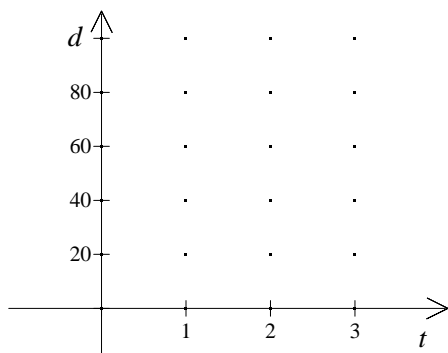


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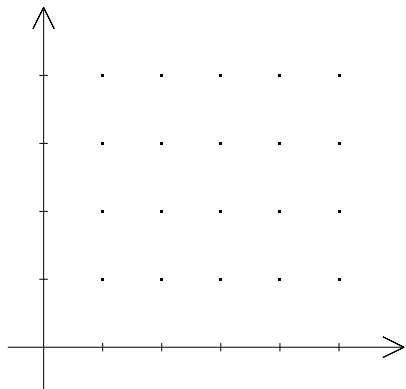
*P.I. A.G.4: Identify and graph quadratic (parabolic) functions*

1. If an object is dropped from a height of 84 feet, the function  $d = -16t^2 + 84$  gives the height of the object after  $t$  seconds. Graph this function. Approximately how long does it take the object to reach the ground ( $d = 0$ )?



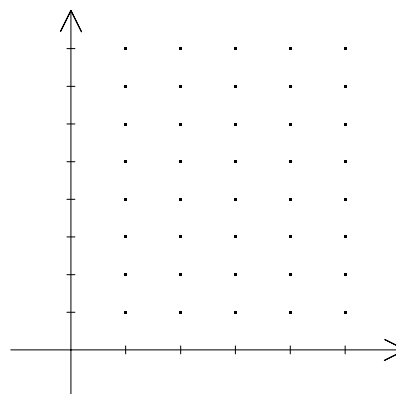
[1] \_\_\_\_\_

2. When an object is dropped from a high place, the rate at which it falls can be described by the quadratic function  $d = 16t^2$ , where  $d$  is the distance in feet and  $t$  is the time in seconds.
- What values of  $t$  make sense in the function?
  - What values of  $d$  make sense in the function?
  - Graph the function.



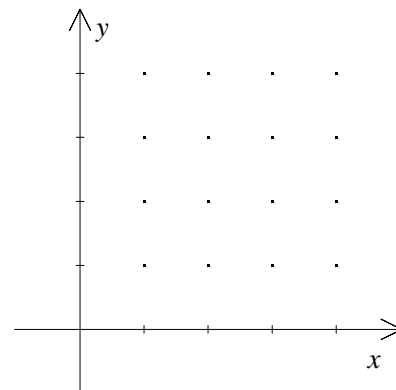
[2] \_\_\_\_\_

3. Suppose that a cake must fit into a box with a base that is 10 in. long and 10 in. wide. You can use the quadratic function  $A = \pi r^2$  to find the area of a cake in terms of its radius.
- What values of  $r$  make sense in the function?
  - What values of  $A$  make sense in the function?
  - Graph the function. Use  $\pi = 3.14$ .



[3] \_\_\_\_\_

4. a. Marla has plans for a garden inside a square fenced-in area. The garden will not include a square in the middle. Each side of the fenced-in area is 15 ft. If each side of the middle square is  $x$  ft, the function  $y = 225 - x^2$  gives the area of garden in  $\text{ft}^2$ . Graph this function.
- What values make sense for the domain? Explain why.
  - What values make sense for the range? Explain why.



[4] \_\_\_\_\_

NAME: \_\_\_\_\_

5. Civil engineers use parabolas to design highways. They design transition curves to smooth out peaks and valleys. The table below shows the elevations at particular points ( $x$ ) along a parabolic curve. Use the table below to draw a graph of this 960-ft curve.

