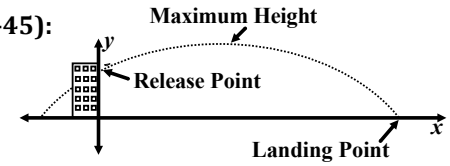
Name: _____

IM2 Semester 1 Final Exam Review H
(Study Guide Questions 43-45, 49-51 & 55-57)

Features of a Quadratic & Factored Form Zeros

To determine needed features from a quadratic situation (problems 43–45):
Start by visualizing the situation as a quadratic graph.
Then, identify the location on the graph of any needed information.



1. A person stands at a window that is modeled by the point (0, 480) on the coordinate plane. He then throws a paper airplane whose path is modeled by a quadratic equation. Select one piece of information that helps to determine the time it takes the airplane to travel from the window to its maximum height. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex	2. A person stands at a window that is modeled by the point (0, 480) on the coordinate plane. He then throws a paper airplane whose path is modeled by a quadratic equation. Select one piece of information that helps to determine the time it takes the airplane to travels from the window to where it lands. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex	3. A person stands at a window that is modeled by the point (0, 480) on the coordinate plane. He then throws a paper airplane whose path is modeled by a quadratic equation. Select one piece of information that helps to determine the initial height of the airplane when it is thrown from the window. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex
4. A person stands at a window that is modeled by the point (0, 480) on the coordinate plane. He then throws a paper airplane whose path is modeled by a quadratic equation. Select one piece of information that helps to determine the height of the airplane when it travels from the window to its maximum height. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex	5. A catapult is fired off of the ground so that the object is released at a point that is modeled by (0, 7) on the coordinate plane. The path of the catapulted object is modeled by a quadratic equation. Select one piece of information that helps to determine the times when the object is on the ground. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex	6. A catapult is fired off of the ground so that the object is released at a point that is modeled by (0, 7) on the coordinate plane. The path of the catapulted object is modeled by a quadratic equation. Select one piece of information that helps to determine the height of the object when it travels from the release point to its maximum height. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex
7. A catapult is fired off of the ground so that the object is released at a point that is modeled by (0, 7) on the coordinate plane. The path of the catapulted object is modeled by a quadratic equation. Select one piece of information that helps to determine the number of seconds the object travels through the air from the release point until it reaches its maximum height. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex	8. A catapult is fired off of the ground so that the object is released at a point that is modeled by (0, 7) on the coordinate plane. The path of the catapulted object is modeled by a quadratic equation. Select one piece of information that helps to determine the time it takes the object to travel from the release point to where it lands on the ground. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex	9. A catapult is fired off of the ground so that the object is released at a point that is modeled by (0, 7) on the coordinate plane. The path of the catapulted object is modeled by a quadratic equation. Select one piece of information that helps to determine the number of seconds it takes for the object to travel from the catapult on the ground to the release point. A. End Behavior B. Positive zero only C. Negative zero only D. Zeros E. Y-intercept F. Vertex

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To compare quadratics from their descriptions (problems 49–51):

For each function, draw a sketch based on the information you're given.

Vertex: Where the graph turns – all points will be mirrored onto the other side of the vertex as well.
Axis of symmetry: The x-value of the vertex
Y-intercept: Where the graph crosses the y-axis (standing line)
Direction:

Opens upwards when a is positive  Opens downwards when a is negative 

The two possible function equations are vertex form and factored form:

Vertex form: $f(x) = a(x-h)^2 + k$
Vertex will be at (h, k)

Factored form: $f(x) = a(x-r_1)(x-r_2)$
The roots will be at $(r_1, 0)$ *and at* $(r_2, 0)$.

10. Two different quadratic functions are described below:

- Function A: This function has a vertex of $(-4, 3)$ and passes through the point $(-2, -1)$
- Function B: This function is represented by the equation $f(x) = -(x+1)(x+7)$

Which statement is true about these two quadratic functions?

a. Both functions open downwards.
b. Both functions have the same y-intercept.
c. Both functions have the same vertex .
d. The vertex of function A is lower on the graph than the vertex of function B.

11. Two different quadratic functions are described below:

- Function A: This function has a vertex of $(-2, 3)$ and passes through the point $(-1, 5)$
- Function B: This function is represented by the equation $f(x) = (x-3)^2 - 4$

Which statement is true about these two quadratic functions?

a. Both functions have the same y-intercept.
b. The vertex of function A is higher on the graph than the vertex of function B.
c. Both functions have the same axis of symmetry.
d. Both functions have the same vertex.

12. Two different quadratic functions are described below:

- Function A: This function has a vertex of $(1, 1)$ and passes through the point $(0, 4)$
- Function B: This function is represented by the equation $f(x) = -(x+1)^2 + 5$

Which statement is true about these two quadratic functions?

a. Both functions open upwards.
b. Both functions have the same y-intercept.
c. Both functions have two real solutions.
d. Both functions have the same axis of symmetry.

