Algebra 1 Honors
Summer Work Packet

Be sure to show work for every problem.
A test on these Pre-Algebra Essential Topics will be given in the first week of school in the fall.

Congratulations!

Your choice to enroll in Algebra 1 (Honors) represents a commitment to academic excellence. The concepts and computational skills you learned are the foundation for success in Algebra 1 Honors. This packet is designed to aid students in brushing up on these essential skills. This packet is only meant as a guide and additional reinforcement may be necessary to endure success in Algebra 1 Honors. Your assignment is to complete all the problems in the packet without a calculator. You must show all your work. Please place a box around your final answer.

Mastery of this material should be completed before school begins but you will have one week after school begins to finish and/or get help from your new teacher during her office hours. Class time will not be allocated to finish this packet.

This assignment will count! The packet will count as three daily grades and will be graded as an average of completion % and accuracy %. An assessment of these prerequisite skills for Algebra 1 will be given at the end of the first week of school.

Congratulations again on your choice to pursue academic excellence in mathematics at Wando High School.
Section 1 – Fractions

We use fractions or ratios every day. A fraction is part of an entire object. It consists of two numbers, a number on the top called a numerator and a number on the bottom called a denominator. To add or subtract a fraction, you must have a common denominator.

- Find the Least Common Denominator (LCD) of the fractions
- Rename the fractions to have the LCD
- Add (or subtract) the numerators
- Keep the LCD
- Simplify the fraction

Example 1

Find each sum or difference. Write in simplest form.

a. \( \frac{1}{2} + \frac{2}{3} \)

\[ \frac{1}{2} + \frac{2}{3} = \frac{3}{6} + \frac{4}{6} = \frac{3+4}{6} = \frac{7}{6} \text{ or } 1\frac{1}{6} \]

The LCD for 2 and 3 is 6. Rename \( \frac{1}{2} \) as \( \frac{3}{6} \) and \( \frac{2}{3} \) as \( \frac{4}{6} \).

Add the numerators.

b. \( \frac{3}{8} - \frac{1}{3} \)

\[ \frac{3}{8} - \frac{1}{3} = \frac{9}{24} - \frac{8}{24} = \frac{9-8}{24} = \frac{1}{24} \]

The LCD for 8 and 3 is 24. Rename \( \frac{3}{8} \) as \( \frac{9}{24} \) and \( \frac{1}{3} \) as \( \frac{8}{24} \).

Subtract the numerators.

c. \( \frac{2}{5} - \frac{3}{4} \)

\[ \frac{2}{5} - \frac{3}{4} = \frac{8}{20} - \frac{15}{20} = \frac{8-15}{20} = -\frac{7}{20} \]

The LCD for 5 and 4 is 20. Rename \( \frac{2}{5} \) as \( \frac{8}{20} \) and \( \frac{3}{4} \) as \( \frac{15}{20} \).

Subtract the numerators.

Section 1A – Exercises

Find each sum or difference. Write your answer in simplest form. (Leave as an improper fraction.)

1. \( \frac{2}{3} + \frac{7}{8} \)
2. \( \frac{13}{20} - \frac{2}{5} \)
3. \( \frac{5}{6} - \frac{8}{9} \)
To multiply fractions, multiply the numerators and multiply the denominators. If the numerators and denominators have common factors, you can simplify before you multiply by cross canceling.

**Example 2**

Find each product.

a. \( \frac{2}{5} \cdot \frac{1}{3} \)

\[
\frac{2}{5} \cdot \frac{1}{3} = \frac{2 \cdot 1}{5 \cdot 3} \\
= \frac{2}{15}
\]

Multiply the numerators.  
Multiply the denominators.  
Simplify.

b. \( \frac{3}{5} \cdot 1\frac{1}{2} \)

\[
\frac{3}{5} \cdot 1\frac{1}{2} = \frac{3}{5} \cdot \frac{3}{2} \\
= \frac{3 \cdot 3}{5 \cdot 2} \\
= \frac{9}{10}
\]

Write 1\(\frac{1}{2}\) as an improper fraction.  
Multiply the numerators.  
Multiply the denominators.  
Simplify.

c. \( \frac{1}{4} \cdot \frac{2}{9} \)

\[
\frac{1}{4} \cdot \frac{2}{9} = \frac{1}{4} \cdot \frac{2}{9} \\
= \frac{1 \cdot 1}{2 \cdot 9} \text{ or } \frac{1}{18}
\]

Divide by the GCF, 2.  
Multiply the numerators.  
Multiply the denominators and simplify.

