3.1 Assignment – Zero Product Property

Solve each quadratic equation using the ZERO PRODUCT PROPERTY. Check your answers using the calculator.

1. \( x^2 - 4x - 12 = 0 \)

2. \( y = 3x^2 + 9x \)

3. \( x^2 + 4x + 4 = y \)

4. \( 0 = 5x^2 - 5 \)

5. \( y = 3x^2 - 3x - 6 \)

6. \( y = x^2 - 9 \)

7. \( x^2 + 5x - 6 = 0 \)

8. \( 0 = 6x^2 - 36x \)
3.2 Assignment – Graphing Quadratic Equations in Standard Form: GCF

_Solve for x using the ZERO PRODUCT PROPERTY._

1. \( y = x^2 - 7x \) 
2. \( y = -2x^2 - 6x \) 
3. \( x^2 + 2x = 0 \)

_Find the x- and y-intercepts for the following quadratics._

4. \( y = x^2 - 4x \) 
5. \( y = 5x^2 + 25x \) 
6. \( y = -8x^2 - 64x \)

Match the graphs to one of the equations in #4, 5, and 6. Put the number on the line. **One graph will NOT be used.**
3.3 Assignment – Graphing Quadratics in Standard Form: Difference of Perfect Squares

_Solve each quadratic using the ZERO PRODUCT PROPERTY._

1. \( y = x^2 - 64 \) 
2. \( y = x^2 - 64x \)

3. \( y = 2x^2 - 8 \) 
4. \( y = 2x^2 - 8x \)

_Solve each quadratic using the ZERO PRODUCT PROPERTY._

5. \( y = x^2 - 49 \) 
6. \( y = -3x^2 + 3 \)

- x-intercepts: ____________ y-intercept: _______
- x-intercepts: ____________ y-intercept: _______

_The graph opens up / down_
_The vertex is a minimum / maximum_

_The graph opens up / down_
_The vertex is a minimum / maximum_
3.4 Assignment – Graphing Quadratics in Standard Form: \( a = 1 \)

_Solve each equation using the ZERO PRODUCT PROPERTY._

1. \( y = 4x^2 + 40x \)
2. \( y = 2x^2 - 200 \)
3. \( y = -3x^2 - 21x \)
4. \( y = 5x^2 - 20 \)
5. \( y = -2x^2 + 6x \)
6. \( y = 2x^2 - 2 \)

_Answer the questions and graph the equations on the axes provided._

7. \( y = x^2 - 2x - 15 \)
   - Graph opens up / down
   - \( x \)-int: ______
   - \( y \)-int: ______
8. \( y = -x^2 + 3x + 4 \)
   - Graph opens up / down
   - \( x \)-int: ______
   - \( y \)-int: ______
9. \( y = x^2 + 7x - 8 \)
   - Graph opens up / down
   - \( x \)-int: ______
   - \( y \)-int: ______
3.5 Assignment – Graphs of Quadratic Equations in Standard Form

Solve using the ZERO PRODUCT PROPERTY.

1. \(3x^2 - 75x = 0\)  
2. \(x^2 - 64 = 0\)

Find the \(x\)-intercepts.

3. \(y = -x^2 + 3x + 4\)  
4. \(y = x^2 - 2x - 15\)

Find the roots.

5. \(y = x^2 + 4x + 4\)  
6. \(y = -2x^2 + 8\)
Analyze the following graphs. Answer the questions for each.

7. a) Is $a$ positive or negative? _________________________
   How do you know? ______________________________

b) How many real roots does this graph have? _________
   What are they? _________________________________

c) What are the factors for this graph? ________________

Work:

7. d) What is the $y$-intercept? _________________________

7. e) What is a possible equation for this graph? _________

Work:

8. a) Is $a$ positive or negative? _________________________
   How do you know? ______________________________

b) How many real roots does this graph have? _________
   What are they? _________________________________

c) What are the factors for this graph? ________________

Work:

8. d) What is the $y$-intercept? _________________________

8. e) What is a possible equation for this graph? _________

Work:
# AFDA – Unit 3 Quadratics in Standard Form Worksheet

Complete the following table with the given information.

