UNIT #8 - FORMATIVE ASSESSMENT
COMMON CORE ALGEBRA II

Part I Questions

1. Which of the following functions would have no \( y \)-intercept?

   (1) \( y = \sqrt{x^2 - 2x + 9} \)  
   (2) \( y = \sqrt{x + 3} \)  
   (3) \( y = \sqrt{2x - 1} \)  
   (4) \( y = \sqrt{5 - x} \)

   \[ y = \sqrt{2(0) - 1} = \sqrt{-1} \]
   \[ \sqrt{-1} \text{ is not a real number} \]

2. If \( \frac{2}{\sqrt{x}} \) was written in the form \( ax^n \) then which of the following would be the product of \( a \) and \( n \)?

   (1) \(-2\)  
   (2) \(2\)  
   (3) \(-\frac{1}{2}\)  
   (4) \(-\frac{1}{8}\)

   \[ 2x^{-\frac{1}{2}} \Rightarrow a = 2 \text{ and } n = -\frac{1}{4} \]

   \[ a \cdot n = (2)\left(-\frac{1}{4}\right) = -\frac{1}{2} \]

3. The expression \( \sqrt[3]{54x^8y^{12}} \) can be written in simplest radical form as

   (1) \(3x^2y^4\sqrt[3]{2x^2} \)  
   (2) \(2x^3y\sqrt[3]{27x^3y^2} \)  
   (3) \(18x^2y^3\sqrt[3]{2y^2} \)  
   (4) \(9xy^2\sqrt[3]{6x^4y^2} \)

   \[ \sqrt[3]{27x^3y^{12}} \cdot \sqrt[3]{2x^2} = 3x^2y^4\sqrt[3]{2x^2} \]

4. The expression \( \frac{\sqrt{x^3}}{\sqrt{x}} \) can be rewritten as

   (1) \(\sqrt{x^3}\)  
   (2) \(\sqrt{x}\)  
   (3) \(\sqrt{x}\)  
   (4) \(\sqrt[3]{x^2}\)

   \[ \frac{(x^3)^{\frac{1}{2}}}{x^{\frac{3}{2}}} = x^{\frac{3}{2} \cdot \frac{1}{2}} = x^{\frac{3}{4}} = x^{\frac{3}{4} - 1} = x^{\frac{1}{4}} = \sqrt[4]{x} \]

   (3)
5. Which of the following represents the solution set to \( 4x^2 + 8x - 1 = 0 \)?

\[
\begin{align*}
(1) \quad x &= -1 \pm \sqrt{10} \\
(2) \quad x &= 2 \pm \sqrt{3}/2 \\
(3) \quad x &= -2 \pm \sqrt{7} \\
(4) \quad x &= -8 \pm \frac{\sqrt{80}}{8} = -8 \pm \frac{4\sqrt{5}}{8} = -8 \pm \frac{4}{8} = -1 \pm \sqrt{5}/2
\end{align*}
\]

6. Which of the following would be the positive x-coordinate where the line \( y = x + 2 \) intersects the circle \( x^2 + y^2 = 13 \)?

\[
\begin{align*}
(1) \quad x &= 1.35 \\
(2) \quad x &= 1.72 \\
(3) \quad x &= 2.17 \\
(4) \quad x &= 3.45
\end{align*}
\]

7. Which of the following is equivalent to \( \frac{(-2x^2)^3}{(4x^3)^2} \)?

\[
\begin{align*}
(1) \quad \frac{2}{x^2} \\
(2) \quad \frac{x^2}{8} \\
(3) \quad \frac{-1}{2x^4} \\
(4) \quad \frac{-4}{x^3}
\end{align*}
\]

8. Which of the following is the solution to the equation shown below in terms of the constants \( a, b, c, \) and \( d \)?

\[
\begin{align*}
(1) \quad x &= \frac{d^2 - c}{b} + a \\
(2) \quad x &= a + (bd - bc)^2 \\
(3) \quad x &= a + \frac{d^2 - c^2}{b} \\
(4) \quad x &= \frac{d^2}{c^2} + b - a
\end{align*}
\]
PART II QUESTIONS: Answer all questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps and explain your reasoning. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit.

