Partner: ______________________ Name: ______________________ Per: ____

Final Exam Prep Quiz 2

Show all work

1. Which equation represents a parabola with a vertex at $(-6, -7)$?
   a. $f(x) = 5(x-6)(x-7)$
   b. $f(x) = 4(x+6)(x-7)$
   c. $f(x) = -8(x+6)^2 - 7$
   d. $f(x) = 3(x-6)^2 - 7$

C. is in vertex form

$a(x-h)^2+k$

switch keep

$(+h, +k)$

$-8(x+6)^2-7$

$(-6,-7)$ correct.

2. Find the equation of the axis of symmetry and the coordinates of the vertex of the graph of $y = -2x^2 + 4x + 6$.

$x = \frac{-b}{2a} = \frac{-(4)}{2(-2)} = \frac{-4}{-4} = 1$

$y = -2x^2 + 4x + 6$

$y = -2\underbrace{(1)^2}_{\text{do first}} + 4(1) + 6$

$y = -2(1) + 4 + 6$

$y = -2 + 4 + 6$

$y = 2 + 6$

$y = 8$ $(1, 8)$

3. Janice correctly factored $3x^2 - 19x + 20$ as $(3x-4)(x-5)$. She then claimed that the zeros of that quadratic function $f(x) = 3x^2 - 19x + 20$ are located at $x = 5$ at $x = 4$.

A. Explain Janice's mistake.

She forgot to divide the 3 from $(3x-4)$; it should have been: $3(x-\frac{4}{3})(x-5)$

B. Determine the correct zeros *(Write answers in space provided)*

Switch the signs:

$x = \frac{4}{3}$ $x = 5$

4. Determine the solutions to the equation (use the form $j \pm \sqrt{k}$, where j and k are integers).

$$x^2 + 8x = 3$$

either

$x^2 + 8x - 3 = 0$

$x = \frac{-(8) \pm \sqrt{(8)^2 - 4(1)(-3)}}{2(1)}$

$x = \frac{-8 \pm \sqrt{64+12}}{2}$

$x = -\frac{8}{2} \pm \frac{\sqrt{76}}{2}$

$x = -4 \pm \frac{\sqrt{4}\sqrt{19}}{2} = -4 \pm \frac{2\sqrt{19}}{2} = \boxed{-4 \pm \sqrt{19}}$

OR

$x^2 + 8x = 3$

$\div 2$

$(x+4)^2 = 3 + 16$

$(x+4)^2 = 19$

$x + 4 = \pm\sqrt{19}$

$\boxed{x = -4 \pm \sqrt{19}}$

5. Solve the quadratic equation by factoring, completing the square or by using the Quadratic Formula. ~~Round to the nearest tenth if necessary.~~ $2x^2 + 1x - 5 = 0$

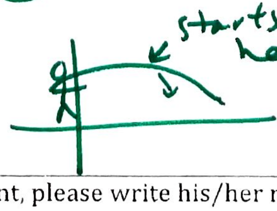
$x = \frac{-(1) \pm \sqrt{(1)^2 - 4(2)(-5)}}{2(2)}$

$x = \frac{-1 \pm \sqrt{1+40}}{4}$

$x = \boxed{\frac{-1 \pm \sqrt{41}}{4}}$

Don't drop the $\sqrt{\ }$!

6. A baseball player stands at a point that is modeled by $(0, 0)$ on the coordinate plane. He then throws a baseball that is modeled by a quadratic equation. Which piece of information (quadratic property) helps determine when the ball starts falling?
   A. End Behavior
   B. Positive zero only
   C. Negative zero only
   D. Zeros
   E. Y-intercept
   F. Vertex



Answers

1.	C
2. $x =$	1 ; (1, 8)
3a. *(see box #3)* b.	$x = \frac{4}{3}$ $x = 5$
4.	$-4 \pm \sqrt{19}$
5.	$\frac{-1 \pm \sqrt{41}}{4}$
6.	F
7.	C
8.	$2 \pm \sqrt{6}$
9a.	256 ft
9b.	6 seconds
10. *See box on back.*	
11.	$p = 10$ $q = 22$
12.	$h(x) = 25x^2 - 30x + 16$

If you want to nominate someone for a HERO point, please write his/her name, and explain why he/she deserves it.