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13. Two different quadratic functions are described below:

- Function A: This function has a vertex of $(5, 2)$ and passes through the point $(6, 1)$
- Function B: This function is represented by the equation $f(x) = 2(x-3)^2 + 2$

Which statement is true about these two quadratic functions?

a. Both functions open upwards.
b. Both functions have the same y-intercept.
c. The vertex of function A is lower on the graph than the vertex of function B.
d. Function A has two real solutions and function B has two imaginary solutions.

14. Two different quadratic functions are described below:

- Function A: This function has a vertex of $(3, -6)$ and passes through the point $(0, 3)$
- Function B: This function is represented by the equation $f(x) = (x-3)(x-1)$

Which statement is true about these two quadratic functions?

a. Both functions have the same y-intercept.
b. The vertex of function B is lower on the graph than the vertex of function A.
c. Function A has two real solutions and function B has two imaginary solutions.
d. Both functions have the same axis of symmetry.

15. Two different quadratic functions are described below:

- Function A: This function has a vertex at $(-3, -4)$ and passes through the point $(-2, -3)$
- Function B: This function is represented by the equation $f(x) = (x-3)(x+3)$

Which statement is true about these two quadratic functions?

a. Both functions open upwards.
b. Both functions have the same y-intercept.
c. The vertex of function A is lower on the graph than the vertex of function B.
d. Function A has two real solutions and function B has two imaginary solutions.

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To determine zeros from factors and to analyze errors (problems 55-57):

Each quadratic is correctly factored, but not necessarily completely factored – watch out for the *a*-value.

If a ( ) has a number in front of x, divide both parts in that ( ) by it, and write the number in front. Do not divide it out of the other ( ) !

For example: $(-7x+2)(x+1) \rightarrow -7\left(\frac{-7x}{-7}+\frac{2}{-7}\right)(x+1) \rightarrow -7\left(x-\frac{2}{7}\right)(x+1)$

Remember that you must switch the signs of the roots when you take them out of the parentheses.

For example: *the zeros of* $-7\left(x-\frac{2}{7}\right)(x+1)$ *would be* $x=+\frac{2}{7}$ *and* $x=-1$

16. Emily correctly factored $2x^2+12x+18$ as $2(x+3)(x+3)$. She then claimed that the zeros of that quadratic function $f(x)=2x^2+12x+18$ are located $x=2$ at $x=-3$ and.

A. Explain Emily's mistake.

B. Determine the correct zeros.

17. Megan correctly factored $5x^2+x-18$ as $(5x-9)(x+2)$. She then claimed that the zeros of that quadratic function $f(x)=5x^2+x-18$ are located $x=9$ at $x=-2$ and.

A. Explain Megan's mistake.

B. Determine the correct zeros.

18. Jeremy correctly factored $6x^2-10x-4$ as $(3x+1)(2x-4)$. He then claimed that the zeros of that quadratic function $f(x)=6x^2-10x-4$ are located $x=\frac{1}{3}$ at $x=-2$ and.

A. Explain Jeremy's mistake.

B. Determine the correct zeros.

19. Stephen correctly factored $-x^2+x+12$ as $-(x+3)(x-4)$. He then claimed that the zeros of that quadratic function $f(x)=-x^2+x+12$ are located $x=3$ at $x=-4$ and.

A. Explain Stephen's mistake.

B. Determine the correct zeros.

20. Margaret correctly factored $2x^2+14x+24$ as $2(x+4)(x+3)$. She then claimed that the zeros of that quadratic function $f(x)=2x^2+14x+24$ are located at the point $(-4,-3)$.

A. Explain Margaret's mistake.

B. Determine the correct zeros.

21. Jorge correctly factored $8x^2+14x-15$ as $8\left(x-\frac{3}{4}\right)\left(x+\frac{5}{2}\right)$. He then claimed that the zeros of that quadratic function $f(x)=8x^2+14x-15$ are located $x=\frac{3}{4}$ at $x=\frac{5}{2}$ and.

A. Explain Jorge's mistake.

B. Determine the correct zeros.

Answers

1. *F*	2. *B*	3. *E*	4. *F*	5. *D*	6. *F*	7. *F*	8. *B*	9. *C*	10. *A*	11. *B*	12. *B*	13. *D*	14. *A*	15. *A*

16. a. Since both factors were the same, it seems like Emily looked for a second root (when there is only one), and decided to use *a* as a root.
b. $x=-3$

17. a. Margaret forgot to factor out *a*.
$(5x-9)(x+2)=5\left(x-\frac{9}{5}\right)(x+2)$
b. $x=\frac{9}{5}$ *and* $x=-2$

18. a. Jeremy forgot to switch the signs of the roots, which means that plugging in the roots will not make zero.
b. $x=-\frac{1}{3}$ *and* $x=2$

19. a. Stephen forgot to switch the signs of the roots.
b. $x=-3$ *and* $x=4$

20. a. Margaret put the two roots together as one point, but they are not. They should be two separate *x*'s, two separate points.
b. $x=-4$ *and* $x=-3$
or $(-4,0)$*and*$(-3,0)$

21. a. Jorge only changed the signs on one of the roots. He needed to switch both.
b. $x=\frac{3}{4}$ *and* $-\frac{5}{2}$