Name: ________________________________

Summer Math Packet

Middle School Math Review for CC Algebra 1

Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>GCF &amp; LCM</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Rounding Numbers</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Statistics (Mean, Median, Mode, Range)</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Operations with Signed Numbers</td>
<td>6 – 7</td>
</tr>
<tr>
<td>5.</td>
<td>Order of Operations</td>
<td>8 – 9</td>
</tr>
<tr>
<td>6.</td>
<td>Evaluating Expressions</td>
<td>10 – 11</td>
</tr>
<tr>
<td>7.</td>
<td>Properties of Operations</td>
<td>12</td>
</tr>
<tr>
<td>8.</td>
<td>Algebraic Translations</td>
<td>13 – 14</td>
</tr>
<tr>
<td>9.</td>
<td>Combining Like Terms</td>
<td>15</td>
</tr>
<tr>
<td>10.</td>
<td>Fractions</td>
<td>16 – 17</td>
</tr>
<tr>
<td>11.</td>
<td>Solving Basic Linear Equations</td>
<td>18 – 19</td>
</tr>
<tr>
<td>12.</td>
<td>Solving Multi-Step Equations</td>
<td>20</td>
</tr>
<tr>
<td>13.</td>
<td>Inequalities</td>
<td>21 – 23</td>
</tr>
<tr>
<td>15.</td>
<td>Graphing</td>
<td>26 – 29</td>
</tr>
<tr>
<td>16.</td>
<td>Linear Functions</td>
<td>30 – 31</td>
</tr>
<tr>
<td>17.</td>
<td>Polynomials</td>
<td>32</td>
</tr>
<tr>
<td>18.</td>
<td>Exponents</td>
<td>33 – 34</td>
</tr>
<tr>
<td>19.</td>
<td>Solving Systems of Linear Equations</td>
<td>35 – 39</td>
</tr>
</tbody>
</table>

This packet is to be completed in its entirety over the summer to be best prepared for your upcoming algebra course.
Directions/Information:

- This packet contains review problems from prior math classes and represents the types of mathematics knowledge you should master to be successful in CC Algebra 1.

- It is NOT recommended to complete this packet immediately following school dismissal in June nor the night before the packet is due. Student learning is most effective if the packet is completed during the months of July and August.

- A mastery of the material in this packet is essential to a successful first semester in CC Algebra 1.

- You should be completing the problems in this packet without a calculator. In many instances the use of a calculator actually slows you down. Your brain can actually operate faster than your fingers can.

- You should show all your work for each problem. Use and attach additional paper if needed to show your work.

- When you complete the entire packet you may check your answers at the end of the packet.

- If you need a little help remembering, you can consult these web sites:
  - [www.analyzemath.com](http://www.analyzemath.com)
  - [www.freemathhelp.com](http://www.freemathhelp.com)
  - [www.sosmath.com](http://www.sosmath.com)

- Have a great summer. See you in September.
Section 1: GCF & LCM

Find the Greatest Common Factor (GCF) and Least Common Multiple (LCM) of 24 and 32.

<table>
<thead>
<tr>
<th>GCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 4 3 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 4 3 4</td>
</tr>
</tbody>
</table>

GCF = $2 \cdot 4 = 8$

LCM = $2 \cdot 4 \cdot 3 \cdot 4 = 96$

Exercises

Find the GCF:

1. 42, 60

2. $24x^2y^2$, $42xy$

3. $27x^2y^2$, $45x^2$

4. 11, 21

Find the LCM:

5. 27, 18

6. $15x$, $18xy$

7. $9x^2y$, $15xy^2$

8. 64, 48
Section 2: Rounding Numbers

Step 1: Underline the place value to which you want to round.

Step 2: Look at the number to the right of that place value to which you want to round.

Step 3: If the number to the right of the place value to which you want to round is LESS than 5, keep the number the same and drop all other numbers.
If the number to the right of the place value to which you want to round is 5 or MORE, round up and drop the rest of the numbers.

