

Name: Key Date: \_\_\_\_\_

### Quadratic Regression – CW

Amery recorded the distance and height of a basketball when shooting a free throw.

Distance(feet), x	Height (feet), f(x)
0	4
2	8.4
6	12.1
9	14.2
12	13.2
13	10.5
15	9.8

- Find the quadratic equation for the relationship of the horizontal distance and the height of the ball. Round to 3 decimal places.

$$f(x) = -0.118x^2 + 2.112x + 4.215$$

- Using this function what is the approximate maximum height of the ball?

$$h = -\frac{b}{2a} = \frac{-2.112}{2(-0.118)} = \frac{-2.112}{-0.236} \approx 8.949$$

$$f(8.949) \approx 13.675 \text{ feet (which is why you need to be careful about rounding)}$$

This table shows the population of a city every ten years since 1970.

Years Since 1970, x	Population (In thousands), y
0	489
10	801
20	1,202
30	1,998
40	2,959

- Find the best-fitting quadratic model for the data. Round to 3 decimal places.

$$f(x) = 1.209x^2 + 12.999x + 504.257$$

- Using this model, what will be the estimated population in 2020?

$$f(50) = 4,177.4 \text{ or } 4,176.707$$

- Which of the following is best modeled by a **quadratic** function?

- A. Relationship between circumference and diameter.
- B. Relationship between area of a square and side length.  $A = s^2$
- C. Relationship between diagonal of a square and side length.
- D. Relationship between volume of a cube and side length.

- If y is a quadratic function of x, which value completes the table?

- A. 12
- B. 20
- C. 44
- D. 48

x	-2	0	2	4	6
y	-8	0	12	28	

Find the regression, then f(6)

7. The graph of a quadratic function having the form  $f(x) = ax^2 + bx + c$  passes through the points  $(0, -8)$ ,  $(3, 10)$ , and  $(6, 34)$ . What is the value of the function when  $x = -3$ ?

A. -32

B. -26

**C. -20**

D. 10

8. Which is the quadratic equation the best fits the scatterplot?

**A.**  $f(x) = (x - 3)^2 - 4$

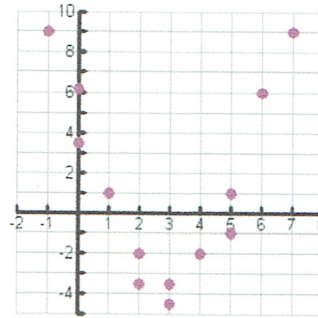
~~B.~~  $f(x) = (x + 3)^2 + 4$

C.  $f(x) = (x - 4)^2 - 3$

~~D.~~  $f(x) = (x + 4)^2 + 3$

B & D move Left and Up, the vertex is right & down.

The lowest point is closer to  $(3, -4)$  than  $(4, -3)$



9. Which is the quadratic equation the best fits the scatterplot?

~~A.~~  $f(x) = x^2 - 8x + 22$

B.  $f(x) = -x^2 - 8x - 10$

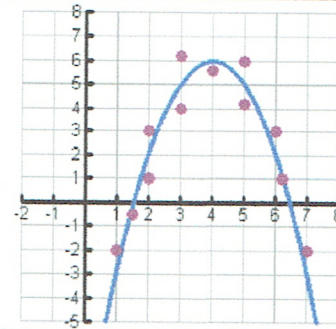
~~C.~~  $f(x) = -x^2 + 8x - 32$

**D.**  $f(x) = -x^2 + 8x - 10$

Using the 1-3-5 rule, the y-intercept will be -10, eliminating A & C.

$-\frac{b}{2a}$  puts the h value for B at -4 and D at 4.

D is much closer.



**Write a quadratic equation that fits each set of points.**

10.  $(0, -8)$ ,  $(2, 0)$ , and  $(-3, -5)$

$$f(x) = x^2 + 2x - 8$$

11.  $(-1, -16)$ ,  $(2, 5)$ , and  $(5, 8)$

$$f(x) = -x^2 + 8x - 7$$

12.  $(1, 4)$ ,  $(-2, 13)$ , and  $(0, 3)$

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

13.

<b>x</b>	-1	0	1	2	3
<b>y</b>	35	22	11	2	-5

$$f(x) = x^2 - 12x + 22$$