) = 3.425t + 517.25$ D) $S(t) = 3.0825t - 521.25$
- 9) In 1880 the population of a midwest city was 19,000. By 1920 it had grown to 20,000. If it continues to grow at the same rate, what will the population be in 1939? Give your answer to the nearest whole number. 9) _____
A) 20,475 B) 19,476 C) 21,000 D) 20,000
- 10) 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? 10) _____
A) 1645 handles B) 1298 handles
C) 1096 handles D) 12,337 handles
- 11) A window is in the shape of a square topped by a semicircle. The side of the square is x cm and the window cannot be wider than 150 cm. Find the function for the perimeter of the window and the domain of the function. 11) _____
A) $P = 3x + \frac{1}{2}\pi x^2 : 0 < x \leq 150$ B) $P = 4x + \frac{1}{2}\pi x^2 : 0 < x \leq 150$
C) $P = 4x + \pi x : 0 < x \leq 150$ D) $P = 3x + \frac{1}{2}\pi x : 0 < x \leq 150$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 12) Two boats leave a dock at the same time. One boat is headed directly east at a constant speed of 35 knots (nautical miles per hour), and the other is headed directly south at a constant speed of 22 knots. Express the distance d between the boats as a function of the time t . 12) _____
- 13)
Finding a Break-Even Point
A company sells sports helmets. The company incurs a one-time fixed cost for \$250,000. Each helmet costs \$120 to produce, and sells for \$140.
a. Find the cost function, C , to produce x helmets, in dollars.
b. Find the revenue function, R , from the sales of x helmets, in dollars.
c. Find the break-even point, the point of intersection of the two graphs C and R .

Answer Key

Testname: MODELING WITH LINEAR FUNCTIONS

- 1) B
- 2) B
- 3) B
- 4) B
- 5) C
- 6) C
- 7) A
- 8) C
- 9) A
- 10) A
- 11) D
- 12) $d(t) = \sqrt{1709t}$