Common Core Readiness Assessment 4

1. What is the simplified form of \((27x^3)^{2/3}\)?
   - A. 3x
   - B. 18x²
   - C. 9x²
   - D. 9x

2. What is the simplified form of \(\frac{3x^{-3}}{(2y)^{-2}}\)?
   - F. \(\frac{2y^2}{3x^3}\)
   - G. \(\frac{12y^2}{x^3}\)
   - H. \(12x^3y^2\)
   - J. \(\frac{1}{12x^3y^2}\)

3. What is the simplified form of \(\left(\frac{c^{-2}d^5}{d^{-1}}\right)^0\)?
   - A. 0
   - B. 1
   - C. \(c^{-2}d^4\)
   - D. \(c^{-2}d^6\)

4. What is the missing value in \(x^3y^{10} \cdot x^4y^\Box = x^7y^2\)?
   - F. -8
   - G. -5
   - H. 5
   - J. 8

5. What is the simplified form of \(\frac{12x^2y^{-3}}{9x^{-3}y^5}\)?
   - A. \(\frac{4x}{3y^2}\)
   - B. \(\frac{4x^3}{3y^5}\)
   - C. \(\frac{4x^5}{3y^8}\)
   - D. \(\frac{4y^8}{3x^5}\)

6. What is the simplified form of \(\frac{(6m^3n^{-4})^2 \cdot 16n^{17}}{9m^{21}}\)?
   - F. \(\frac{52n}{9m^{12}}\)
   - G. \(\frac{32n^{15}}{3m^{16}}\)
   - H. \(\frac{22n^{33}}{m^{12}}\)
   - J. \(\frac{64n^9}{m^{15}}\)
7. Make an equation to represent the area of a square whose sides are given by the expression \( x + y \).

- A \( A = 2x + 2y + 2xy \)
- B \( A = x^2 + 2xy + y^2 \)
- C \( A = 2(x^2 + y^2) \)
- D \( A = x^2 + y^2 \)

8. The world’s population is slightly under 6.8 billion. Which of the following is a reasonable representation of the world’s population?

- F \( 6.755 \times 10^5 \)
- G \( 6.755 \times 10^7 \)
- H \( 6.755 \times 10^9 \)
- J \( 6.755 \times 10^{11} \)

9. Which of the following arguments shows why \( \sqrt{x} \) may be rewritten in the form \( x^{1/2} \)?

- A Recall that \( 2\sqrt{x} = x^{1} \). Since \( 2x^{1/2} = x^{2(1/2)} \) also equals \( x^1 \), \( \sqrt{x} \) must be equal to \( x^{1/2} \).
- B Recall that \( (\sqrt{x})^2 = x^1 \). Since \( (x^{1/2})^2 = x^{1/2+1/2} \) is also equal to \( x^1 \), \( \sqrt{x} \) must be equal to \( x^{1/2} \).
- C Recall that \( (\sqrt{x})^2 = x^1 \). Since \( \frac{x}{2} = x^{1/2} \), the sum \( x^{1/2} + x^{1/2} \) is also equal to \( x^1 \). Therefore, \( \sqrt{x} \) must be equal to \( x^{1/2} \).
- D Recall that \( \sqrt{x} + \sqrt{x} = x^1 \). Since \( x^{1/2} + x^{1/2} \) also equals \( x^1 \), \( \sqrt{x} \) must be equal to \( x^{1/2} \).

10. Which of the following is the graph of \( y = \frac{1}{2} \cdot 3^x \)?
11. Which exponential function is represented by the table below?

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>3</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>1280</td>
</tr>
</tbody>
</table>

A. \(2 \cdot 5^x\)
B. \(-5 \cdot 2^x\)
C. \(5 \cdot 2^x\)
D. \(5 \cdot \frac{1^x}{2}\)

12. Evaluate the function \(y = \frac{1}{2} \cdot 3^x\) for \(x = 8\).

F. 85
G. 3280.5
H. 6561
J. 13,122

13. Which of the following statements is always true about the function \(y = a \cdot b^x\)?

A. When \(a > 0\) and \(b > 1\), the function models exponential decay.
B. When \(a > 0\) and \(b > 1\), the function models exponential growth.
C. When \(a > 0\) and \(0 < b < 1\), the function models exponential growth.
D. When \(a < 0\) and \(0 < b < 1\), the function models exponential decay.

