Name Key Date _____ Hour _____

5.1 – 5.3 Review

Use your graphing calculator to find a quadratic model for each set of values.

1. A toy rocket is shot upward from ground level. The table shows the height of the rocket at different times.

Time (seconds)	0	1	2	3	4
Height (feet)	0	256	480	672	832

a. Use a graphing calculator to find a quadratic model for this data.

$y = -16x^2 + 272x$

b. Use the model to estimate the height of the rocket after 1.5 seconds.

372

c. What's the highest point the rocket reaches in feet?

max $\frac{-272}{2(-16)} = (8.5 \text{ sec}, \frac{1156}{\text{ft}})$

d. How long does it take for the rocket to land?

@ half way it's 8.5 sec, so it takes 17 seconds

Simplify. Then determine whether each function is linear or quadratic.

2. $f(x) = 7(x - 2) + 5(3x)$

linear

$7x - 14 + 15x$

$22x - 14$

3. $f(x) = 3x^2 - (4x - 8)$

quad

$3x^2 - 4x + 8$

4. $f(x) = (2x - 3)(x + 2)$

quad

$2x^2 + 4x - 3x - 6$

$2x^2 + 1x - 6$

5. Describe the differences between $y = (x-4)^2$ and $y = -(x+4)^2 - 3$

y reflected, goes left 4 instead of right 4 & goes down 3.

6. Write the equation of a parabola in any form that has a vertex at (-2, 4) and a y-intercept of (0,0).

$y = a(x+2)^2 + 4$

$0 = a(0+2)^2 + 4$

$0 = a(4) + 4$

$\frac{-4}{4} = \frac{a(4)}{4}$ $-1 = a$

$y = -1(x+2)^2 + 4$

7. A skating rink manager finds that revenue R based on an hourly fee F for skating is represented by the function $R = -480F^2 + 3120F$. What hourly fee will produce maximum revenues?

$\frac{-b}{2a}$ $\frac{-3120}{2(-480)}$ = \$3.25

(3.25, 5386.88)
\$ Revenue

8. The path of a baseball after it has been hit is modeled by the function $h = -0.0032d^2 + d + 3$, where h is the height in feet of the baseball and d is the distance in feet the baseball is from home plate. What is the maximum height reached by the baseball? How far is the baseball from home plate when it reaches its maximum height?

$\frac{-b}{2a}$ $\frac{-1}{2(-.0032)} = \frac{-1}{-.0064} =$ 156.25 = distance

(156.25, 81.25)
dist. height

Write each function in vertex form.

9. $y = x^2 - 4x - 4$

$\frac{4}{2(1)} = 2$ (2, −8)

$y = a(x-2)^2 - 8$

$y = 1(x-2)^2 - 8$

10. $y = -3x^2 - 18x - 4$

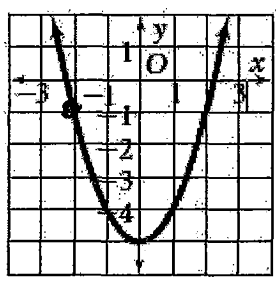
$\frac{18}{2(-3)} = -3$ (−3, 23)

$y = a(x+3)^2 + 23$

$y = -3(x+3)^2 + 23$

Write the equation of the parabola in vertex form.

11.



Point (−2, −1)

V (0, −5)

$y = a(x-0)^2 - 5$

$-1 = a(-2-0)^2 - 5$

$-1 = a(4) - 5$

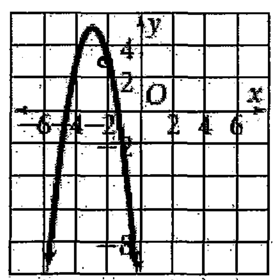
$4 = 4a$

$1 = a$

$y = (x-0)^2 - 5$

$y = (x)^2 - 5$

12.



Point (−2, 3)

V (−3, 5)

$y = a(x+3)^2 + 5$

$3 = a(-2+3)^2 + 5$

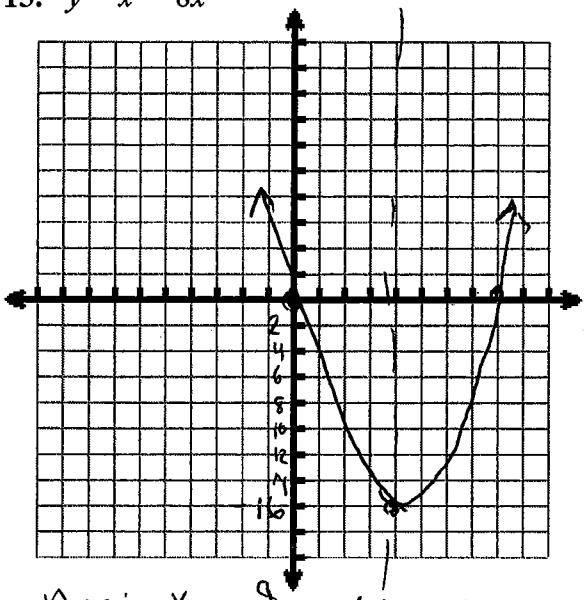
$3 = a(1) + 5$

$-2 = a$

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

For #13 – 16, graph each function. Identify the AOS, Vertex, Y-intercept and a random point if needed. Then sketch the graph.

