Quadratic Volleyball   Name _____

Algebra 1H

You are examining the technique of volleyball players. You have a computer with a camera that collects data. While filming Marissa, a volleyball player, she bumps the ball and the computer gathers the following data:

| x *(feet)*	2	4	6	8	10	12	14	16	18	20	22
y *(feet)*	3	12	19	24	27	28	27	24	19	12	3

1) Graph the data.
2) Find the vertex and explain what information the vertex tells you about the path of the ball.
3) Give the equation of the line of symmetry.
4) Use the data to write a function in vertex form that represents the path of the ball.
5) Give the domain and range of the data.
6) If Nicole bumps the ball and it achieves a maximum height that is three feet less than Marissa, starting at the same point and covering the same horizontal distance, give the function that describes the path of Nicole's ball.

Show work on this page or scratch paper.

Key

x (feet)	2	4	6	8	10	12	14	16	18	20	22
y (feet)	3	12	19	24	27	28	27	24	19	12	3

1.)
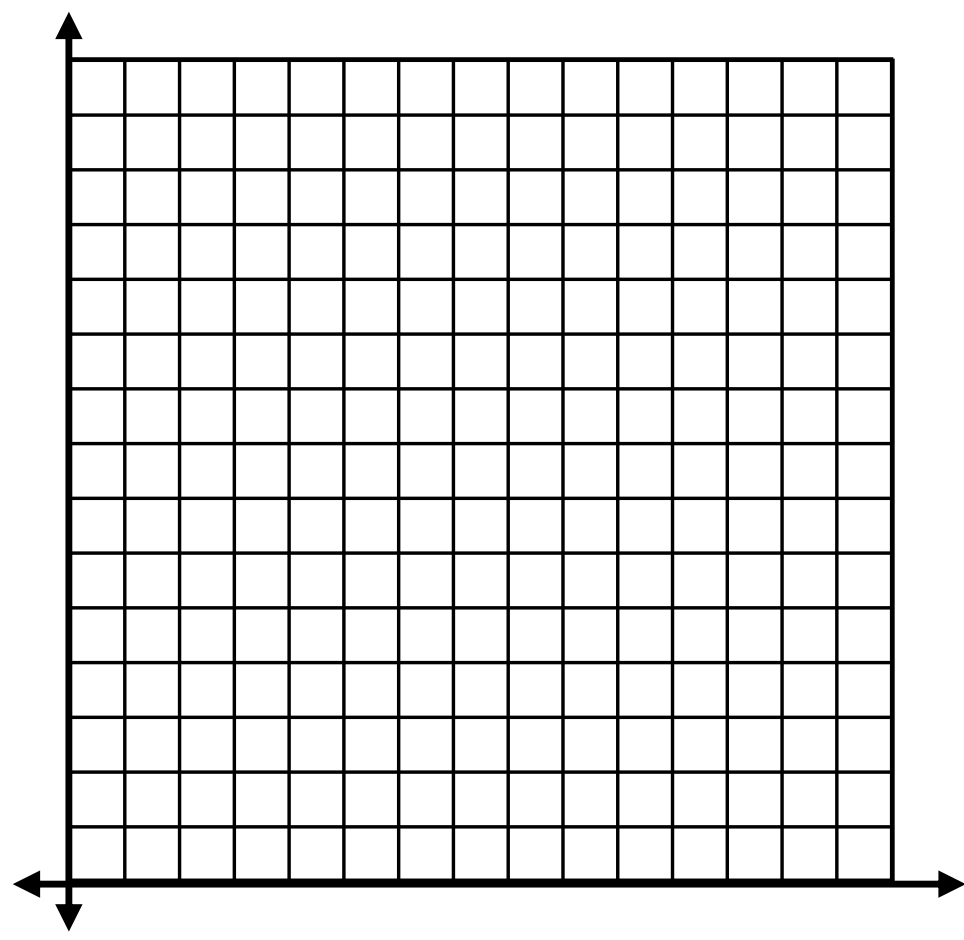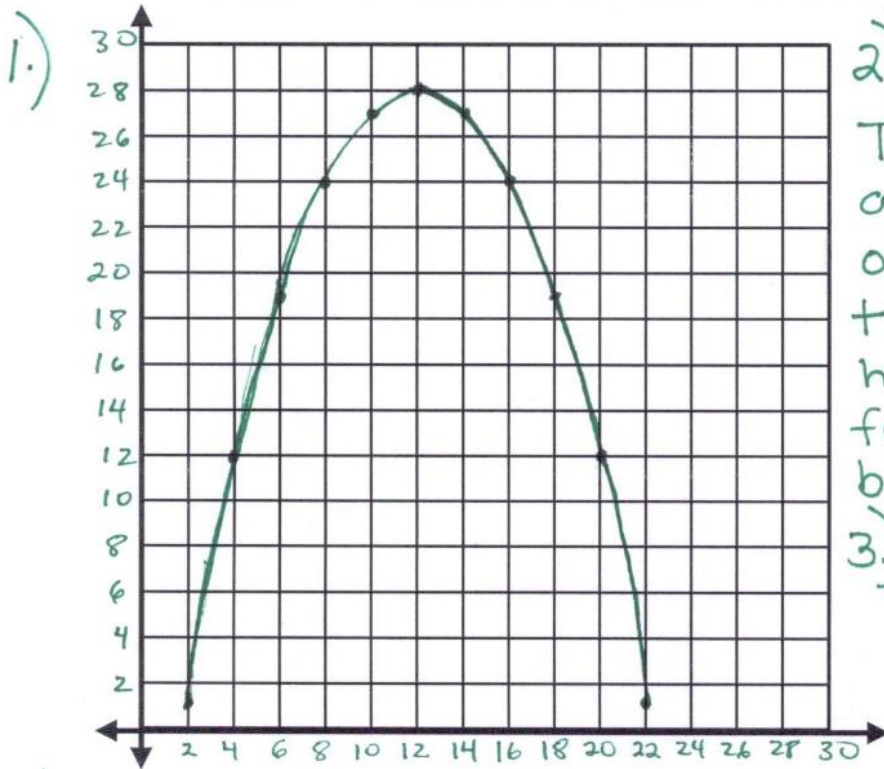
2.) $(12, 28)$

The ball attains a maximum height of 28 feet after traveling 10 feet horizontally $(12-2=10)$ from where it was bumped.

3.) $X = 12$

4.) To find the function use any point except the vertex. I choose $(2,3)$.

$$f\underset{3}{(x)} = a(\underset{2}{x} - 12)^2 + 28$$

$$3 = a(2-12)^2 + 28$$
$$3 = a(-10)^2 + 28$$
$$3 - 28 = 100a$$
$$\frac{-25}{100} = a$$
$$-\frac{1}{4} = a \quad \text{therefore:}$$

$$f(x) = -\frac{1}{4}(x-12)^2 + 28$$

is the function for Marissa's ball path.

5.) Domain
$$2 \leq x \leq 22$$
Range $3 \leq y \leq 28$

6.) $f(x) = a(x-12)^2 + 25$

$(2,3)$
$$3 = a(2-12)^2 + 25$$
$$3 = a(-10)^2 + 25$$
$$3 - 25 = 100a$$
$$-22 = 100a$$
$$\frac{-22}{100} = a = -\frac{11}{50}$$
$$f(x) = -\frac{11}{50}(x-12)^2 + 25$$

Key

x *(feet)*	2	4	6	8	10	12	14	16	18	20	22
y *(feet)*	3	12	19	24	27	28	27	24	19	12	3