**Section 1B – Exercises**

Find each product. Write your answer in simplest form. (Leave as an improper fraction.)

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>4.</td>
<td>( \frac{3}{5} \cdot \frac{5}{6} )</td>
<td>5.</td>
</tr>
<tr>
<td>7.</td>
<td>( -\frac{2}{7} \cdot \frac{4}{3} )</td>
<td>8.</td>
</tr>
</tbody>
</table>
To divide one fraction by another, you multiply the first fraction by the reciprocal of the second fraction.

**Example 3**

**Find each quotient.**

a. \( \frac{1}{3} \div \frac{1}{2} \)

\[
\frac{1}{3} \div \frac{1}{2} = \frac{1}{3} \cdot \frac{2}{1} \\
= \frac{2}{3}
\]

Multiply \( \frac{1}{3} \) by \( \frac{2}{1} \), the reciprocal of \( \frac{1}{2} \). Simplify.

b. \( \frac{3}{8} \div \frac{2}{3} \)

\[
\frac{3}{8} \div \frac{2}{3} = \frac{3}{8} \cdot \frac{3}{2} \\
= \frac{9}{16}
\]

Multiply \( \frac{3}{8} \) by \( \frac{3}{2} \), the reciprocal of \( \frac{2}{3} \). Simplify.

c. \( \frac{3}{4} \div \frac{2}{2} \)

\[
\frac{3}{4} \div \frac{2}{2} = \frac{3}{4} \div \frac{5}{2} \\
= \frac{3}{4} \cdot \frac{2}{5} \\
= \frac{6}{20} \text{ or } \frac{3}{10}
\]

Write \( \frac{2}{2} \) as an improper fraction. Multiply \( \frac{3}{4} \) by \( \frac{2}{5} \), the reciprocal of \( \frac{2}{2} \). Simplify.

d. \( \frac{1}{5} \div \left( -\frac{3}{10} \right) \)

\[
\frac{1}{5} \div \left( -\frac{3}{10} \right) = \frac{-1}{5} \cdot \left( \frac{10}{3} \right) \\
= \frac{10}{15} \text{ or } \frac{2}{3}
\]

Multiply \( \frac{-1}{5} \) by \( -\frac{10}{3} \), the reciprocal of \( -\frac{3}{10} \). Same sign \( \rightarrow \) positive quotient; simplify.

**Section 1C – Exercises**

Find each quotient. Write your answer in simplest form. (Leave as an improper fraction.)

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<tbody>
<tr>
<td>10. ( \frac{3}{25} \div \frac{2}{15} )</td>
<td>11. ( \frac{1}{4} \div \frac{1}{2} )</td>
<td>12. ( -\frac{9}{10} \div \frac{3}{2} )</td>
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</table>
Section 2 – Real Number Comparison

An inequality is a mathematical sentence that compares the value of two expressions using an inequality symbol.

<table>
<thead>
<tr>
<th>Inequality Symbol</th>
<th>Pronounced</th>
<th>Example</th>
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<tbody>
<tr>
<td>&lt;</td>
<td>Less than</td>
<td>4 &lt; 9</td>
</tr>
<tr>
<td>≤</td>
<td>Less than or equal to</td>
<td>–3 ≤ 2</td>
</tr>
<tr>
<td>&gt;</td>
<td>Greater than</td>
<td>–4 &gt; –7</td>
</tr>
<tr>
<td>≥</td>
<td>Greater than or equal to</td>
<td>5 ≥ 5</td>
</tr>
<tr>
<td>≠</td>
<td>Not equal to</td>
<td>7 ≠ 11</td>
</tr>
</tbody>
</table>

Example 1

Which one is greater, \( \frac{4}{9}\) or \(\frac{5}{12}\)?

