9.2 Notes Continue (Day 2)

* Review Problem 2 on pg. 555

→ Think through what the problem looks like as a graph, what the variables are & what the problem is asking you to find. (see attached, "Quadratic Keywords")

→ Got it #2)

$h = -16t^2 + vt + c$
$h = -16t^2 + 64t + 5$

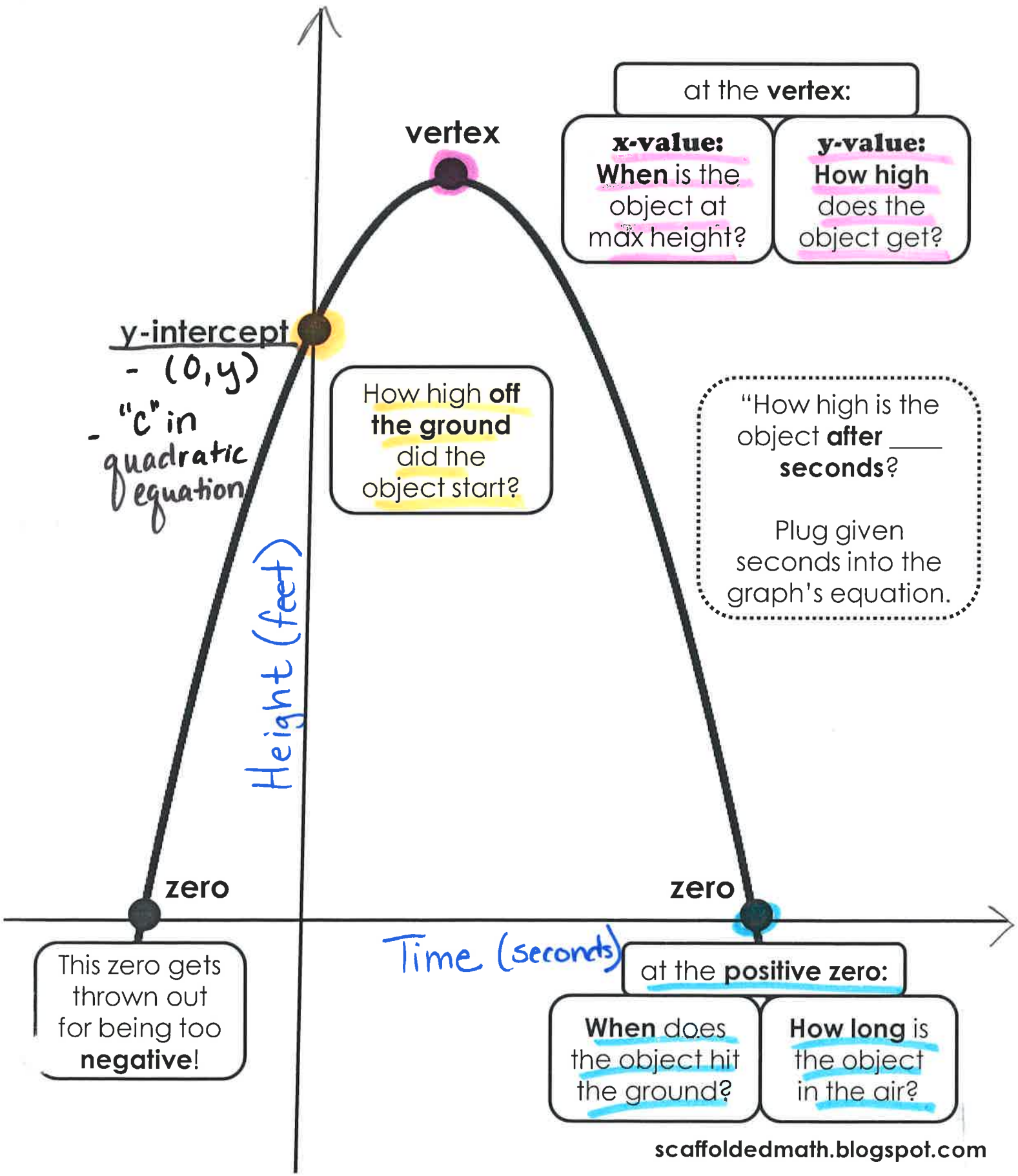
$$\text{vertex} = t = \frac{-b}{2a} = \frac{-64}{2(-16)} = \frac{-64}{-32} = 2$$

* It will take 2 seconds for the t-shirt to reach max. height of 69 feet.

