



Name _____ Period _____ Date _____

NON-CALCULATOR SECTION

Vocabulary: Define each word and give an example.

1. Quadratic Function
2. Zero (of a function)
3. One-to-One Function

Short Answer:

4. Describe how to find a quadratic inverse and how it can be verified.
5. What is the discriminant of the quadratic equation $ax^2 + bx + c = 0$? Describe what it means if the discriminant is negative, positive, or zero.

Review:

6. Find $f \circ g$ if $f(x) = 2x - 5$ and $g(x) = x + 7$.
7. The graph of $y = f(x)$ is reflected in the x-axis, is shifted 5 units up and 3 units right. The equation of the transformation is:
8. Simplify: $(3 - 2i)(-2 + 9i)$

Problems:

****Be sure to show all work used to obtain your answer. Circle or box in the final answer.****9. Solve the quadratic equations by **factoring**.

a. $4x^2 - 25 = 0$

b. $-9x^2 + 12x - 4 = 0$

c. $6 = x^2 - x$

10. Solve the quadratic equations by **square roots**.



a. $5x^2 = 100$

b. $3(x+1)^2 + 4 = 22$

c. $-2x^2 = 6$

11. Solve the quadratic equation by **completing the square**: $2x^2 - 4x + 20 = 0$

12. Solve the quadratic equation by the **quadratic formula**: $4x^2 + 2x = 5$

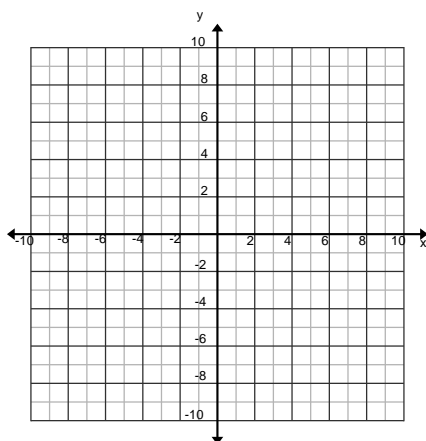
13. Find the discriminant and decide whether the equation has one, two or zero real solutions. $2x^2 + 8x + 1 = 0$

14. Write $y = x^2 + 8x - 9$ in vertex form. Find the zeros and the vertex of the function.

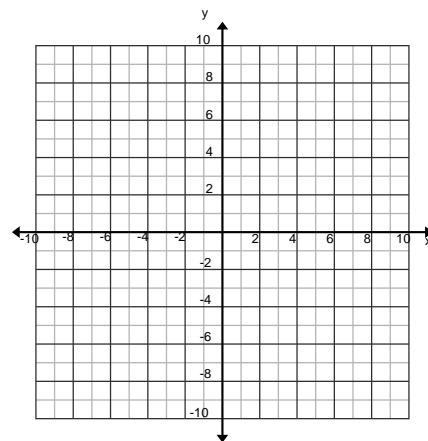
15. Find the inverse of each function. Graph and **label** the function and its inverse. State the domain and range of each function and its inverse. Determine whether the inverse is a function.

a. $f(x) = (x - 4)^2$

b. $f(x) = 2x^2 - 3, x > 0$



16. Find the inverse of the



function



$f(x) = (x+1)^2 - 5$ and verify it by composition.

$$17. f(x) = \begin{cases} 3, & -4 \leq x < -2 \\ -2x+1, & -2 \leq x < 1 \\ x^2 - 2, & x \geq 1 \end{cases}$$