Name: ______________________ Reason: ______________________

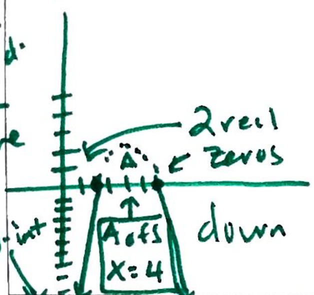
Partner: ______________________ Name: ______________________ Per: ____

7. Two different quadratic functions are described below:
- Function A: This function has roots at 2 and 6, and has a y-intercept at -13.
- Function B: This function is represented by the equation $f(x) = 2(x-4)^2 + 5$

Which statement is true about these two quadratic functions?

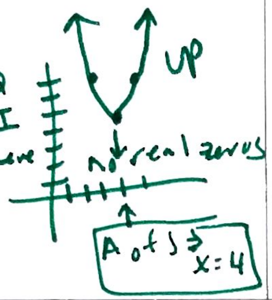
~~a. Both functions open downwards.~~
~~b. Both functions have two real solutions.~~
c. Both functions have the same axis of symmetry.
~~d. The vertex of both functions are in Quadrant II.~~

A.



B.

x	y
3	7
4	5
5	7



8. Use the quadratic formula to solve.

$$x^2 - 4x - 2 = 0$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-2)}}{2(1)}$$

$$x = \frac{+4 \pm \sqrt{16+8}}{2}$$

$$x = \frac{4 \pm \sqrt{24}}{2}$$

either $\sqrt{24} = \sqrt{4}\sqrt{6} = 2\sqrt{6}$

or $\sqrt{24}$: 2, 12; 2, 6; 3, 2; $\cancel{2} \cdot \cancel{2} \cdot 3 \cdot 2$; $2\sqrt{3 \cdot 2} = 2\sqrt{6}$

$$x = \frac{4 \pm 2\sqrt{6}}{2}$$

$$x = \frac{4}{2} \pm \frac{2\sqrt{6}}{2} = \boxed{2 \pm \sqrt{6}}$$

9. A rocket is launched from 192 feet above the ground at time $t = 0$. The function that models this situation is given by $h = -16t^2 + 64t + 192$, where t is measured in seconds and h is height above the ground measured in feet.
   A. Determine the maximum height obtained by the rocket. Show all work.
   B. Determine the time at which the rocket hits the ground. Show all work.

A.

$$x = \frac{-b}{2a} = \frac{-(64)}{2(-16)} = 2$$

$$y = -16(2)^2 + 64(2) + 192$$

$$y = \boxed{256 \text{ ft}}$$

B.

$$x = \frac{-(64) \pm \sqrt{(64)^2 - 4(-16)(192)}}{2(-16)}$$

$$x = \frac{-64 \pm \sqrt{16384}}{-32}$$

$$x = \frac{-64 \pm 128}{-32}$$

$\frac{-64+128}{-32} = -2$

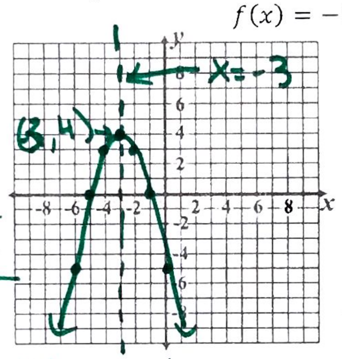
$\frac{-64-128}{-32} = 6$

use positive only

$\boxed{6 \text{ seconds}}$

10. Graph. Label the vertex and axis of symmetry.

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



V: (-3, +4)
switch keep

x	y
-6	-5
-5	0
-4	3
-3	4
-2	3
-1	0
0	-5

Vertex (-3, 4)

SAME

Plug in x's

$-((-2)+3)^2+4 = -(1)^2+4 = 3$

$-((-1)+3)^2+4 = -(2)^2+4 = 0$

$-((0)+3)^2+4 = -(3)^2+4 = -5$

11. The equation $x^2 - 20x + 78 = 0$ can be transformed into an equation of the form $(x-p)^2 = q$, where p and q are rational numbers. Complete the table below with the values of p and q.

Constant	Value
p	10
q	22

$x^2 - 20x + 78 = 0$

$x^2 - 20x = -78$

÷2

$(x - 10)^2 = -78 + 100$

$100 - 78 = 22$

$(x-10)^2 = 22$

switch keep

$(x-p)^2 = q$

$p = +10$ $q = 22$

12. Rewrite the quadratic equation in standard form.

$$h(x) = (5x-3)^2 + 7$$

$(5x-3)(5x-3) + 7$

$25x^2 - 15x - 15x + 9 + 7$

$\boxed{h(x) = 25x^2 - 30x + 16}$