$h = -16t^2 + 64t + 5$
$h = -16(2)^2 + 64(2) + 5$
$h = -64 + 128 + 5$
$h = 69$

Range $5 \leq h \leq 69$ or $[5, 69]$

Quadratic Keywords



* Textbk pg. 556 #5, 26, 28, 29 & 33

#5) "a"

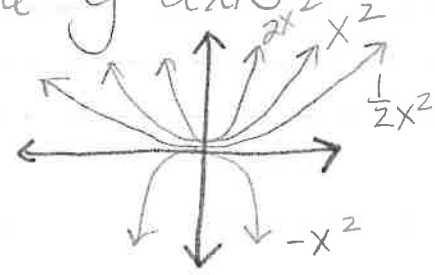
- $a > 0$, graph opens upward & vertex is a minimum
- $a < 0$, graph opens downward & vertex is a maximum

* the greater the value of $|a|$, the narrower the parabola

"c" is the y-intercept of the parabola

"b" - as "b" changes the line of symmetry changes
- without a "bx" the line of symmetry is the y-axis

Sketch only



26) $h = -16t^2 + 30t + 6$

$\frac{-b}{2a} = \frac{-30}{2(-16)} = \frac{-30}{-32} = \frac{15}{16}$ seconds

$h = -16\left(\frac{15}{16}\right)^2 + 30\left(\frac{15}{16}\right) + 6$

$h = -\cancel{16}\left(\frac{225}{\cancel{256}_{16}}\right) + \frac{\overset{15}{\cancel{30}}}{1}\left(\frac{15}{\cancel{16}_{8}}\right) + 6$

$h = \frac{-225}{16} + \frac{225}{8} + \frac{6}{1}$

$h = \frac{-225}{16} + \frac{450}{16} + \frac{96}{16}$

$h = \frac{321}{16} = 20\frac{1}{16}$ feet

$6 \leq h \leq 20\frac{1}{16}$ OR $\left[6, 20\frac{1}{16}\right]$

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

Since there is no "bx", the vertex is at the y-intercept

(0, 4)

b) (0, -6)

29) $y = 5x^2 + 10x + 24$

$\frac{-b}{2a} = \frac{-10}{2(5)} = \frac{-10}{10} = -1$

$y = 5(-1)^2 + 10(-1) + 24$

$y = 5(1) + -10 + 24$

$y = 19$

(-1, 19)

b) (-2, -5)

33) The value of "b" is -6, but they substituted 6

$\frac{-(-6)}{2(-1)} = \frac{6}{-2} = -3$

Name _____ Class _____ Date _____

9-2 Practice

Form G

Find the equation of the axis of symmetry and the coordinates of the vertex of the graph of each function.

1. $y = 4x^2 - 2$
2. $y = -x^2 + 4x - 6$
3. $y = x^2 + 4x + 5$
4. $y = x^2 - 8x + 12$
5. $y = -6x^2 + 3$
6. $y = -3x^2 + 12x - 7$
7. $y = 2x^2 + x - 14$
8. $y = -6x^2 - 8x + 10$
9. $y = -2x^2 + 3x + 6$

Graph each function on graph paper. Label the axis of symmetry and the vertex.

10. $f(x) = x^2 - 2x - 1$
11. $f(x) = -2x^2 + 8x - 10$
12. $f(x) = 2x^2 - 12x + 19$
13. $f(x) = -3x^2 - 6x - 8$
14. $f(x) = 2x^2 + 2x + 1$
15. $f(x) = -2x^2 + 12x - 2$

16. A punter kicked the football into the air with an upward velocity of 62 ft/s. Its height h in feet after t seconds is given by the function $h = -16t^2 + 62t + 2$. What is the maximum height the ball reaches? How long will it take the football to reach the maximum height? How long does it take for the ball to hit the ground?