Rewrite each fraction using the LCD.

\[
\frac{4}{9} = \frac{16}{36} \quad \text{and} \quad \frac{5}{12} = \frac{15}{36}
\]

\[
\frac{16}{36} > \frac{15}{36} \quad \text{So} \quad \frac{4}{9} > \frac{5}{12}
\]

Section 2 – Exercises

Use <, =, or > to compare the numbers.

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<table>
<thead>
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<tbody>
<tr>
<td>13. (-12)____(-15)</td>
<td>14. (0.63)____(0.6)</td>
<td>15. (0.88)____(\frac{8}{9})</td>
</tr>
<tr>
<td>16. (\frac{2}{3})____(\frac{1}{6})</td>
<td>17. (\frac{3}{4})____(\frac{12}{16})</td>
<td>18. (-2\frac{5}{8})____(-2\frac{1}{2})</td>
</tr>
</tbody>
</table>
Section Three:

Evaluating Algebraic Expressions

1. Substitute the given values for the variables in the expression
   \[ 9x^2 - 4(y + 3z) \]
   for \( x = -3, y = 2, z = 5 \)

2. Evaluate the expression using the order of operations
   - Parentheses/Brackets (inside to outside)
   - Exponents
   - Multiplication/Division (left to right)
   - Addition/Subtraction (left to right)
   \[ q(-3)^2 - 4(2 + 3 \cdot 5) \]
   \[ q(-3)^2 - 4(2 + 15) \]
   \[ q(-3)^2 - 4 \cdot 17 \]
   \[ q \cdot q - 4 \cdot 17 \]
   \[ 81 - 4 \cdot 17 \]
   \[ 81 - 68 = 13 \]

The Distributive Property

1. Multiply the number outside the parentheses by each term in the parentheses.
   \[ 5(8x - 3) \]
   \[ 5(8x) - 5(3) \]
   \[ 40x - 15 \]

2. Keep the addition/subtraction sign between each term.

Simplifying Algebraic Expressions

1. Clear any parentheses using the Distributive Property
   \[ 2(3x - 4) - 12x + 9 \]
   \[ 2(3x - 4) - 12x + 9 \]
   \[ 6x - 8 - 12x + 9 \]
   \[ -6x + 1 \]
Evaluate each expression for \( a = 9, b = -3, c = -2, d = 7 \). Show your work.

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<thead>
<tr>
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<tbody>
<tr>
<td>1. ( a - cd )</td>
<td>2. ( 2b^3 + c^2 )</td>
<td>3. ( \frac{a + d - c}{b} )</td>
<td>4. ( (a - b)^2 + d(a + c) )</td>
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<tr>
<td>5. ( 4c - (b - a) )</td>
<td>6. ( \frac{a}{b} - 5a )</td>
<td>7. ( 2bc + d(12 - 5) )</td>
<td>8. ( b + 0.5[8 - (2c + a)] )</td>
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</tbody>
</table>

Simplify each expression using the Distributive Property.

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<tbody>
<tr>
<td>9. ( 5(2a - 8) )</td>
<td>10. ( 7(y + 3) )</td>
<td>11. ( -3(4w - 3) )</td>
<td>12. ( (6r + 3)^2 )</td>
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</tbody>
</table>

Simplify each expression, showing all work.

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</thead>
<tbody>
<tr>
<td>13. ( 8(x + 1) - 12x )</td>
<td>14. ( 6w - 7 + 12w - 3z )</td>
<td>15. ( 9n - 8 + 3(2n - 11) )</td>
<td>16. ( 3(7x + 4y) - 2(2x + y) )</td>
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<tr>
<td>17. ( (15 + 8d)(-5) - 24d + d )</td>
<td>18. ( 9(b - 1) - c + 3b + c )</td>
<td>19. ( 20f - 4(5f + 4) + 16 )</td>
<td>20. ( 8(h - 4) - h - (h + 7) )</td>
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</table>
**Section Four:**

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### Solving One-Step Equations

1. Cancel out the number on the same side of the equal sign as the variable using inverse operations (addition/subtraction; multiplication/division)