<table>
<thead>
<tr>
<th>Problem Number</th>
<th>Roots &amp; y-intercept (c)</th>
<th>Quick Sketch Label x and y-intercepts</th>
<th>Linear Factors (Opposite of roots)</th>
<th>Standard Form Multiply Linear Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$x = -2$ or $x = 7$</td>
<td>$y = -14$</td>
<td>$y = (x \quad )(x \quad )$</td>
<td>$y = $</td>
</tr>
<tr>
<td>2.</td>
<td>$x = 3$ or $x = 6$</td>
<td>$y = 18$</td>
<td>$y = (x \quad )(x \quad )$</td>
<td>$y = $</td>
</tr>
<tr>
<td>3.</td>
<td>$x = -2$ or $x = -4$</td>
<td>$y = 8$</td>
<td>$y = (x \quad )(x \quad )$</td>
<td>$y = $</td>
</tr>
<tr>
<td>4.</td>
<td>$x = -1$ or $x = 1$</td>
<td>$y = -1$</td>
<td>$y = (x \quad )(x \quad )$</td>
<td>$y = $</td>
</tr>
<tr>
<td>5.</td>
<td>$x = -8$ or $x = 3$</td>
<td>$y = -24$</td>
<td>$y = (x \quad )(x \quad )$</td>
<td>$y = $</td>
</tr>
<tr>
<td>6.</td>
<td>$x = 7$ or $x = 2$</td>
<td>$y = 14$</td>
<td>$y = (x \quad )(x \quad )$</td>
<td>$y = $</td>
</tr>
<tr>
<td>7.</td>
<td>$x = -3$ or $x = -6$</td>
<td>$y = 18$</td>
<td>$y = (x \quad )(x \quad )$</td>
<td>$y = $</td>
</tr>
<tr>
<td>Problem Number</td>
<td>Roots &amp; y-intercept (c)</td>
<td>Quick Sketch Label x and y-intercepts</td>
<td>Linear Factors (Opposite of roots) $y = (x )(x )$</td>
<td>Standard Form Multiply Linear Factors $y = ax^2 + bx + c$</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------</td>
<td>--------------------------------------</td>
<td>-------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
</tbody>
</table>
| 8.             | $x = -1 \text{ or } x = 3$  
$y = -3$ | $\uparrow$ | $y = (x )(x )$ | $y =$ |
| 9.             | $x = 7 \text{ or } x = 4$  
$y = 28$ | $\uparrow$ | $y = (x )(x )$ | $y =$ |
| 10.            | $x = -9 \text{ or } x = -6$  
$y = 54$ | $\uparrow$ | $y = (x )(x )$ | $y =$ |
| 11.            | $x = -4 \text{ or } x = 4$  
$y = -16$ | $\uparrow$ | $y = (x )(x )$ | $y =$ |
| 12.            | $x = -5 \text{ or } x = 3$  
$y = -15$ | $\uparrow$ | $y = (x )(x )$ | $y =$ |
| 13.            | $x = 8 \text{ or } x = 1$  
$y = 8$ | $\uparrow$ | $y = (x )(x )$ | $y =$ |
| 14.            | $x = -7 \text{ or } x = -9$  
$y = 63$ | $\uparrow$ | $y = (x )(x )$ | $y =$ |
**AFDA – Unit 3 Think Piece**

**Reasoning Problem:** Your friend is convinced that \((x + y)^2 = x^2 + y^2\). How would you show them that they are not correct? (Hint: You can use numbers or algebra to show your reasoning)

**Situation 1:** A baseball player hits the ball straight up. Its height above the ground, \(y\) (in feet) after \(x\) seconds is given by

\[y = -x^2 + 8x\]

a) Draw the graph to represent the above situation. Label both the axes and the intercepts. (*HINT: Make \(y = 0\), factor, and use the ZERO PRODUCT PROPERTY.*)

\[\text{Work:}\]

![Graph](https://via.placeholder.com/150)

b) How long does it take for the ball to reach its maximum height? ________

c) What is the maximum height reached by the ball? ________

(*HINT: Use your answer from question b and plug it into the equation to find the \(y\)-value*)

d) How long does it take for the ball to reach the ground? ________

e) What is the height of the ball 3 seconds after it has been hit? ________

*Challenge Question*

f) After how much time is the ball at the height of 12 feet? Explain the two answers that you get, in this context.
Situation 2: Wile E Coyote is chasing the road runner along the edge of a cliff and doesn’t change directions quickly enough. If the graph below represents his path over time as he runs off the edge of the cliff, answer the corresponding questions based on his trajectory. ($h$ represents height and $t$ represents time)

a) Which equation could possibly represent his trajectory over the cliff? (Check your answer with me before moving on to the next question!!!)

