Algebra I Review

Chapter 3 Test

\[ a^2 - b^2 = (a+b)(a-b) \]

GEOMETRY

\[ (ab)^n = a^n b^n \]
\[ a^n \times a^n = a^{2n} \]

\[ s = vt \]

CIRCLE

\[ C = 2\pi r \]
\[ A = \pi r^2 \]

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

Math

\[ A = \frac{1}{2} bh \]

\[ a^n = \frac{1}{a^n} \]

\[ (\frac{a}{b})^n = \frac{a^n}{b^n} \]

\[ (a+b)^2 = a^2 + 2ab + b^2 \]
\[ (a-b)^2 = a^2 - 2ab + b^2 \]
1. Tickets for a spaghetti dinner cost $4 for children and $6 for adults. The equation \(4x + 6y = 36\) represents the number of children \(x\) and adults \(y\) who can eat at the dinner for $36. If no children are eating at the dinner, how many adults can eat for $36?

2. If \((a, 9)\) is a solution to the equation \(-4a = b - 21\), what is \(a\)?

3. Find the \(x\)-intercept of \(x - 2y = 9\).

4. Graph the equation \(y = 2x + 1\). Make a table!

5. Find the root (solution) of \(9x - 36 = 0\).

For Questions 6 – 8, find the slope of the line passing through each pair of points. If the slope is undefined, write \textit{undefined}.

6. \((2, 5)\) and \((3, 5)\)

7. \((6, -4)\) and \((-3, 7)\)

8. \((-1, 3)\) and \((6, 3)\)

9. In 1972, federal vehicle emission standards allowed 3.4 hydrocarbons released per mile driven. By 2007, the standards allowed only 0.8 hydrocarbons per mile driven. What was the rate of change from 1972 to 2007?

10. If a shark can swim 27 miles in 9 hours, how many miles will it swim in 12 hours?

For Questions 11 and 12, determine whether each equation is a linear equation. If so, write the equation in standard form.

11. \(xy = 6\)

12. \(2x + 3y + 7 = 3\)

13. Graph the equation \(x - 4y = 2\) by finding the intercepts.
14. Graph \( y = -\frac{1}{2} x \)  Make a table!

15. Graph \( y = 3 \)  Make a table if needed.

16. Determine whether the sequence \(-10, -7, -4, -1, \ldots\) is an arithmetic sequence. Write yes or no. If so, state the common difference.

17. Find the next three terms of the arithmetic sequence \(8, 15, 22, 29, \ldots\)

18. Write an equation for the \( n \)th term of the sequence \( 12, 5, -2, -9, \ldots\)

For Questions 19 and 20, use the table below that shows the amount of gasoline a car consumes for different distances driven.

<table>
<thead>
<tr>
<th>Distance (mi)</th>
<th>1</th>
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<tbody>
<tr>
<td>Gasoline (gal)</td>
<td>0.04</td>
<td>0.08</td>
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19. Write an equation in function notation for the relationship between distance and gasoline used.

20. How many gallons will the car consume after driving for 150 miles?

**Bonus** Graph \( x = 3, \ y = -1, \) and \( y = x \) on a coordinate plane. Give the vertices of the figure formed by the three lines.

B: __________________
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\[ C = 2\pi r \]
\[ A = \pi r^2 \]

TRIANGLE

\[ c^2 = a^2 + b^2 \]
\[ A = \frac{1}{2} bh \]

SQUARE

\[ a^n = \frac{1}{a^n} \]
\[ (a^n)^m = a^{nm} \]

numbers

\[ (a+b)^2 = a^2 + 2ab + b^2 \]
\[ (a-b)^2 = a^2 - 2ab + b^2 \]
1. Tickets for a spaghetti dinner cost $4 for children and $6 for adults. The equation $4x + 6y = 36$ represents the number of children $x$ and adults $y$ who can eat at the dinner for $36. If no children are eating at the dinner, how many adults can eat for $36? 

