Algebra I – Chapter 7 Test Review

Standards/Goals:
- **N.RN.1./F.1.a.** I can use properties of exponents to evaluate and simplify expressions.
- **N.RN.1./A.1.e.** I can use scientific notation when working with very large or very small quantities.
- **N.RN.1.** I can multiply and divide monomial expressions.
- **D.2.c.** I can evaluate exponential functions at given values.
- **F.IF.7.e.** I can graph exponential functions.
- **F.IF.8.b.** I can recognize exponential and exponential decay functions.
- **N.RN.2.** I can rewrite expressions involving radicals and rational exponents using the properties of exponents.
- **F.1.b./F.1.e.** I can evaluate and simplify rational/radical expressions.
- **A.CED.2.** I can solve exponential equations with common bases.

Evaluating the following expressions for the given values:

#1. \( \frac{x^4 \cdot x^3}{x} \) for \( x = -3 \).

#2. \( \frac{(x-5)(x+8x)}{2x} \) when \( x = -2 \).

#3. \(-a^{-2}\) if \( a = -7\).

#4. \( 1.8 \cdot 2^x \) if \( x = 4 \).

#5. **MULTIPLE CHOICE:**

What is the value of \( \frac{(2x^2 - x)(x+1)}{4 - x} \) when \( x = 2 \)?

A. 3
B. 6
C. 9
D. 12

#6. **MULTIPLE CHOICE:**

What is the value of this expression if \( x = 6 \) and \( y = -3 \)?

\( \left(-\frac{2}{y}\right)^4 \left(\frac{xy^3}{z^2}\right)^2 \)

A. -54
B. -9
C. 27
D. 81
Simplify: (Use ONLY positive exponents).

#7. \((z^{-8}z^5)^4\)

#8. \(\frac{w^7}{w^{-6}}\)

#9. \(10a^5b^{-6}c^4\)

#10. \((3n^4)^2\)

#11. \(\frac{r^5}{g^{-3}}\)

#12. \(4\sqrt[4]{x^7}\)

#13. \((2t)^{-6}\)

#14. \(5m^5m^{-8}\)

#15. \((m^7t^{-5})^2\)

#16. \((x^2n^4)(n^{-8})\)

#17. \(-5m^{-3}n^{12} \cdot -8m^{-8}n^{-3}\)

#18. \(-(12w)^0y^{-9}z\)
#19. \((3a^3a^{-7}b^{-2})^3\)  

#20. \(\frac{a^2b^{-7}c^4}{a^5b^3c^{-2}}\)

#21. \(\left(\frac{a^6}{a^7}\right)^{-3}\)

#22. \(\frac{(2t^5)^3}{4t^8t^{-1}}\)

#23. \((t^6)^3(m)^2\)

#24. \((w^{-2}j^{-4})^{-3}(j^7)\)

#25. **MULTIPLE CHOICE:**  

Which expression is the completely simplified form of \(\frac{(6x^{-8}y^3)(-x^5y^{-1})}{(2x^{-1}y^2)^3}\)?

A. \(\frac{-3}{4y^4}\)

B. \(-3x^{-37}y^{-9}\)

C. \(\frac{3}{4x^{10}y^4}\)

D. \(3y^{-2}\)
#26. MULTIPLE CHOICE:
Which expression is the completely simplified form of \( \frac{7a^2b^{-1}c^3}{11(-a)^3bc^5} \) ?

A. \( \frac{-7}{11ac^2} \)

B. \( \frac{-7}{11ab^2c^2} \)

C. \( \frac{-7}{11a^{-5}b^2c^2} \)

D. \( \frac{-7}{11a^{-5}bc^2} \)

#27. MULTIPLE CHOICE:
Which expression is equivalent to \( \frac{(2pm^{-1})(-p^{-1}m)}{(-2m)^3} \) ?

A. \( \frac{1}{4m^3} \)

B. \( \frac{1}{4pm^4} \)

C. \( -\frac{p^2}{4m^3} \)

D. \( -\frac{p}{4m^2} \)

Scientific Notation:
#28. Write 0.000005091 in scientific notation.

#29. Write 1,780,000 in scientific notation.

#30. What is the simplified form of \((4.16 \times 10^4)(8.8 \times 10^9)\) written in scientific notation?
**Exponential Equations:**

#31. Write an example of an exponential equation and an example of a linear equation.

#32. Write an example of an exponential equation showing growth.

#33. Write an example of an exponential equation showing decay.

**Equations: Solve each.**

#34. $8 \cdot 6^x = 1728$  
#35. $6^{1-4x} = 216$  

#36. $5^{5x-20} = 1$  
#37. $\frac{9^x}{9^x} = 9^{-6x}$

#38. $8^{-3x} \cdot 8^{7x} = \frac{1}{8}$  
#39. $5^{8x} = 625$  

#40. $3^{-6x+10} = 27$  
#41. $4^{2x+8} = 64$
Word Problems:
#42. A rectangular pasture has a fence around the perimeter. The length of the fence is $28x^5$ and the width $12x^7$.
   a. What is the area of the pasture?
   b. What is the perimeter of the pasture?

#43. The side of a square measures $4x^2y^3$.
   a. What is the area of the square if $x = -2$ and $y = 3$?
   b. What is the perimeter of the square?

$A(t) = a(1 + \frac{r}{n})^{nt}$

#44. You invest $20,000 at 9% interest compounded annually. How much will the investment be worth 6 years later?