A $h = t^2 + 64t$
B $h = -t^2 + 64t$
C $h = t^2 + 64$
D $h = -t^2 + 64$

Explain: ________________________________________________________________

b) Why are negative values of $h$ not relevant in this scenario?

c) Why are negative values of $t$ not relevant in this scenario?

d) What is his maximum height? Why?

e) How long will it take him to reach the ground? _______________________

- How can you tell from the graph?

- Check your answer algebraically:
AFDA Unit 3 Test Review

Use the following graph to answer questions 1 – 3.

1. The possible factors for this graph are ___________ and ___________

2. In the standard form of the equation for this graph, \( y = ax^2 + bx + c \):
   
   \[
   a = \underline{\phantom{0}} \quad \text{positive/negative} \quad c = \underline{\phantom{0}}
   \]

3. The coordinates of the vertex are _____, and the vertex is a _______________
   
   \( \text{Maximum/Minimum} \)

4. Give the roots of \( y = (x - 1)(x + 2) \)
   
   \( \underline{\phantom{0}} \)

   Work:

5. Solve by factoring completely: \( 2x^2 - 18 = 0 \)
   
   \( \underline{\phantom{0}} \)

   Work:

6. Let \( y = x^2 + 4x - 21 \). Find the \( x \)-intercepts by factoring completely.
   
   \( \underline{\phantom{0}} \)

   Work:

7. Solve by factoring completely: \( y = -3x^2 - 6x \)
   
   \( \underline{\phantom{0}} \)

   Work:
Use the equation $y = x^2 + 7x + 10$ to answer questions 8–10.

8. Find the roots by factoring completely: ______________

   Work:

9. Give the coordinates of the $y$-intercept: ______

10. Select the graph that most likely represents the equation.

     A
     
     B
     
     C

Use the equation $y = x^2 - 7x - 8$ to answer questions 11–13.

11. Find the $x$-intercepts by factoring completely: ______________

   Work:

12. Give the coordinates of the $y$-intercept: ______

13. Select the graph that most likely represents the equation.

     A
     
     B
     
     C
14. a) Find the coordinates of the $x$-intercepts: $y = -3x^2 + 3$

b) Give the coordinates of the $y$-intercept.

c) Plot and label the intercepts with their coordinates.

d) Sketch the graph on the grid below.
4.1 Assignment – Simplifying Radical Expressions

Match the following to the correct letter.

1. $\sqrt{9}$
   For #1 – 10
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7
   H. 8
   J. 9
   K. 10

11. $\frac{1}{3}\sqrt{27}$
   For #11 – 20
   L. 1
   M. $-1$
   N. 2
   O. $-2$
   P. 3
   Q. $-3$
   R. 4
   S. $-4$
   T. 5
   U. $-5$

Simplify the following radicals.

1. $\sqrt{x^3y^7}$
2. $\sqrt{27}$
3. $\sqrt{72}$
4. $\sqrt[4]{4a^4b^5}$

5. $\sqrt[3]{27x^6y^8}$
6. $\sqrt[3]{-8a^2b^4}$
7. $\sqrt[3]{16}$
4.2 Assignment – Adding and Subtracting Radicals

Follow the directions for each section. Show all work in order to receive credit.

Simplify the following radicals.

1. $\sqrt{a^2b^3c^4}$
2. $\sqrt{8x^6y^7}$
3. $\sqrt[3]{24p^3r^5}$

Perform the indicated operation.

4. $2\sqrt{2} + 3\sqrt{2}$
5. $5\sqrt{5} - 4\sqrt{5} + 2\sqrt{5}$
6. $7\sqrt{3} + \sqrt{27}$

7. $\sqrt{18} + \sqrt{8}$
8. $3\sqrt{2} - 2\sqrt{3} + 5\sqrt{2}$
9. $4\sqrt{5} + 2\sqrt{3} - 6\sqrt{5}$

10. $\sqrt{48} - \sqrt{3}$
11. $\sqrt[3]{8} + \sqrt{16} - \sqrt{9}$
12. $\sqrt[3]{16} - \sqrt[3]{54} + \sqrt[3]{5}$
4.3 Assignment – Multiplying and Dividing Radicals

Simplify the following radicals.