   **ex:** $-18 = 6j$

   \[
   \begin{align*}
   -18 &= 6j \\
   \frac{6}{6} &= \frac{6}{6} \\
   -3 &= j \quad \rightarrow \quad j = -3
   \end{align*}
   \]

2. Be sure to do the same thing to both sides of the equation!

---

### Solving Two-Step Equations

1. Undo operations one at a time with inverse operations, using the order of operations in reverse (i.e. undo addition/subtraction before multiplication/division)

   **ex:** \[
   \begin{align*}
   \frac{a}{7} - 12 &= -q \\
   \frac{a}{7} &= -q + 12 + 12 \\
   \frac{a}{7} &= 3 \times 7 \\
   a &= 21
   \end{align*}
   \]

2. Be sure to always do the same thing to both sides of the equation!

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### Solving Multi-Step Equations

1. Clear any parentheses using the Distributive Property

   **ex:** \[
   \begin{align*}
   5(2x - 1) &= 3x + 4x - 1 \\
   10x - 5 &= 3x + 4x - 1 \\
   10x - 5 &= 7x - 1 \\
   -7x &= -7x \\
   3x - 5 &= -1 \\
   +5 &= +5 \\
   3x &= 4 \\
   \frac{3x}{3} &= \frac{4}{3} \\
   \frac{3x}{3} &= \frac{4}{3} \\
   x &= \frac{4}{3}
   \end{align*}
   \]

2. Combine like terms on each side of the equal sign

3. Get the variable terms on the same side of the equation by adding/subtracting a variable term to/from both sides of the equation to cancel it out on one side

4. The equation is now a two-step equation, so finish solving it as described above
Solve each equation, showing all work.

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<tbody>
<tr>
<td>21. ( f - 64 = -23 )</td>
<td>22. (-7 = 2d)</td>
<td>23. ( \frac{b}{12} = -6 )</td>
<td>24. ( 13 = m + 21 )</td>
</tr>
<tr>
<td>25. ( 5x - 3 = -28 )</td>
<td>26. ( \frac{w + 8}{3} = -9 )</td>
<td>27. ( -\frac{h}{4} + 13 )</td>
<td>28. ( 22 = 6y + 7 )</td>
</tr>
<tr>
<td>29. ( 8x - 4 = 3x + 1 )</td>
<td>30. (-2(5d - 8) = 20 )</td>
<td>31. ( 7r + 21 = 49r )</td>
<td>32. (-9g - 3 = -3(3g + 2) )</td>
</tr>
<tr>
<td>33. ( 5(3x - 2) = 5(4x + 1) )</td>
<td>34. ( 3d - 4 + d = 8d - (-12) )</td>
<td>35. ( f - 6 = -2f + 3(f - 2) )</td>
<td>36. (-2(y - 1) = 4y - (y + 2) )</td>
</tr>
</tbody>
</table>
Section 5 – Plotting on the Coordinate Plane

You can graph points on a coordinate plane. Use an ordered pair \((x, y)\) to record the coordinates. The first number in the pair is the \(x\)-coordinate. The second number is the \(y\)-coordinate. To graph a point, start at the origin \((0, 0)\). Move **horizontally** according to the value of \(x\). Then move **vertically** according to the value of \(y\).

Section 8 – Exercises

List the ordered pair for each letter, then identify the quadrant or axes the point lies in.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Ordered Pair</th>
</tr>
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<tbody>
<tr>
<td>C</td>
<td></td>
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<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
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<td>P</td>
<td></td>
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<td>F</td>
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<td>I</td>
<td></td>
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<tr>
<td>R</td>
<td></td>
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<tr>
<td>E</td>
<td></td>
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</tbody>
</table>

Plot & label the following ordered pairs.

<table>
<thead>
<tr>
<th>Ordered Pair</th>
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<tbody>
<tr>
<td>((-8, 6))</td>
</tr>
<tr>
<td>((6, -1))</td>
</tr>
<tr>
<td>((-5, -7))</td>
</tr>
<tr>
<td>((4, 9))</td>
</tr>
<tr>
<td>((2, -3))</td>
</tr>
<tr>
<td>((-4, 0))</td>
</tr>
<tr>
<td>((0, 7))</td>
</tr>
</tbody>
</table>