Example: Round the following numbers to the tenths place.

Tenths
1. 23.1246
   \[ \text{2 is less than 5 so keep the 1 the same} \]
   23.1

2. 64.2685
   \[ \text{6 is greater than 5 so add 1 to the 2} \]
   64.3

3. 83.9721
   \[ \text{7 is greater than 5 so add 1 to the 9} \]
   \[ \begin{array}{c}
   83.9721 \\
   +0.01 \\
   \hline
   84.0 \\
   \end{array} \]
   84.0

Round odd numbered problems to the hundredths place and even numbered problems to the tenths place.

1. 18.6231
2. 0.2658

3. 25.0543
4. 100.9158

5. 3.9215
6. 19.9816

7. 36.9913
8. 17.1083

9. 15.9199
10. 0.6701
Section 3: Statistics  
(Mean, Median, Mode and Range)

Mean is the sum of the values in a set of data divided by the number of values.

Median is the middle value of a set of data written in ascending order. If there are two middle values, the median is the mean of those values.

Mode is the most frequent value in a set of data.

Range is the difference between the greatest and least value in a set of data.

Exercises:

Find the mean, median, mode, and range of each set of data.

1. 108, 93, 426, 766, 518, 210

2. 21.5, 35.5, 49.5, 16.3, 35.5
Section 4: Operations With Signed Numbers

Adding and Subtracting Signed Numbers

**Adding Signed Numbers**

<table>
<thead>
<tr>
<th>Like Signs</th>
<th>Different Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add the numbers and carry the sign</td>
<td>Subtract the numbers and carry the sign of the larger number</td>
</tr>
<tr>
<td>(+) + (+) = +</td>
<td>(+) + (-) = ?</td>
</tr>
<tr>
<td>(+3) + (+4) = +7</td>
<td>(+3) + (-2) = +1</td>
</tr>
<tr>
<td>(−) + (−) = −</td>
<td>(−) + (+) = ?</td>
</tr>
<tr>
<td>(−2) + (−3) = (−5)</td>
<td>(−5) + (+3) = −2</td>
</tr>
</tbody>
</table>

**Subtracting Signed Numbers**

Don’t subtract! Change the problem to **addition** and change the sign of the **second** number. Then use the addition rules.

| (+9) − (+12) = (+9) + (−12) = −7 | (+4) − (−3) = (+4) + (+3) = 7 |
| (−5) − (+3) = (−5) + (−3) = −8  | (−1) − (−5) = (−1) + (+5) = 4 |

Simplify. **Do not** use a calculator for this section.

1. 9 + (−4) =
2. 20 − (−6) =
3. −8 + 7 =
4. 7 − 10 =
5. −14 − 6 =
6. −6 − (−7) =
7. −30 + (−9) =
8. 5 − 9 =
9. 14 − 20 =
10. −8 − 7 =
11. −2 + 11 =
12. 1 − (−12) =
Multiplying and Dividing Signed Numbers

<table>
<thead>
<tr>
<th>Like Signs</th>
<th>Different Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If the signs are the same, the answer is <strong>positive</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(+)(+) = +</td>
<td>(+)(-) = -</td>
</tr>
<tr>
<td>(+3)(+4) = +12</td>
<td>(+2)(-3) = -6</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(-)(-) = +</td>
<td>(-)(+) = -</td>
</tr>
<tr>
<td>(-5)(-3) = +15</td>
<td>(-7)(+1) = -7</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(+)/(+)= +</td>
<td>(+)/(-) = -</td>
</tr>
<tr>
<td>(+12)/(+3) = +4</td>
<td>(+6)/(-3) = -2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(-)/(-) = +</td>
<td>(-)/ (+) = -</td>
</tr>
<tr>
<td>(-12)/(-4) = +3</td>
<td>(-7)/(+1) = -7</td>
</tr>
</tbody>
</table>

Simplify. **Do not** use a calculator for this section.