1. $\sqrt{16x^4}$
2. $\sqrt[3]{27y^6}$
3. $\sqrt[4]{4a^5}$

4. $\sqrt[3]{-8c^7}$
5. $\sqrt[5]{20d^3c^4}$
6. $\sqrt[6]{24f^6g^5}$

Perform the indicated operation.

7. $\sqrt{8} \cdot \sqrt{8}$
8. $\sqrt[3]{8} \div \sqrt[3]{2}$
9. $\sqrt[6]{6} \cdot \sqrt[12]{2}$

10. $\frac{\sqrt[3]{-16}}{\sqrt[3]{2}}$
11. $\sqrt{2} \cdot \sqrt{32}$
12. $\sqrt[3]{-3} \cdot \sqrt[3]{-9}$

13. $\frac{\sqrt[3]{-54}}{\sqrt[3]{2}}$
14. $\frac{\sqrt{81}}{\sqrt{3}}$
15. $\frac{\sqrt{20}}{\sqrt{5}}$

16. $\sqrt[3]{-1} \cdot \sqrt[3]{8}$
17. $\frac{\sqrt[3]{40}}{\sqrt[3]{5}}$
18. $\sqrt{5} \cdot \sqrt{8}$
4.4 Assignment – Solving Radical Equations

Simplify the following radicals.

1. $\sqrt{28a^2b^3}$
2. $\sqrt[3]{16x^3}$
3. $\sqrt{f^5g^6}$
4. $\sqrt[3]{n^5p^3}$

Perform the indicated operation.

5. $7\sqrt{3} + \sqrt{27}$
6. $\frac{\sqrt[3]{81} - 2\sqrt{3}}{3}$
7. $\frac{\sqrt[3]{32}}{\sqrt[3]{-4}}$
8. $\sqrt[3]{3} \cdot \sqrt[6]{6}$

Solve the following radicals. Indicate if the solution is extraneous.

9. $\sqrt{x} + 2 = 3$
10. $\sqrt[3]{6x} - 10 = -2$
11. $\sqrt{2x - 2} + 2 = 4$

12. $2\sqrt[3]{x} = -6$
13. $-5\sqrt{x} - 3 = 2$
14. $2\sqrt[3]{3x + 4} - 1 = 5$
4.5 Assignment – Graphing Radical Equations

For questions 1 – 4, match the equation with its graph.

1. ___ $y = \sqrt{x} + 1$
2. ___ $y = \sqrt{x + 1}$
3. ___ $y = \sqrt[3]{x} + 1$
4. ___ $y = \sqrt[3]{x - 1}$

For questions 5 – 10, graph the radical equation. Plot two additional points using the table. List the transformations of the graph from the parent function (if any).

5. $y = \sqrt{x} - 2$
   
   $(h, k)$ is ________

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

   Transformations:

6. $y = \sqrt{x + 3}$
   
   $(h, k)$ is ________

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>1</td>
</tr>
</tbody>
</table>

   Transformations:

7. $y = \sqrt[3]{x - 3}$
   
   $(h, k)$ is ________

8. $y = \sqrt[3]{x} + 1 + 2$
   
   $(h, k)$ is ________

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>0</td>
</tr>
</tbody>
</table>

   Transformations:

9. $y = \sqrt{x - 4} - 1$
   
   $(h, k)$ is ________

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

   Transformations:

10. $y = \sqrt[3]{x} + 3$
    
    $(h, k)$ is ________

    | x | y |
    |---|---|
    | -1 | 1 |

    Transformations:
11. Simplify: $\sqrt{20a^2b^5}$  
12. Simplify: $\frac{\sqrt[3]{8y^5}}{3}$  
13. Solve: $2\sqrt{3x} - 3 + 1 = 7$

For questions 14 – 17, perform the indicated operation.

14. $\sqrt[3]{8} + 3\sqrt[3]{2}$  

15. $\frac{3\sqrt[3]{24}}{3\sqrt[3]{3}}$

16. $\sqrt{5} \cdot \sqrt[3]{8}$  

17. $\sqrt[3]{48} - 5\sqrt{6}$
Perform the indicated operation. All answers should be in simplest radical form. (NO DECIMALS!)