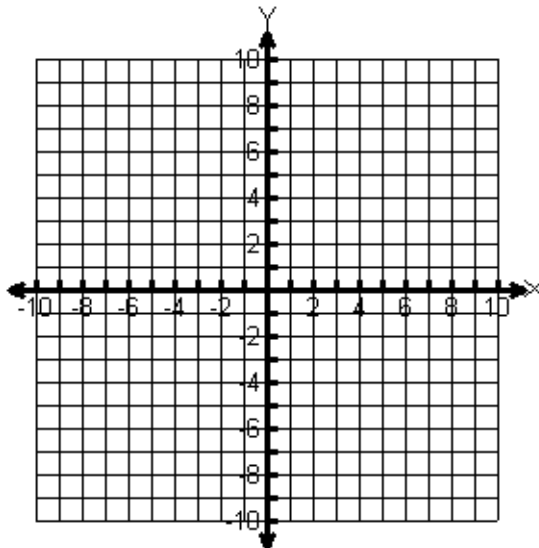
$D_f =$ _____

$R_f =$ _____

evaluate: $f(-3) =$ _____

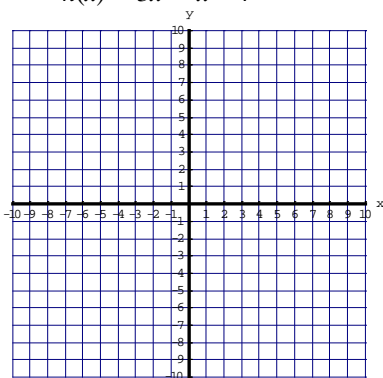
$f(0) =$ _____

$f(1) =$ _____



18. Solve by graphing and answer the questions below.

$h(x) = 3x^2 - x - 4$



$x =$ _____

Vertex: _____

Max or min? _____

Direction of opening? _____

Wider or narrower than $y = x^2$? _____

Domain: _____

Range: _____

x -intercepts: _____

Axis of symmetry: _____

19. Solve the quadratic inequalities:

a. $9x^2 - 16 < 0$

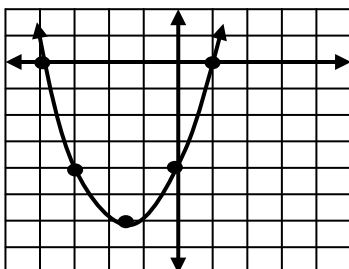
b. $x^2 - 3x \geq -10$

20. The ages of three family children can be expressed as consecutive integers. The square of the age of the youngest child is 4 more than eight times the age of the oldest child. Find the ages of the three children.

21. If the measure of one side of a square is increased by 2 centimeters and the measure of the adjacent side is decreased by 2 centimeters, the area of the resulting rectangle is 32 square centimeters. Find the measure of one side of the square.



22. Write the equation for the graph:



Multiple Choice Questions: **Circle the best answer.**

23. What are the solutions of the quadratic equation $3x^2 + 5x = -4$?

A. $x = \frac{-5 + i\sqrt{23}}{6}, \frac{-5 - i\sqrt{23}}{6}$

B. $x = \frac{5 + i\sqrt{23}}{6}, \frac{5 - i\sqrt{23}}{6}$

C. $x = \frac{-5 + i\sqrt{73}}{6}, \frac{-5 - i\sqrt{73}}{6}$

D. $x = \frac{5 + i\sqrt{73}}{6}, \frac{5 - i\sqrt{73}}{6}$

24. Which is one of the appropriate steps in finding the solutions for $x^2 + 8x - 9 = 0$ when solved by completing the square?

A. $(x + 4)^2 = 25$

B. $(x + 8)^2 = 9$

C. $(x + 4)^2 = 9$

D. $(x + 9)(x - 1) = 0$

25. For the scenario below, use the model $h = -16t^2 + v_0t + h_0$, where h = height (in feet), h_0 = initial height (in feet), v_0 = initial velocity (in feet per second), and t = time (in seconds).

A cheerleading squad performs a stunt called a “basket toss” where a team member is thrown into the air and is caught moments later. During one performance, a cheerleader is thrown upward, leaving her teammates’ hands 6 feet above the ground with an initial vertical velocity of 15 feet per second.

When the girl falls back, the team catches her at a height of 5 feet. How long was the cheerleader in the air?

A. $\frac{1}{16}$ second

B. $1\frac{9}{16}$ second

C. 1 second

D. 2 seconds



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CALCULATOR SECTION

1. Old Faithful in Yellowstone Park is probably the world's most famous geyser. Old Faithful sends a stream of boiling water into the air. During the eruption, the height h (in feet) of the water t seconds after being forced out of the ground could be modeled by $h = -16t^2 + 150t$.
- What is the initial velocity of the boiling water?
 - What is the maximum height of the boiling water?
 - How long is the boiling water in the air?

2. From 1970 to 1990, the average cost of a new car, C (in dollars), can be approximated by the model $C = 30.5t^2 + 4192$, where t is the number of years since 1970. During which year was the average cost of a new car \$12,000?

3. A punter kicked a 41-yard punt. The path of the football can be modeled by $y = -0.035x^2 + 1.4x + 1$, where x is the distance (in yards) the football is kicked and y is the height (in yards) the football is kicked. Find the maximum height of the football.

4. The average hourly earnings of U.S. production workers for 1990-2003 are shown in the table.

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Avg. Hourly Earnings	10.19	10.50	10.76	11.03	11.32	11.64	12.03	12.49	13.00

- Find the quadratic regression equation.
 - Report the R^2 value and discuss whether the quadratic model is appropriate.
5. Solve the quadratic equation $ax^2 + bx + c = 0$ by completing the square.