<table>
<thead>
<tr>
<th>13. (-5)(-3) =</th>
<th>14. (\frac{-7}{-1} =)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. (\frac{-6}{2} =)</td>
<td>16. ((3)(-4) =)</td>
</tr>
<tr>
<td>17. ((2)(4) =)</td>
<td>18. (\frac{8}{-4} =)</td>
</tr>
<tr>
<td>19. (\frac{-12}{-4} =)</td>
<td>20. ((-2)(7) =)</td>
</tr>
<tr>
<td>21. ((-1)(-5) =)</td>
<td>22. (\frac{-20}{-1} =)</td>
</tr>
<tr>
<td>23. (\frac{-16}{8} =)</td>
<td>24. ((2)(-5) =)</td>
</tr>
</tbody>
</table>
Section 5: Order of Operations

To avoid having different results for the sample problem, mathematicians have agreed on an order of operations when simplifying expressions that contain multiple operations.

1. Perform any operation(s) inside grouping symbols: parentheses (), brackets [], above or below a fraction bar
2. Simply any term with exponents
3. Multiply and divide in order from left to right
4. Add and subtract in order from left to right

One easy way to remember the order of operations process is to remember the acronym PEMDAS or the old saying “Please Excuse My Dear Aunt Sally.”

| P | Perform operations in grouping symbols like Parentheses
| E | Simplify Exponents
| M | Perform Multiplication and Division in order from left to right
| D | Perform Addition and Subtraction in order from left to right

### Example 1

<table>
<thead>
<tr>
<th>Expression</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 2 - 3^2 + (6+3 \times 2) )</td>
<td>5</td>
</tr>
<tr>
<td>( 2 - 3^2 + (6+6) )</td>
<td>6</td>
</tr>
<tr>
<td>( 2 - 3^2 + 12 )</td>
<td>13</td>
</tr>
<tr>
<td>( 2 - 9 + 12 )</td>
<td>5</td>
</tr>
<tr>
<td>( -7 + 12 )</td>
<td>5</td>
</tr>
</tbody>
</table>

### Example 2

<table>
<thead>
<tr>
<th>Expression</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-7 + 4 + (2^3 - 8 \div -4))</td>
<td>7</td>
</tr>
<tr>
<td>(-7 + 4 + (8 - 8 \div -4))</td>
<td>7</td>
</tr>
<tr>
<td>(-7 + 4 + (8 - 2))</td>
<td>10</td>
</tr>
<tr>
<td>(-7 + 4 + 10)</td>
<td>17</td>
</tr>
<tr>
<td>(-3 + 10)</td>
<td>7</td>
</tr>
</tbody>
</table>