1. \(3\sqrt{16} \cdot 4\sqrt{5}\)

2. \(\frac{\sqrt{54}}{\sqrt{3}}\)

3. \(-\sqrt{4} - 5\sqrt{32}\)

4. \(2\sqrt{8} + 7\sqrt{2}\)

Circle the error(s) in the problem and explain the mistake(s). Then complete the problem correctly.

5. \(2\sqrt{48} + 6\sqrt{6}\)

   Explain mistake(s): ____________________  Simplified Correctly: \(2\sqrt{48} + 6\sqrt{6}\)

   ______________________________________

   ______________________________________

   ______________________________________

   ______________________________________

   ______________________________________

   ______________________________________
Solve the following radical equations. Check for extraneous solutions.

6. \( \sqrt[3]{3x + 2} = -1 \)  
7. \( -2\sqrt{x} + 12 = 4 \)  
8. \( 3 + \sqrt{5x - 10} = 8 \)  
9. \( \sqrt[3]{x - 7} + 1 = 3 \)

Circle the error(s) in the problem and explain the mistake(s). Then solve the equation correctly.

10. \( \sqrt[6]{6x - 10} = -2 \)  

   Explain the mistake(s): _____________________  
   Solved Correctly: \( \sqrt[6]{6x - 10} = -2 \)

   \[
   \begin{align*}
   \sqrt[6]{6x - 10} &= -2 \\
   6x - 10 &= (-2)^6 \\
   6x &= 12 \\
   x &= 2 \\
   \end{align*}
   \]

Complete each table of values and graph the radical equations.

11. \( y = \sqrt{x} + 4 \)  
12. \( y = \sqrt[3]{x - 2} \)

Circle the error(s) on the graph and explain the mistake(s). Then graph the equation correctly.

13. \( y = \sqrt[3]{x + 1} - 4 \)  

   Explain the mistake(s): _____________________  
   Correct Graph:

   \[
   \begin{align*}
   \sqrt[3]{x + 1} - 4 &= y \\
   \sqrt[3]{x + 1} &= y + 4 \\
   x + 1 &= (y + 4)^3 \\
   x &= y^3 + 12y^2 + 36y + 16 \\
   \end{align*}
   \]
AFDA Unit 4 Test Review

*Evaluate the following radicals.*

1. \( \sqrt{16} + \sqrt{-8} \)  
2. \( \sqrt[3]{64} - \sqrt{49} \)

*For questions 3 & 4, choose the best answer.*

3. Which expression is \( 5\sqrt{2} \) in simplest form?
   - A \( \sqrt{10} \)
   - B \( \sqrt{75} \)
   - C \( \sqrt{20} \)
   - D \( \sqrt{50} \)

4. The expression \( 3a^3 \) is completely simplified from which of the following radicals?
   - A \( \sqrt[3]{9a^6} \)
   - B \( \sqrt{6a^9} \)
   - C \( \sqrt[3]{27a^9} \)
   - D \( \sqrt{27a^6} \)

*For questions 5 – 10, simplify.*

5. \( \sqrt[3]{16} - 5\sqrt{2} \)  
6. \( \frac{\sqrt{8}}{\sqrt{2}} \)  
7. \( \sqrt{20x^3y^4} \)

8. \( \sqrt{6} \cdot \sqrt{2} \)  
9. \( 2\sqrt{3} + \sqrt{27} \)  
10. \( \sqrt[3]{40a^5b^3} \)

11. What kind of radical equation can end in an extraneous solution? How do you know? ___________________________
Solve the radical equations.

12. \(-2\sqrt{x} + 3 - 5 = -9\)  
13. \(\sqrt[3]{x} - 1 + 2 = 4\)  
14. \(\sqrt{x} - 4 = 6\)

Choose the best answer for questions 15 & 16.

15. Which graph best represents the equation \(y = \sqrt{x} - 3 + 2\):
   - A
   - B
   - C
   - D

16. Which graph best represents the equation \(y = \sqrt[3]{x} + 2\):
   - A
   - B
   - C
   - D

17. Given the equation \(y = \sqrt{x} + 1\):
   a) What is \((h, k)\)?
   b) Complete the following table:

<table>
<thead>
<tr>
<th>(x)</th>
<th>(y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

   Work:

   c) Plot \((h, k)\) and the points from the table on the grid to the right.
   Sketch the graph and label the points with their ordered pairs.