9. Explain the two transformations that occur to the graph of \( y = \sqrt{x} \) to produce the graph of \( y = -\sqrt{x} + 5 \).

   In either order:
   (1) A shift to the left by 5 units.
   (2) A reflection in the x-axis.

10. If \( \sqrt[8]{x} \) was written as \( \sqrt[8]{x} \), then what would be the value of \( n \)? Explain your thinking.

   \[
   \sqrt[8]{x} = \left( \left( (x)^{\frac{1}{4}} \right)^{\frac{1}{2}} \right)^{\frac{1}{2}} = (x^{\frac{1}{4}})^{\frac{1}{2}} = x^{\frac{1}{2} \cdot \frac{1}{2}} = x^{\frac{1}{4}}
   \]

   \[\Rightarrow\]

   \[n = 8\]

11. Determine the domain of the function \( f(x) = \sqrt{3x - 21} \). Explain or show how you arrived at your answer.

   \[
   3x - 21 \geq 0 \\
   3x \geq 21 \\
   x \geq 7
   \]

PART III QUESTIONS: Answer all questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps and explain your reasoning. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit.

12. Two positive, real numbers differ by one and have a product equal to one. Algebraically, find the value of the smaller number to the nearest hundredth.

   Let \( x = \) the smaller number
   Let \( y = \) the larger number

   \[
   \begin{align*}
   y - x &= 1 \\
   xy &= 1
   \end{align*}
   \]

   \[
   \begin{align*}
   y &= x + 1 \\
   x(y + 1) &= 1
   \end{align*}
   \]

   \[
   \begin{align*}
   x^2 + x &= 1 \\
   x^2 + x - 1 &= 0 \\
   x &= \frac{-1 \pm \sqrt{1^2 - 4(1)(-1)}}{2} \\
   x &= \frac{-1 \pm \sqrt{5}}{2} \\
   x &= 0.62
   \end{align*}
   \]
13. Find all solution(s) to the equation shown below. Show all work.

\[ y + 3 = -\sqrt{y + 15} \]

\[
\begin{align*}
(y + 3)^2 &= (-\sqrt{y + 15})^2 \\
(y + 3)(y + 3) &= y + 15 \\
y^2 + 6y + 9 &= y + 15 \\
y^2 + 5y - 6 &= 0 \\
(y + 6)(y - 1) &= 0
\end{align*}
\]

\[
\begin{align*}
\text{Check } y &= -6: \\
-6 + 3 &= -\sqrt{-6 + 15} \\
-6 - 3 &= -9 \\
\sqrt{-9} &= \text{not a real number} \\
\end{align*}
\]

\[
\begin{align*}
\text{Check } y &= 1: \\
1 + 3 &= -\sqrt{1 + 15} \\
4 &= -\sqrt{16} \\
4 &= 4 \text{ no reject!}
\end{align*}
\]

\[ y = -6 \text{ only} \]

**PART IV QUESTION:** Answer the question in this part. The question is worth 6 points.

14. Given the quadratic function \( y = x^2 + 8x + c \), where \( c \) is some real number constant, answer the following questions.

(a) If \( c = 4 \), find the \( x \)-intercepts of the function in simplest radical form. [3 points]

\[
y = x^2 + 8x + 4 \\
x^2 + 8x + 4 = 0
\]

\[
x = \frac{-8 \pm \sqrt{8^2 - 4(1)(4)}}{2(1)} = \frac{-8 \pm \sqrt{48}}{2} = -4 \pm 2\sqrt{3}
\]

(b) Use the quadratic formula to explain why the function will fail to have any \( x \)-intercepts if \( c = 20 \). [3 points]

\[
y = x^2 + 8x + 20 \\
x^2 + 8x + 20 = 0
\]

\[
x = \frac{-8 \pm \sqrt{8^2 - 4(1)(20)}}{2(1)} = \frac{-8 \pm \sqrt{-16}}{2}
\]

Because the square root of negative 16 can be no real number, this parabola will fail to have any \( x \)-intercepts.