14. Which of the following statements is never true?

F. All quadratic trinomials can be written as the product of two binomial factors.
G. Some quadratic trinomials can be written as the product of two binomial factors.
H. Some quadratic trinomials have a greatest common factor.
J. Some quadratic trinomials have binomial factors that are the same.

15. An investment grows according to the exponential equation \(y = 15,000 \cdot 1.07^x\), where \(x\) is the number of years invested. Which of the following statements is true?

A. The investment will continue to grow at a rate of 7% per year compounded quarterly.
B. The investment will increase by $1050 per year.
C. The investment will more than double within 12 years.
D. The investment will triple within 15 years.
16. What is the simplified form of $5x + 6 - 4x^2 + 3x$?
   F $4x^2 + 8x + 6$
   G $4x^2 + 2x + 6$
   H $-4x^2 + 8x + 6$
   J $-4x^2 + 2x + 6$

17. Add:
   $(7x^2 - 8x^3 + 4) + (9x^3 + 2x^2 + 7)$
   A $-x^3 + 9x^2 + 11$
   B $16x^5 - 6x + 11$
   C $x^3 + 9x^2 + 11$
   D $x^3 + 9x^2 - 3$

18. Subtract:
   $(x^2 + 6x - 8) - (-3x^2 + 2x - 9)$
   F $4x^2 + 4x + 1$
   G $-2x^2 + 4x + 1$
   H $4x^2 + 4x + 17$
   J $4x^2 + 8x + 17$

19. If the perimeter of a triangle is $10x + 5y$ and two of the sides are $3x + 4y$ and $5x - y$, which is the third side?
   A $2x + 2y$
   B $2x + y$
   C $-2x + 2y$
   D $x + 2y$

20. What is the simplified form of $(-5a^2 + 6a + 2) - (3a^2 - 4a - 5)$?
   F $-8a^2 + 10a + 7$
   G $-8a^2 + 2a + 7$
   H $-2a^2 + 10a + 7$
   J $-8a^2 + 10a - 3$

21. What is the simplified form of $(3b^2 - 8) + (5b + 9) - (b^2 + 6b - 4)$?
   A $4b^2 + 11b - 13$
   B $4b^2 - b + 5$
   C $2b^2 - b + 5$
   D $2b^2 + b - 13$

22. Write the explicit formula for the geometric sequence 324, 108, 36, 12, 4, ...
   F $\frac{324}{2^n - 1}$
   G $4 \cdot 3^{n - 1}$
   H $324 \cdot \left(\frac{1}{3}\right)^{n - 1}$
   J $324 - 3^{n - 1}$

23. An engineer uses the equation $y = -0.2x + 0.8$ to model the data in the following table.

<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>$y$</td>
<td>1</td>
<td>0.5</td>
<td>0.25</td>
<td>0.125</td>
<td>0.0625</td>
</tr>
</tbody>
</table>

Find the elements of the domain for which the engineer’s model predicts a higher value of $y$ than the actual value.
   A $\{1, 2, 3\}$
   B $\{2, 3\}$
   C $\{0, 4\}$
   D $\{1, 2, 3, 4\}$

24. The width of a box is 1 cm less than its length. The height of the box is 9 cm greater than the length. The dimensions can be represented by $x, x^2 - 1$, and $x + 9$. Multiply the dimensions and find the greatest common factor of the terms.
   F $x^4$
   G $x^3$
   H $x^2$
   J $x$
25. Compare the graphs of the two functions \( f(x) = 2^x \), and \( g(x) \). Determine the equation of \( g(x) \).

\[
\begin{align*}
&\text{A} \quad g(x) = -2^x \\
&\text{B} \quad g(x) = (-2)^x \\
&\text{C} \quad g(x) = 2^{-x} \\
&\text{D} \quad g(x) = \left(\frac{1}{2}\right)^{-x}
\end{align*}
\]

26. What is the factored form of \( x^2 + 3x - 70 \)?

\[
\begin{align*}
&\text{F} \quad (x + 7)(x - 10) \\
&\text{G} \quad (x + 15)(x - 4) \\
&\text{H} \quad (x - 7)(x + 10) \\
&\text{J} \quad 2(5x - 7)(x - 3)
\end{align*}
\]

27. A circle’s area is represented by \( A = \pi(x^2 - 22x + 121) \). What expression represents the radius of the circle?

