/25/24   Name **Key.**

Clearly show all work when needed.

1. Graph the quadratic in your calculator and determine the following (nearest tenth): (3 marks)

   /3

   $y = 1.8x^2 + 3x - 5$

   Vertex: $(-0.8, -6.3)$ x-intercept(s): $(1, 0)$ $(-2.7, 0)$

   Axis of symmetry: $x = -0.8$ Domain (set notation): $\{x \mid x \in \mathbb{R}\}$

   y-intercept: $b = -5$ Range (set notation): $\{y \mid y \geq -6.3, y \in \mathbb{R}\}$

2. Alex jumps off a cliff beside a lake and follows a parabolic path until she enters the water below. The height above the water (h) of Alex in meters at time (t) in seconds after jumping is given by the function $h(t) = -0.9t^2 + 6t + 15$. Graph the function in your calculator and use it to answer the following (nearest tenth if necessary).

   a) What is the y-intercept? What does it represent? (2 marks)

   /2

   $b = 15$ height Alex starts at

   /4'

   b) What is the vertex? What does it tell you about the situation? (2 marks)

   /2 $(3.3, 25)$ At 3.35, Alex is at her max height of 25m.

   c) When does Alex enter the water? (1 mark)

   /1 $h = 0$ $8.6\,s$

   d) State the domain and range in set notation. (2 marks)

   /2   D $[0, 8.6]$ $\{t \mid 0 \leq t \leq 8.6, t \in \mathbb{R}\}$

        R $[0, 25]$ $\{h(t) \mid 0 \leq h(t) \leq 25, h(t) \in \mathbb{R}\}$

3. Change the following quadratic functions to vertex form by completing the square:

   a) $y = x^2 + 10x + 20$ (2 marks)   b) $f(x) = 2x^2 - 12x + 15$ (3 marks)

   /4

   $y = (x^2 + 10x + 25 - 25) + 20$ $f(x) = 2(x^2 - 6x + 9 - 9) + 15$

   $y = (x+5)^2 - 5$ $= 2(x-3)^2 - 18 + 15$

                                             $f(x) = 2(x-3)^2 - 3$

   /15

4. An amusement park charges $20 for a day pass and averages 1000 day pass sales in a day. The owners are deciding whether to raise the pass cost or leave it the same. For every $2 they increase the price the park expects to sell 50 less passes in a day.

a) Write a quadratic in standard form that models the revenue (R) as a function of the cost increase (c). (2 marks)

$$R(c) = (20 + 2c)(1000 - 50c)$$

$$R(c) = -100c^2 + 1000c + 20000$$

/2

b) Change the function to vertex form by completing the square. (3 marks)

$$R(c) = -100(c-5)^2 + 22500$$

/3

c) What will be the maximum possible revenue and what day pass cost produces it? (2 marks) [if you were unable to complete part b you may use your graphing calculator to assist you]

$$(5, 22500)$$

Max Revenue 22,500

Cost $2c = 2(5) \rightarrow 20 + 10$

$$1 = \$30$$

/2

d) State the domain of the function in set notation. [Hint: use your graphing calculator] (2 marks)

$$D : [0, 20]$$

$$\{x | 0 \le x \le 20, x \in \mathbb{R}\}$$

$$R : [0, 22500]$$

/1

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