17. A disc is thrown into the air with an upward velocity of 20 ft/s. Its height h in feet after t seconds is given by the function $h = -16t^2 + 20t + 6$. What is the maximum height the disc reaches? How long will it take the disc to reach the maximum height? How long does it take for the disc to be caught 3 feet off the ground?

Name _____ Class _____ Date _____

9-2 Practice (continued)

Form G

Graph each function. Label the axis of symmetry and the vertex.

on graph paper.

18. $f(x) = \frac{3}{2}x^2 + 6x + 2$

19. $f(x) = \frac{2}{3}x^2 + 8x + 5$

20. $f(x) = \frac{1}{4}x^2 + 4x - 10$

Skip

21. $f(x) = \frac{1}{2}x^2 - 12x + 11$

22. $f(x) = -\frac{3}{4}x^2 + 2x + 3$

23. $f(x) = \frac{5}{4}x^2 - 4x + 1$

Skip

Open-Ended For Exercises 24–26, give an example of a quadratic function with the given characteristic(s).

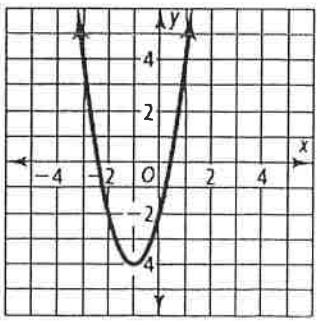
24. Its graph opens up and has its vertex at (0, –3).

25. Its graph lies entirely below the x-axis.

26. Its vertex lies on the x-axis and the graph opens down.

27. A fountain that is 5 feet tall sprays water into the air with an upward velocity of 22 ft/s. What function gives the height h of the water in feet t seconds after it is sprayed upward? What is the maximum height of the water?

28. The parabola shown at the right is of the form $y = ax^2 + bx + c$.



a. What is the y-intercept?

b. What is the axis of symmetry?

c. Use the formula $x = \frac{-b}{2a}$ to find b.

d. What is the equation of the parabola?

Name Key Class Date

9-2 Practice

Form G

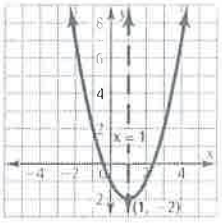
Quadratic Functions

Find the equation of the axis of symmetry and the coordinates of the vertex of the graph of each function.

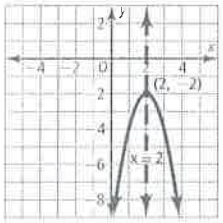
1. $y = 4x^2 - 2$
   (0, −2); $x = 0$
2. $y = -x^2 + 4x - 6$
   (2, −2); $x = 2$
3. $y = x^2 + 4x + 5$
   (−2, 1); $x = -2$
4. $y = x^2 - 8x + 12$
   (4, −4); $x = 4$
5. $y = -6x^2 + 3$
   (0, 3); $x = 0$
6. $y = -3x^2 + 12x - 7$
   (2, 5); $x = 2$
7. $y = 2x^2 + x - 14$
   $\left(-\frac{1}{4}, -14\frac{1}{8}\right)$; $x = -\frac{1}{4}$
8. $y = -6x^2 - 8x + 10$
   $\left(-\frac{2}{3}, 12\frac{2}{3}\right)$; $x = -\frac{2}{3}$
9. $y = -2x^2 + 3x + 6$
   $\left(\frac{3}{4}, 7\frac{1}{8}\right)$; $x = \frac{3}{4}$

Graph each function. Label the axis of symmetry and the vertex.