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4. Graph the equation $y = 2x + 1$. Make a table! 

   See the work for the table 

5. Find the root (solution) of $9x - 36 = 0$. 

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11. $xy = 6$ 

12. $2x + 3y + 7 = 3$ 

13. Graph the equation $x - 4y = 2$ by finding the intercepts. 

   $(2,0)$ and $(0,-\frac{1}{2})$ 

14. $\text{lo adults}$ 

15. $a=3$ 

16. $x\text{-int: 9 or (9,0)}$ 

17. $m=\frac{1}{3}$ 

18. $m=-\frac{11}{9}$ 

19. $m=0$ 

20. $-0.07 \text{ hc per year}$ 

21. $310 \text{ miles}$ 

22. not linear 

23. yes $2x+3y=-4$
14. Graph \( y = -\frac{1}{2}x \) Make a table!

15. Graph \( y = 3 \) Make a table if needed.

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20. How many gallons will the car consume after driving for 150 miles?

**Bonus** Graph \( x = 3, y = -1, \) and \( y = x \) on a coordinate plane. Give the vertices of the figure formed by the three lines.
1. \[4x + 6y = 36\]
   \[\begin{align*}
   4(0) + 6y &= 36 \\
   6y &= 36 \\
   y &= 6
   \end{align*}\]
   No children: \(x = 0\)
   6 adults

2. \((a, 9)\) is a solution to \(-4a = b - 21\)
   \[\begin{align*}
   a & \quad b \\
   \text{plug them in!}
   \end{align*}\]
   \[-4a = b - 21\]
   \[-4(a) = 9 - 21\]
   \[-4a = -12\]
   \[\frac{-4a}{-4} = \frac{-12}{-4}\]
   \[a = 3\]

3. \(x\)-intercept means \(\rightarrow\) let \(y = 0\)
   \[\begin{align*}
   x - 2y &= 9 \\
   x - 2(0) &= 9 \\
   x &= 9 \\
   x - \text{intercept: } 9 \\
   \text{or you can write } (9, 0)
   \end{align*}\]
4. \[ \begin{array}{c|cc}
X & Y & \text{plug in each } x\text{-value to find } y\text{-values} \\
\hline
-2 & 3 & -3 \\
-1 & 1 & \text{whops} \\
0 & 3 & \\
1 & 3 & \text{x-intercept} \\
2 & 5 & \\
\end{array} \]

Suggested but can be any numbers.

5. \[ 9x - 3lx = 0 \quad \text{just solve for } x \]
\[
\begin{align*}
+3lx + 3lx \\
9x & = 3lx \\
\frac{9x}{9} & = \frac{3lx}{9} \\
x & = 4
\end{align*}
\]

6. \[
\frac{m}{\begin{array}{c}
(2, 5) \quad \text{and } (3, 6) \\
x_1, y_1 \quad \text{and } x_2, y_2
\end{array}} = \frac{y_2 - y_1}{x_2 - x_1}
\]
\[
m = \frac{6 - 5}{3 - 2} = \frac{1}{1}
\]
\[
m = 1
\]
7. \((x_1, -4)\) and \((-3, 7)\)
\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]
\[ m = \frac{7 - (-4)}{-3 - x_1} \]
\[ m = \frac{11}{-3 - (-4)} \]
\[ m = \frac{11}{1} = 11 \]

8. \((-1, 3)\) and \((6, 3)\)
\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]
\[ m = \frac{3 - 3}{6 - (-1)} \]
\[ m = \frac{0}{7} = 0 \]

9. Rate of change → means use slope formula!

\((1972, 3.4)\) \((2007, 0.8)\)
\[ m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0.8 - 3.4}{2007 - 1972} \approx -0.07 \]

A decrease of about 0.07 hydrocarbons each year.
10. \[ \frac{x}{27} \text{ miles} \rightarrow 9 \text{ hours} \]
\[ \frac{x}{y} \text{ miles} \rightarrow 12 \text{ hours} \]

\[ y = k \frac{x}{27} \]
\[ \frac{9}{27} = k \cdot \frac{27}{27} \]
\[ \frac{1}{3} = k \]

\[ y = \frac{1}{3} x \rightarrow 12 = \frac{1}{3} x \]
\[ (3) 12 = \frac{1}{3} x (3) \]
\[ 36 = x \]

11. \( xy = 6 \) \(-\) no because the variables are being multiplied.

