Vocabulary

Review
1. Cross out the equation below that is not a function.

\[ f(x) = 2x - 7 \quad y^2 = 3x^2 - 4x \quad y = -x^2 + 14x - 7 \quad g(x) = |x^3| \]

Vocabulary Builder

Zero of a function (noun) ZEER oh

Main Idea: Wherever the graph of a function \( y = f(x) \) intersects the x-axis, \( f(x) = 0 \). The value of \( x \) at any of these intersection points is called a zero of the function.

Definition: A value of \( x \) for which \( f(x) = 0 \) is a zero of the function \( f(x) \).

Example: \( x = 2 \) is a zero of \( f(x) = 3x - 6 \), because \( f(2) = 3(2) - 6 = 0 \).

Use Your Vocabulary

Write the zero(s) of each function.

2.

3.

4.

Zero(s):

Zero(s):

Zero(s):

Key Concept Zero-Product Property

If \( ab = 0 \), then \( a = 0 \) or \( b = 0 \).

Example: If \((x + 7)(x - 2) = 0\), then \((x + 7) = 0\) or \((x - 2) = 0\).

5. If either \( x + 7 = 0 \) or \( x - 2 = 0 \), circle all of the possible values of \( x \).

\[
-7 \quad -2 \quad 2 \quad -7
\]
Problem 1  Solving Quadratic Equations by Factoring

Got It? What are the solutions of the quadratic equation $x^2 - 7x = -12$?

6. The equation is solved below. Write a justification for each step.

\[
\begin{align*}
  x^2 - 7x &= -12 & \text{Write the original equation.} \\
  x^2 - 7x + 12 &= 0 & \\
  (x - 3)(x - 4) &= 0 & \\
  x - 3 &= 0 \text{ or } x - 4 &= 0 & \\
  x &= 3 \text{ or } x &= 4 &
\end{align*}
\]

Problem 2  Solving Quadratic Equations With Tables

Got It? What are the solutions of the quadratic equation $4x^2 - 14x + 7 = 4 - x$?

7. Write the equation in standard form.

\[
x^2 + \quad x + \quad = 0
\]

8. Enter the equation into your calculator. Use the results to complete the table below.

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y_1$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Based on the table, one solution of the equation is $x = \quad$.

10. Another solution occurs between $\quad$ and $\quad$. Change the $x$-interval to 0.05. Complete the table.

<table>
<thead>
<tr>
<th>$x$</th>
<th>0.1</th>
<th>0.15</th>
<th>0.2</th>
<th>0.25</th>
<th>0.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y_1$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. Based on the table, the other solution to the equation is $x = \quad$. 
Solving a Quadratic Equation by Graphing

Got It? What are the solutions of the quadratic equation \( x^2 + 2x - 24 = 0 \)?

12. The graph at the right shows the equation.
   Circle the zeros of the function.

13. The solutions of the quadratic equation are ___ and ___.

Using a Quadratic Equation

Got It? The function \( y = -0.03x^2 + 1.60x \) models the path of a kicked soccer ball. The height is \( y \), the distance is \( x \), and the units are meters. How far does the soccer ball travel? How high does the soccer ball go? Describe a reasonable domain and range for the function.

14. The graph below shows the function. Circle the point on the graph where the soccer ball is at its highest point and the point where the soccer ball lands. Label each point with its coordinates.

Reasoning Circle the phrase that completes each sentence.

15. The distance the soccer ball travels is the ___.

16. The maximum height of the soccer ball is the ___.

17. Underline the correct word to complete each sentence.
   The domain should include positive / negative numbers only.
   The range should include positive / negative numbers only.

18. Complete.
   Domain: \( \_ \leq x \leq \_ \)          Range: \( \_ \leq y \leq \_ \)
Lesson Check • Do you know HOW?

Solve the equation $x^2 - 9 = 0$ by factoring.

19. Circle the phrase that best describes the expression on the left side of the equals sign.
   - binomial
   - difference of two squares
   - parabola
   - quadratic expression

20. Factor the expression on the left side of the equal sign.

21. The solutions of the equation are □ and □.

Lesson Check • Do you UNDERSTAND?

Vocabulary If 5 is a zero of the function $y = x^2 + bx - 20$, what is the value of $b$? Explain.

22. If 5 is a zero of the function then whenever □ = 5,
   □ = 0.

23. Substitute □ for $x$ and solve for □.

24. The coefficient $b = □$.

Math Success

Check off the vocabulary words that you understand.

- zero of a function
- Zero-Product property

Rate how well you can find the zeros of quadratic equations.

Need to review

0 2 4 6 8 10

Now I get it!