$x$	elevation $y$
0	1,100.0
100	1,096.3
200	1,093.3
300	1,090.8
400	1,089.0
500	1,087.8
600	1,087.3
700	1,087.3
800	1,088.0
900	1,089.3
960	1,090.4

[5] \_\_\_\_\_

6. Write a parabola in standard form that has its axis of symmetry at  $x = 1$ . Sketch the graph of your parabola.

[6] \_\_\_\_\_

7. List the coordinates of three points on the graph of the function

$$f(x) = -0.12x^2 + 0.04x + 1.5.$$

[7] \_\_\_\_\_

8. The height in feet,  $h$ , above ground after  $t$  seconds of a model rocket can be found by using the function  $h = 100t - 16t^2$ . What is the height of the rocket after 3 seconds?

[8] \_\_\_\_\_

9. Which shows this equation written in standard form?

$$y = -3x(x - 2) - 7x + 1$$

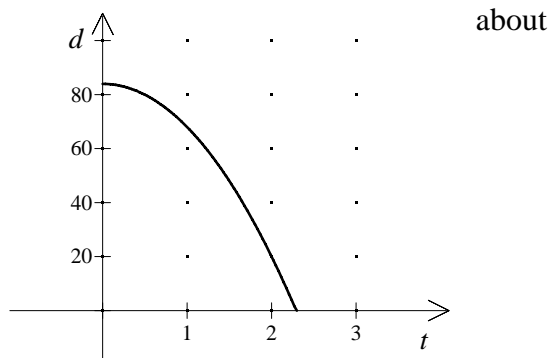
[A]  $y = -3x^2 + x + 1$

[B]  $y = -3x^2 - 9x + 1$

[C]  $y = -3x^2 - 13x - 1$

[D]  $y = -3x^2 - x + 1$

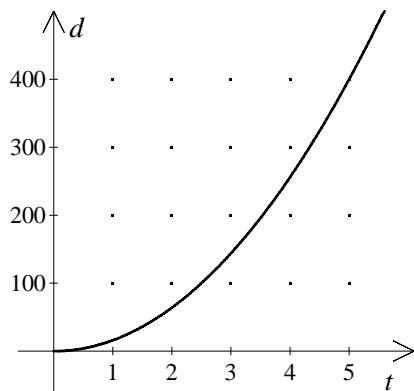
[9] \_\_\_\_\_



2.3 seconds

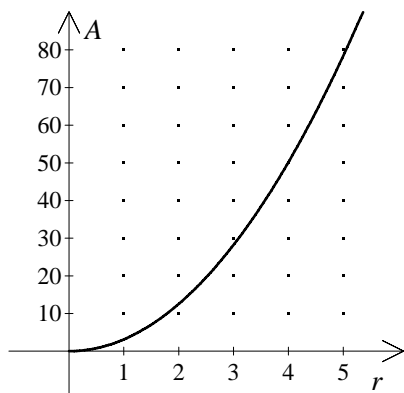
[1]

- a.  $t \geq 0$   
b.  $d \geq 0$   
c.

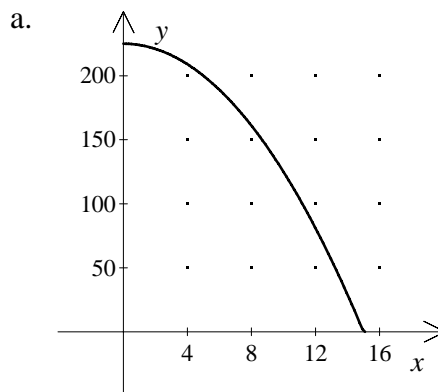


[2]

- a.  $0 < r < 5$   
b.  $0 < A < 78.5$   
c.

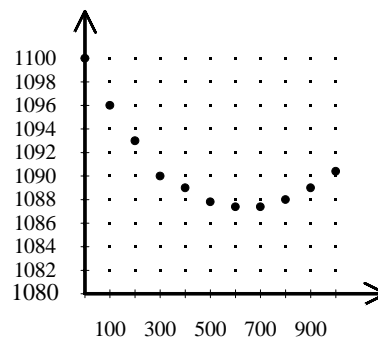


[3]



- a.  
b.  $0 < x < 15$ ; The length of a side of the inner square must fit inside the fenced-in area.  
c.  $0 < y < 225$ ; The area of the garden must

[4] be within the area of the fenced-in area.



[5]

Answers may vary. Sample:  $y = x^2 - 2x + 4$ ;

[6] check students' graphs.

Answers may vary. Sample: (0, 1.5), (1,

[7] 1.42), (2, 1.1)

[8] 156 ft

[9] D