Evaluate each expression using the order of operations process (PEMDAS). Do not use a calculator.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( 6 + 4 - 2 \cdot 3 )</td>
<td>8</td>
</tr>
<tr>
<td>2. ((-2) \cdot 3 + 5 - 7)</td>
<td>-4</td>
</tr>
<tr>
<td>3. (15 \div 3 \cdot 5 - 4)</td>
<td>10</td>
</tr>
<tr>
<td>4. (29 - 3 \cdot 9 + 4)</td>
<td>10</td>
</tr>
<tr>
<td>5. (20 - 7 \cdot 4)</td>
<td>-12</td>
</tr>
<tr>
<td>6. (4 \cdot 9 - 9 + 7)</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>7.</td>
<td>$50 - (17 + 8) = $</td>
</tr>
<tr>
<td>8.</td>
<td>$(12 - 4) ÷ 8 = $</td>
</tr>
<tr>
<td>9.</td>
<td>$12 \cdot 5 + 6 ÷ 6 = $</td>
</tr>
<tr>
<td>10.</td>
<td>$18 - 4^2 + 7 = $</td>
</tr>
<tr>
<td>11.</td>
<td>$3(2 + 7) - 9 \cdot 7 = $</td>
</tr>
<tr>
<td>12.</td>
<td>$3 + 8 \cdot 2^2 - 4 = $</td>
</tr>
<tr>
<td>13.</td>
<td>$16 ÷ 2 \cdot 5 \cdot 3 ÷ 6 = $</td>
</tr>
<tr>
<td>14.</td>
<td>$12 + 3 - 6 \cdot 2 - 8 ÷ 4 = $</td>
</tr>
<tr>
<td>15.</td>
<td>$10 \cdot (3 - 6^2) + 8 ÷ 2 = $</td>
</tr>
<tr>
<td>16.</td>
<td>$6.9 - 3.2 \cdot (10 ÷ 5) = $</td>
</tr>
<tr>
<td>17.</td>
<td>$32 ÷ [16 ÷ (8 ÷ 2)] = $</td>
</tr>
<tr>
<td>18.</td>
<td>$[10 + (2 \cdot 8)] ÷ 2 = $</td>
</tr>
<tr>
<td>19.</td>
<td>$180 ÷ [2 + (12 ÷ 3)] = $</td>
</tr>
<tr>
<td>20.</td>
<td>$\frac{3}{4} [3 \cdot 8] + 2 \cdot (-12) = $</td>
</tr>
<tr>
<td>21.</td>
<td>$\frac{5 + [30 - (8-1)^2]}{11 - 2^2} = $</td>
</tr>
<tr>
<td>22.</td>
<td>$\frac{3 [10 - (27 - 9)]}{4 - 7} = $</td>
</tr>
<tr>
<td>23.</td>
<td>$5(14 - 39 ÷ 3) + 4 \cdot \frac{1}{4} = $</td>
</tr>
<tr>
<td>24.</td>
<td>$[8 \cdot 2 - (3 + 9)] + [8 - 2 \cdot 3] = $</td>
</tr>
<tr>
<td>25.</td>
<td>$162 + [6(7\cdot 4)^2] ÷ 3 = $</td>
</tr>
</tbody>
</table>
**Section 6: Evaluating Expressions**

**Example:**

Evaluate each of the following expressions when $x = 5$.

Rewrite the expression substituting 5 for the $x$ and simplify.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Substitute for $x$ and Simplify</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. $5x$</td>
<td>$5(5)$</td>
<td>25</td>
</tr>
<tr>
<td>b. $-2x$</td>
<td>$-2(5)$</td>
<td>-10</td>
</tr>
<tr>
<td>c. $x + 25$</td>
<td>$5 + 25$</td>
<td>30</td>
</tr>
<tr>
<td>d. $5x - 15$</td>
<td>$5(5) - 15 = 25 - 15$</td>
<td>10</td>
</tr>
<tr>
<td>e. $3x + 4$</td>
<td>$3(5) + 4 = 15 + 4$</td>
<td>19</td>
</tr>
</tbody>
</table>

Evaluate each expression (do not use a calculator) given that: $x = 5$, $y = -4$ and $z = 6$

<table>
<thead>
<tr>
<th>Expression</th>
<th>Substitute values and simplify</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $3x$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. $2x^2$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. $3x^2 + y$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. $2(x + z) - y$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. $y + 4$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. $5z - 6$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. $xy + z$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. $2x + 3y - z$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expression</td>
<td>Substitute values and Simplify</td>
<td>Answer</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>9. $5x - (y + 2z)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. $\frac{xy}{2}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. $x^2 + y^2 + z^2$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. $2x(y + z)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. $5z + (y - x)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. $2x^2 + 3$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. $4x + 2y - z$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. $\frac{yz}{2}$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 7: Properties of Operations

Commutative Property of Addition: \[ a + b = b + a \]

Commutative Property of Multiplication: \[ a \times b = b \times a \]

Associative Property of Addition: \[ (a + b) + c = a + (b + c) \]

Associative Property of Multiplication: \[ (a \times b) \times c = a \times (b \times c) \]

Identity Property of Addition: \[ a + 0 = a \]

Identity Property of Multiplication: \[ a \times 1 = a \]

Name the property illustrated by each expression.

