Key

Sept. 10 Worksheet

1. What are the x and y intercepts of the following equations? What are the slopes?

   - $y = (1/2)x + 3$

     X-int = (-6, 0)

     y-int = (0, 3)

     slope = 1/2

   - $y = 9x - 7$

     X-int = (7/9, 0)

     y-int = (0, -7)

     slope = 9

   - $y = -7x^2$

     X-int = (0, 0)

     y-int = (0, 0)

     slope = n/a

2. A piece of heavy machinery is purchased for $150,000. After five years, its value is estimated to be $80,000. Assuming the equipment's value depreciates linearly:

   What is the annual depreciation of this function?

   $14000 per year

   $y = -14000x + 150,000$

   How long will it be until the equipment is worth $20,000?

   $\approx$ 9.3 years

3. A leisure boat is purchased for $90,000, and after five years, it is now worth $65,000. Assuming the boat's value depreciates linearly:

   Find the linear depreciation equation.

   $y = -5000x + 90,000$

   How much will the boat be worth after 12 years?

   $30,000

4. A small bakery makes custom cakes. Each cake costs $12 to produce. The total cost to produce 80 cakes is $1,360.

What is the cost function equation?

$C(x) = 12x + 400$

Using this information, what are the fixed costs?

$400

5. From question 4, find the average cost to produce 50 cakes compared to 500 cakes.

50 cakes = $20 per cake

500 cakes = $12.80 per cake

6. Tillie's Dog Biscuit Company has a monthly fixed cost of $15,000. It costs $1.50 to produce each bag of biscuits. A bag of these biscuits sells for $4.00.

Find the cost function to produce x bags of biscuits.

$C(x) = 1.5x + 15000$

Find the revenue function from selling x bags of biscuits.

$R(x) = 4x$

Find the profit function on x bags of biscuits.

$P(x) = 2.5x - 15000$

How many bags of biscuits need to be sold to break even?

6000 bags

7. The function below represents the projected sales (in thousands of dollars) for a new line of eco-friendly cleaning products over the next 10 years.

$$S(x)=0.3x3-0.7x2+3x+5$$

What are the projected sales for the current year?

$5,000

What sales are expected for Year 3? Year 9?

Year 3: $15,800 Year 9: $194,000

8. In a certain city, the average hourly rainfall in inches during a storm can be approximated by the following piecewise function, where t represents the number of hours since the storm began:

$$R(t)=\begin{cases} 0.5t & \text{if } 0 \le t \le 4 \\ 2 & \text{if } 4 < t \le 6 \\ -0.25t+3.5 & \text{if } 6 < t \le 12 \end{cases}$$

Find the average hourly rainfall after 3 hours.

1.5 inches

Find the average hourly rainfall after 9 hours.

1.25 inches

9. Determine the vertex of the parabola. $y = -2(x+3)^2 + 5$

Does the parabola open up or down?

down

Does it have a minimum or maximum value?

maximum

What is the vertex?

(-3,5)

10. Find the equilibrium quantity (q) and the equilibrium price (P) for artisanal coffee beans.

Price-supply: $S=21q^2$

Price-demand: $D=-3q+50$

quantity = 1.47 units

price = $45.59

Sketch the lines.