12. \[ 2x + 3y + 7 = 3 \]
\[ -7 -7 \]
\[ 2x + 3y = -4 \] \(-\) yes because it can be written in standard form.

13. \[ x - 4y = 2 \]

- **x-intercept** (let \( y = 0 \))
  \[ x - 4(0) = 2 \]
  \[ x - 0 = 2 \]
  \[ x = 2 \]
  \[ (2, 0) \]

- **y-intercept** (let \( x = 0 \))
  \[ 0 - 4y = 2 \]
  \[ -4y = 2 \]
  \[ y = -\frac{1}{2} \]
  \[ (0, -\frac{1}{2}) \]
14. \[ y = -\frac{1}{2}x \]

\[
\begin{array}{c|c|c}
\hline
x & y \\
0 & 0 \\
2 & -1 \\
\hline
\end{array}
\]

Plot this point then use the slope.

A direct variation will always go through \((0, 0)\).

\[
\begin{array}{c|c|c|c|c}
\hline
x & y & \text{OR use the suggested x-values} \\
-2 & 1 & & \\
-1 & \frac{1}{2} & & \\
0 & 0 & * & \text{you will get the same} \\
1 & -\frac{1}{2} & & \text{graph!} \\
2 & -1 & & \\
\hline
\end{array}
\]

15. When \(y = 3\), no matter what the x-value is, \(y\) will always \underline{= 3}\).

\[
\begin{array}{c|c|c|c|c|c|c|c}
\hline
x & y & \text{OR use the suggested x-values} \\
-2 & 3 & & \\
-1 & 3 & & \\
0 & 3 & & \\
1 & 3 & & \\
2 & 3 & & \\
\hline
\end{array}
\]

16. \(-10, -7, -4, -1, \ldots\)

\[
\begin{array}{c}
\uparrow \\
+3 \\
\uparrow +3 \\
\hline
+3
\end{array}
\]

Yes, it is an arithmetic sequence. Common difference: \(+3\)
17. \( 8, 15, 22, 29, \frac{36}{7}, \frac{43}{7}, \frac{50}{7} \)

18. \( 12, 5, -2, -9, \ldots \quad a_1 = 12, \ d = -7 \)

Formula: \( a_n = a_1 + (n-1)d \)

Keep the \( n \) \( \Rightarrow \) \( a_n = 12 + (n-1)(-7) \)

\( a_n = 12 - 7n + 7 \)

\( a_n = 19 - 7n \)

19. Find the slope: \((1, 0.04)\) and \((2, 0.08)\)

\( m = \frac{0.08 - 0.04}{2 - 1} = \frac{0.04}{1} = 0.04 \)

Find the table value where \( x = 0 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<td>( y )</td>
<td>0.04</td>
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</table>

\[ y = 0.04x \]

\[ f(x) = 0.04x \]
20. \[ f(x) = 0.04x \]
   \[ f(150) = 0.04(150) \]
   \[ f(150) = 6 \]

   After 150 miles, the car used 6 gallons of gas.

21. 1. \( x = 3 \) means a vertical line where \( x \rightarrow 3 \)
    2. \( y = -1 \) means a horizontal line where \( y \rightarrow -1 \)
    3. \( y = x \)

\[
\begin{array}{c|c}
  x & y \\
  \hline
  -2 & -2 \\
  -1 & -1 \\
  0 & 0 \\
  1 & 1 \\
  2 & 2 \\
\end{array}
\]