#45. Suppose you deposit $15,000 into an account earning 8% interest compounded quarterly. To the nearest dollar, what is the balance after 8 years?
Evaluate each expression for \( m = 2, t = -3, w = 4 \) and \( z = 0 \).

#46. \((w \cdot t)^m\) 

#47. \(w^m t^m\)

#48. \(z^{-t} (m^t)^z\) 

#49. \((w^z)^m\)

#50. Define a variable, write an inequality, solve it, graph it and write its corresponding interval.

“Twelve is at most a number decreased by seven.”

#51. Define a variable, write an inequality, solve it, graph it, and write its corresponding interval.

“Eighteen is at least a number increased by twenty-seven.”

Consider this equation: \( y = -\frac{3}{4} x + 9\)

#52. Write an equation that would be \textit{parallel} to that equation.

#53. Write an equation that would be \textit{perpendicular} to that equation.
Consider this equation: 
\[-4x + 2y = 28\]

#54. Find the \textit{x and y intercepts} of that equation.

#55. Write an equation that would be \textit{parallel} to that equation.

#56. Write the equation in \textit{slope-intercept form}.

#57. What would an equation (in slope intercept form) of a line \textit{perpendicular} to the equation that you found in the previous question look like?

\textit{Find the domain of the following equations:}

#58. \[ y = \frac{6 + x}{x - 7} \]

#59. \[ y = \frac{x + 10}{121 + x} \]

#60. \textbf{MULTIPLE CHOICE:}

Evaluate \[ 5 - 2(3 - 2^2)^2 + 6 - (5 + 1). \]

\begin{enumerate}
  \item A. 1
  \item B. 3
  \item C. 9
  \item D. 27
\end{enumerate}
Equations of a Line

Standard Form \[ Ax + By = C \]
A, B, and C are constants with \( A \) and \( B \) not both equal to zero.

Slope-Intercept Form \[ y = mx + b \]
\((x_1,y_1)\) is a point.

Point-Slope Form \[ y - y_1 = m(x - x_1) \]
\( m = \) slope
\( b = y\)-intercept

Quadratics

Standard Form of a Quadratic Equation \[ ax^2 + bx + c = 0 \]
a, b, and c are constants, where \( a \neq 0 \).

Quadratic Formula \[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

Pythagorean Theorem

\[ a^2 + b^2 = c^2 \]

Circles

Equation of a Circle \[ (x - h)^2 + (y - k)^2 = r^2 \]
center \((h,k)\)

Area \[ A = \pi r^2 \]
\( A = \) area
\( r = \) radius

Circumference \[ C = \pi d \]
\( C = \) circumference
\( d = \) diameter
\( \pi = 3.14 \)

Sequence and Series

Arithmetic Sequence \[ a_n = a_1 + (n - 1)d \]
a\(_n\) = \(n^{th}\) term

Arithmetic Series \[ s_n = \frac{n}{2} (a_1 + a_n) \]
\( n = \) number of the term
\( d = \) common difference
\( s_n = \) sum of the first \( n \) terms
### Miscellaneous

<table>
<thead>
<tr>
<th>Distance, Rate, Time</th>
<th>$D = rt$</th>
<th>$D = \text{distance}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Interest</td>
<td>$I = prt$</td>
<td>$r = \text{rate}$</td>
</tr>
<tr>
<td>Compound Interest</td>
<td>$A = p\left(1 + \frac{r}{n}\right)^{nt}$</td>
<td>$t = \text{time}$</td>
</tr>
<tr>
<td>Direct Variation</td>
<td>$y = kx$</td>
<td>$I = \text{interest}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$p = \text{principal}$</td>
</tr>
<tr>
<td>Indirect Variation</td>
<td>$y = \frac{k}{x}$</td>
<td>$A = \text{amount of money after } t \text{ years}$</td>
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<tr>
<td></td>
<td></td>
<td>$n = \text{number of times interest is}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\text{compounded annually}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$k = \text{variation constant}$</td>
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</tbody>
</table>

### Area and Volume of Polygons and Solids

<table>
<thead>
<tr>
<th>Triangle</th>
<th>$A = \frac{1}{2}bh$</th>
<th>$A = \text{area}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallelogram</td>
<td>$A = bh$</td>
<td>$b = \text{base}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$h = \text{height}$</td>
</tr>
<tr>
<td>Trapezoid</td>
<td>$A = \frac{1}{2}(b_1 + b_2)h$</td>
<td>$V = \text{volume}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$B = \text{area of base}$</td>
</tr>
<tr>
<td>General Prism</td>
<td>$V = Bh$</td>
<td>$r = \text{radius}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\pi = 3.14$</td>
</tr>
<tr>
<td>Right Circular Cylinder</td>
<td>$V = \pi r^2h$</td>
<td></td>
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<td></td>
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<tr>
<td>Pyramid</td>
<td>$V = \frac{1}{3}Bh$</td>
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<tr>
<td>Right Circular Cone</td>
<td>$V = \frac{1}{3}\pi r^2h$</td>
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</tr>
<tr>
<td>Sphere</td>
<td>$V = \frac{4}{3}\pi r^3$</td>
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</table>

### Lines and Points

<table>
<thead>
<tr>
<th>Slope</th>
<th>$m = \frac{y_2 - y_1}{x_2 - x_1}$</th>
<th>$(x_1,y_1)$ and $(x_2,y_2)$ are 2 points.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midpoint</td>
<td>$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$</td>
<td>$M = \text{midpoint}$</td>
</tr>
<tr>
<td>Distance</td>
<td>$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$</td>
<td>$d = \text{distance}$</td>
</tr>
</tbody>
</table>