Name ____ Date ___________ Class ___________

Additional Practice

Investigation 4

1. A ship conducting oceanographic research drops anchor offshore Honiara, the capitol of the Solomon Islands in the South Pacific. When the anchor is tossed into the water, the depth in feet D it has descended after t seconds is given by the equation $D = -4t^2 + 12t$.

a. If it takes the anchor 10 seconds to reach the bottom, how deep is the water where the ship has dropped anchor?

b. If the ship moves to another location and the anchor takes 8.5 seconds to reach the bottom, how deep is the water in that spot?

c. If the ship anchors in the harbor of Honiara, where the water is 72 feet deep (that is, $D = -72$), how long will it take for the anchor to reach the bottom when it is dropped?

2. Metropolitan Container produces storage containers from recycled plastic. The total cost in dollars C of manufacturing n containers is given by the equation $C = 2n^2 + 9n + 100$.

a. What is the total cost of manufacturing 4 containers?

b. What is the total cost of manufacturing 10 containers?

c. The *average cost* of manufacturing each container is $\frac{C}{n}$, the total cost of manufacturing the containers divided by the number of containers.

i. Based on your answer to part (a), what is the average cost of manufacturing 4 containers?

ii. Based on your answer to part (b), what is the average cost of manufacturing 10 containers?

iii. Compare your answers to parts (i) and (ii). What can you say about manufacturing 4 containers versus 10 containers?

d. The city of Metropolis has placed an order for a certain number of containers. If the cost of producing these containers is \$3,660, how many containers did the city order? Explain your reasoning.

Additional Practice *(continued)*

3. a. Complete this table for the equation $y = 5x^2$.

x	0	1	2	3	4
y					

b. What are the first differences in your table for the y values as x increases by 1?

c. What are the second differences in your table for the y values as x increases by 1?

d. Describe any patterns in the values you found in part (c) for the second differences.

4. a. Complete this table for the equation $y = 8x^2$.

x	0	1	2	3	4
y					

b. What are the first differences in your table for the y values as x increases by 1?

c. What are the second differences in your table for the y values as x increases by 1?

d. Describe any patterns in the values you found in part (c) for the second differences.

Additional Practice *(continued)*

5. a. Complete this table for the equation $y = 0.1x^2$.

x	0	1	2	3	4
y					

b. What are the first differences in your table for the y values as x increases by 1?

c. What are the second differences in your table for the y values as x increases by 1?

d. Describe any patterns in the values you found in part (c) for the second differences.

6. a. Complete this table for the equation $y = -3x^2$.

x	0	1	2	3	4
y					

b. What are the first differences in your table for the y values as x increases by 1?

c. What are the second differences in your table for the y values as x increases by 1?

d. Describe any patterns in the values you found in part (c) for the second differences.

Name ____ Date ___________ Class ___________

Additional Practice *(continued)*

7. Which of these are quadratic functions?

a. $y = x^2 - 7$ **b.** $y = 2(x + 7)$ **c.** $y = x\,(x + 7)$

d. $y = (x + 4)(x - 2)$ **e.** $y = (6 + 5)(x + 2)$ **f.** $y = (x - 3)(4)$

g. $y = 2x + 9$ **h.** $y = x^2 - 9$ **i.** $y = x + x + 9$

8. For each quadratic function in Exercise 7, find the coordinates of the x- and y-intercepts and the maximum/minimum point of the graph of the function.

Additional Practice: Digital Assessments

9. a. Use the values in the bank to complete the table for the function $y = 4x^2$.

0 1 4 8 16 24 36 64

x	0	1	2	3	4
y					

Circle the word or phrase to complete each statement for parts (b) and (c).

b. Based on the table, the first differences for the y-values as x increases [vary / are constant].

c. Based on the table, the second differences for the y-values as x increases [vary / are constant].

10. Consider the function $y = (x - 5)(x + 3)$. Choose numbers from the tiles for key features of the graph of the function. Numbers may be used more than once.

0	1	−1
5	2	−3
−16	−15	8

Vertex: (☐ , ☐)

x-intercepts: (☐ , ☐) and (☐ , ☐)

y-intercept: (☐ , ☐)

11. A baseball player hits a baseball such that the height, in feet, of the ball t seconds after it is hit is given by the equation $h = -16t^2 + 85t + 3$. Circle the numbers that make each statement true.

After 2 seconds, the ball is [72 / 106 / 109] feet high.

The ball reaches its maximum height between [1 and 2 / 2 and 3 / 3 and 4 / 4 and 5] seconds.

12. A company's profit can be modeled by the function $p = -x^2 + 430x + 12{,}500$, where x represents the number of items sold. Circle the numbers that make each statement true.

The maximum profit the company can make is [$12,500 / $25,000 / $50,250 / $58,725] by selling [215 / 430 / 460] items.

Name ____ Date ___________ Class ___________

Skill: Quadratic Functions

Investigation 4

1. You and a friend are hiking in the mountains. You want to climb to a ledge that is 20 feet above you. The height of the grappling hook you throw is given by the function $h = -16t^2 - 32t + 5$. What is the maximum height of the grappling hook? Can you throw it high enough to reach the ledge?

2. The total profit made by an engineering firm is given by the function $p = x^2 - 25x + 5000$. Find the minimum profit made by the company.

3. You are trying to dunk a basketball. You need to jump 2.5 feet in the air to dunk the ball. The height that your feet are above the ground is given by the function $h = -16t^2 + 12t$. What is the maximum height your feet will be above the ground? Will you be able to dunk the basketball?