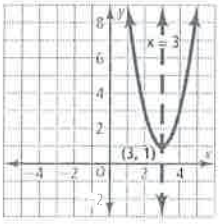
10. $f(x) = x^2 - 2x - 1$



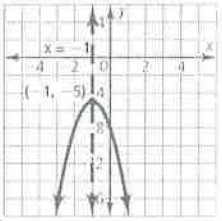
11. $f(x) = -2x^2 + 8x - 10$



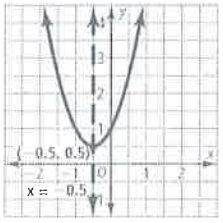
12. $f(x) = 2x^2 - 12x + 19$



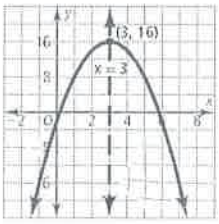
13. $f(x) = -3x^2 - 6x - 8$



14. $f(x) = 2x^2 + 2x + 1$



15. $f(x) = -2x^2 + 12x - 2$



16. A punter kicked the football into the air with an upward velocity of 62 ft/s. Its height h in feet after t seconds is given by the function $h = -16t^2 + 62t + 2$. What is the maximum height the ball reaches? How long will it take the football to reach the maximum height? How long does it take for the ball to hit the ground?

62.06 ft; 1.94 s; about 3.91 s

17. A disc is thrown into the air with an upward velocity of 20 ft/s. Its height h in feet after t seconds is given by the function $h = -16t^2 + 20t + 6$. What is the maximum height the disc reaches? How long will it take the disc to reach the maximum height? How long does it take for the disc to be caught 3 feet off the ground?

12.25 ft; 0.625 s; 1.385 s

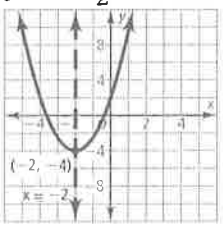
Name _____ Class _____ Date _____

9-2 Practice (continued) Form G

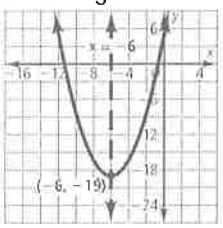
Quadratic Functions

Graph each function. Label the axis of symmetry and the vertex.

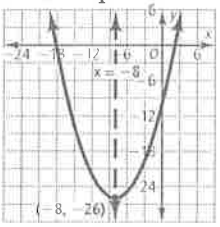
18. $f(x) = \frac{3}{2}x^2 + 6x + 2$



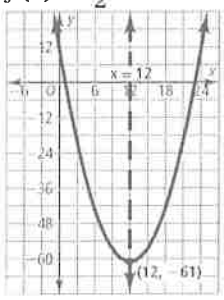
19. $f(x) = \frac{2}{3}x^2 + 8x + 5$



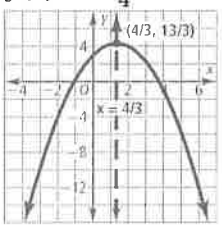
20. $f(x) = \frac{1}{4}x^2 + 4x - 10$



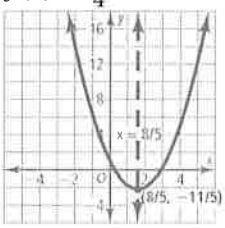
21. $f(x) = \frac{1}{2}x^2 - 12x + 11$



22. $f(x) = -\frac{3}{4}x^2 + 2x + 3$



23. $f(x) = \frac{5}{4}x^2 - 4x + 1$



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Answers may vary. Sample: $y = x^2 - 3$

25. Its graph lies entirely below the x-axis.

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

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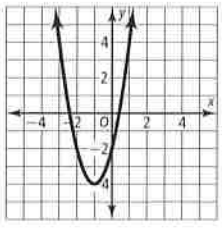
Answers may vary. Sample: $y = -\frac{1}{2}x^2$

27. A fountain that is 5 feet tall sprays water into the air with an upward velocity of 22 ft/s. What function gives the height h of the water in feet t seconds after it is sprayed upward? What is the maximum height of the water?

$h = -16t^2 + 22t + 5$; 12.6 ft

28. The parabola shown at the right is of the form $y = ax^2 + bx + c$.



a. What is the y-intercept? -2

b. What is the axis of symmetry? $x = -1$

c. Use the formula $x = \frac{-b}{2a}$ to find b. $b = 4$

d. What is the equation of the parabola? $y = 2x^2 + 4x - 2$