Name:_____Date:_____Period:_____

Chapter 12 Tiered Problems **Show all Work!**

Objectives

- B.A.REI.B.2 Solve quadratic equations in one variable. Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.
- B.F.IF.C.4 Graph linear, quadratic, absolute value, and piecewise functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated ones.
- B.N.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- B.N.CN.A.1 Know there is a complex number *i* such that $i^2 = -1$, and every complex number has the form a + bi with a and b real.
- B.N.CN.A.2 Know and use the relation $i^2 = -1$ and the commutative, associative and distributive properties to add, subtract, and multiply complex numbers.

Tier 1 (up to 70 pts) Complete #1-3 Do not move to tier 2 if you have not completed tier 1.

Tier 2 (up to 85 pts) Complete #1-4 Do not move to tier 3 if you have not completed tier 2.

Tier 3 (up to 100 points) Complete #1-5

1. (20 points) A study shows that the daily revenue from product sales can be modeled by the equation
   $y = 5x^2 + 4$, where *y* equals the revenue in hundreds of dollars and *x* equals possible increases and decreases in price.

   a. Analyze the function.
      Is the function quadratic? _____ Explain.

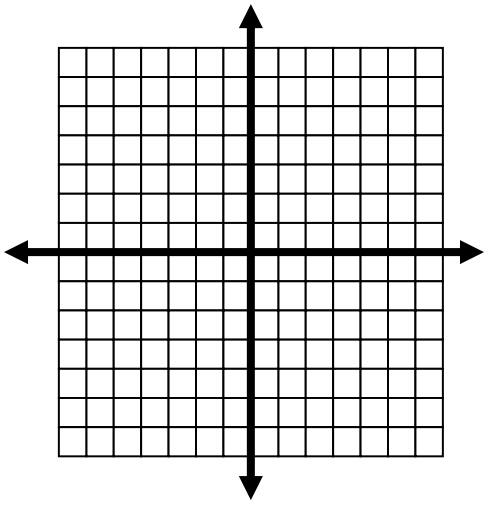
      Does it open upward or downward? _____ Explain.

      Will the vertex represent a maximum or a minimum? _____

   b. Graph the function.

   c. Determine the coordinates of the vertex.

   d. What is the minimum daily revenue in hundreds of dollars?

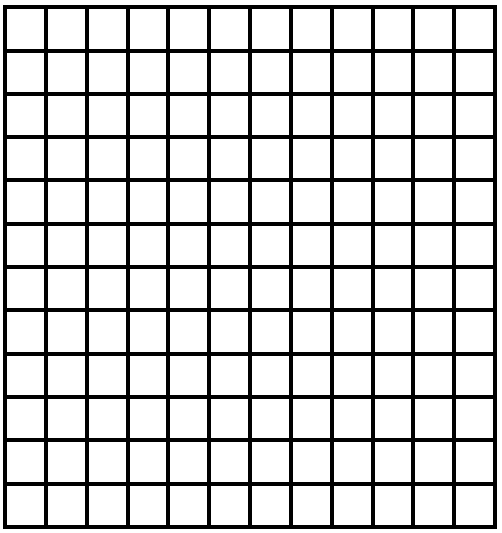


2. (30 points) Four times the square of a number is 16.

   a. Create an equation that models this situation.

   b. Write the corresponding quadratic function for the situation in standard form.

   c. Graph the function. Label the axes, vertex and solutions (*x*-intercepts).



3. (20 points) A rocket is launched with an initial upward velocity of 250 feet per second from a launch pad. The equation $h = -5t^2 + 250t + 3$ gives the rocket's height in at any given time *t*.
   a. Analyze the function. What does the vertex represent in the context of this problem?

   b. Predict the maximum height of the rocket.

   c. Evaluate the height of the rocket after 50 seconds.

4. (15 points) Suppose a projectile is launched from ground level. If you know the velocity with which the projectile is launched, you can find the time between launch and landing using the equation $h = vt - 16t^2$ where v is initial velocity in ft/sec and h represents the height.
   a. The projectile is launched with an initial velocity of 128 ft/sec. Create an equation that describes the path of the projectile.

   b. Write the equation for part a in standard form.

   c. Find the maximum height of the projectile.

5. (15 points) Compare and Contrast three methods for finding the solutions to a quadratic equation.