\[
\begin{align*}
&\text{A} \quad x + 11 \\
&\text{B} \quad x - 11 \\
&\text{C} \quad x - 22 \\
&\text{D} \quad x + 22
\end{align*}
\]

28. What is the factored form of \( 5d^2 + 6d - 8 \)?

\[
\begin{align*}
&\text{F} \quad (5d - 2)(d + 4) \\
&\text{G} \quad (5d + 4)(d + 2) \\
&\text{H} \quad (5d - 4)(d + 2) \\
&\text{J} \quad (5d - 4)(d - 2)
\end{align*}
\]

29. What is the factored form of \( 49b^2 - 56b + 16 \)?

\[
\begin{align*}
&\text{A} \quad (4b - 7)^2 \\
&\text{B} \quad (7b - 4)^2 \\
&\text{C} \quad (7b - 8)(7b - 2) \\
&\text{D} \quad (8b - 7)(2b - 7)
\end{align*}
\]

30. The area of a rectangle is \( 10r^2 - 11r - 6 \). The width is \( 2r - 3 \). What is the length?

\[
\begin{align*}
&\text{F} \quad 8r - 3 \\
&\text{G} \quad 5r + 2 \\
&\text{H} \quad 5r + 3 \\
&\text{J} \quad 5r - 2
\end{align*}
\]

31. Which function best models the sequence \( 2, 4, 8, 16, 32, \ldots \)?

\[
\begin{align*}
&\text{A} \quad A(n) = 2n \\
&\text{B} \quad A(n) = 2^n \\
&\text{C} \quad A(n) = n^2 \\
&\text{D} \quad A(n) = n^2 + 1
\end{align*}
\]

32. Factor \( 10x^2 + 19x + 6 \) by grouping.

\[
\begin{align*}
&\text{F} \quad (5x + 2)(2x + 3) \\
&\text{G} \quad (x + 2)(10x + 3) \\
&\text{H} \quad 2(x + 1)(5x + 3) \\
&\text{J} \quad 2(5x + 1)(x + 3)
\end{align*}
\]
33. An analyst predicts that the demand for homeowner’s insurance will continue to decline for a time, and then begin to climb. Her model for the number of insurance policies demanded, shown in the following graph, is \(D = 0.0625t^2 - 0.75t + 4.25\), where \(D\) represents tens of millions of policies and \(t\) is time in months. On what interval does the analyst predict that the demand for policies will increase?

![Graph showing the demand model](image)

**A** \(t \geq 6\)

**B** \(4 \leq t \leq 10\)

**C** \(t \geq 8\)

**D** \(0 \leq t \leq 6\)

34. The function \(b(h)\) models the percent of a certain wildflower that blooms during months in which the average daily sunlight is \(h\) hours. Name the most appropriate domain for this function.

- **F** Integers, \(h \leq 24\)
- **G** Integers, \(0 \leq h \leq 24\)
- **H** Real numbers, \(0 \leq h \leq 24\)
- **J** Whole numbers, \(h \leq 24\)

35. What is the width of the rectangle shown below?

\[
A = 10x^2 - 13x - 3
\]

**A** \(x - 3\)

**B** \(2x - 5\)

**C** \(2x - 3\)

**D** \(2x - 1\)

36. Which expressions can represent the dimensions of a rectangular prism with a volume of \(12y^3 + 62y^2 + 80y\)?

- **F** \(2y, 2y + 8, 3y + 5\)
- **G** \(2y, 2y + 4, 3y + 10\)
- **H** \(y, 2y + 5, 3y + 8\)
- **J** \(2y, 2y + 5, 3y + 8\)

37. An experimental machine heats up rapidly as it operates. Engineers measure its temperature every 10 seconds and record the results in a table.

<table>
<thead>
<tr>
<th>time (seconds)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>temperature (°C)</td>
<td>20.000</td>
<td>24.000</td>
<td>28.800</td>
<td>34.560</td>
<td>41.472</td>
</tr>
</tbody>
</table>

Describe how the temperature of the machine changes over time.

- **A** The temperature increases by 20% every 10 seconds.
- **B** The temperature increases by 0.4°C where \(t\) is the time in seconds.
- **C** The temperature doubles every 40 seconds.
- **D** The temperature increases by 4°C every 10 seconds.

STOP