13. $y = x^2 - 8x$

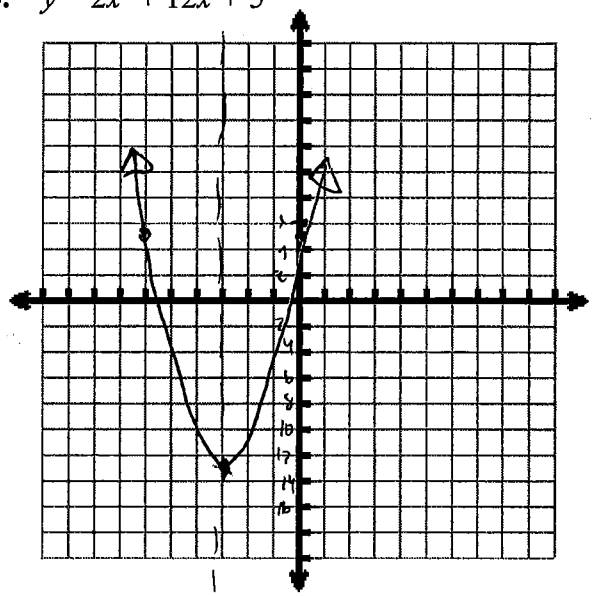


AOS: $x = \frac{8}{2} = 4$

V: $(4, -16)$

Y-int $(0, 0)$

14. $y = 2x^2 + 12x + 5$

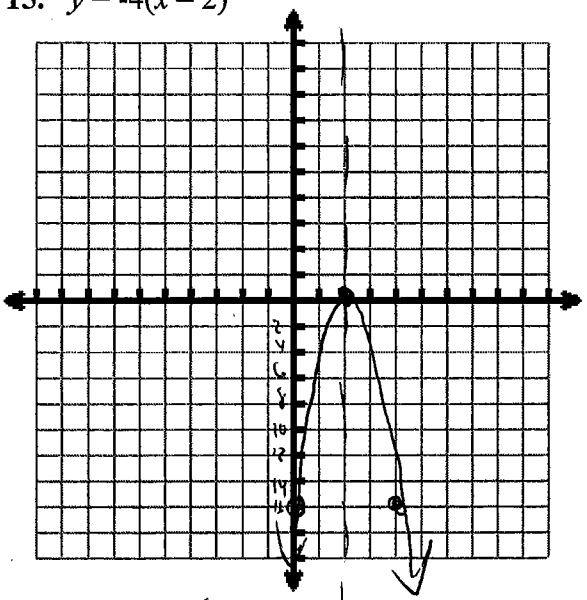


AOS: $x = \frac{-12}{4} = -3$

V: $(-3, -13)$

Y-int $(0, 5)$

15. $y = -4(x - 2)^2$

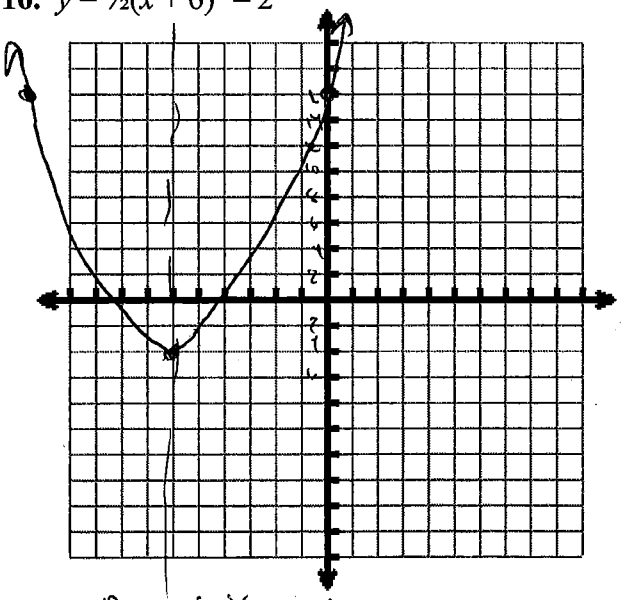


AOS: $x = 2$

V: $(2, 0)$

Y-int $(0, -16)$

16. $y = \frac{1}{2}(x + 6)^2 - 2$



AOS: $x = -6$

V: $(-6, -2)$

Y-int $(0, 16)$