1. \[ 8 \times 12 = 12 \times 8 \] 
2. \[ 3 \times (2 \times 5) = (3 \times 2) \times 5 \]
3. \[ 2 + 5 + 12 = 5 + 2 + 12 \] 
4. \[ xy + 0 = xy \]
5. \[ 1x = x \] 
6. \[ 5 + 7 = 7 + 5 \]
7. \[ 3 + (4 + 5) = 3 + (5 + 4) \] 
8. \[ 3xy = 3xy(1) \]
9. \[ (4 + 8) + 5 = 4 + (8 + 5) \] 
10. \[ 5 \times 6 \times 8 = 8 \times 5 \times 6 \]

Distributive Property: \[ a(b + c) = ab + ac \text{ or } a(b - c) = ab - ac \]

Simplify each expression using the distributive property.

Example: \[ 4(x + 5) = 4(x) + 4(5) = 4x + 20 \]

11. \[ 3(b + 9) \] 
12. \[ 5(2x - 3) \] 
13. \[ -3(4x + 9) \]
14. \[ x(2x + 4) \] 
15. \[ \frac{1}{2}(4r + 12) \] 
16. \[ -(6p - 11) \]
Section 8: Algebraic Translations
(Translating from English to Mathematics)

Keywords for Translations

<table>
<thead>
<tr>
<th>Add</th>
<th>Subtract</th>
<th>Multiply</th>
<th>Divide</th>
<th>Inequalities</th>
<th>Variable</th>
<th>=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plus</td>
<td>Decreased</td>
<td>Per</td>
<td>One-third</td>
<td>&lt; is less than</td>
<td>A number</td>
<td>Same as</td>
</tr>
<tr>
<td>Sum</td>
<td>Smaller</td>
<td>For Every</td>
<td>Quotient</td>
<td>&gt; is greater than</td>
<td>Some number</td>
<td>Equals</td>
</tr>
<tr>
<td>Longer than</td>
<td>Less than</td>
<td>For Each</td>
<td>Divided by</td>
<td>≤ is less than or equal to</td>
<td>Quantity</td>
<td>Is</td>
</tr>
<tr>
<td>Greater than</td>
<td>Difference</td>
<td>Triple</td>
<td>Each part</td>
<td>≥ is greater than or equal to</td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Together</td>
<td>Reduced</td>
<td>Multiplied</td>
<td>Half as much</td>
<td></td>
<td></td>
<td>Result</td>
</tr>
<tr>
<td>Total</td>
<td>Differ</td>
<td>Of</td>
<td>Split equally</td>
<td></td>
<td></td>
<td>Outcome</td>
</tr>
<tr>
<td>Increased</td>
<td>Fewer</td>
<td>Times</td>
<td></td>
<td></td>
<td></td>
<td>Answer</td>
</tr>
<tr>
<td>More than</td>
<td>Shorter than</td>
<td>Twice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In all</td>
<td>Minus</td>
<td>Double</td>
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<td></td>
<td></td>
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<tr>
<td>And</td>
<td>Diminished</td>
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</tbody>
</table>

Examples:

A) Translate into a mathematical expression: 3 less than 5 times some number
   3 \text{ less than } 5 \text{ times some number}
   3 \text{ to subtract from (multiply) (use a variable)}
   \text{translation: } 5n - 3

B) Translate into a mathematical expression: 3 less than 5 some number is 22
   3 \text{ less than } 5 \text{ times some number is 22}
   3 \text{ (to subtract) (multiply) (use a variable) =}
   \text{translation: } 5n - 3 = 22

C) Translate into a mathematical expression: the quotient of a number and -4, less 8 is -42
   the \text{quotient} of \text{a number and -4} \text{ less 8 is -42}
   divide a variable and number subtract =
   \text{translation: } \frac{n}{-4} - 8 = -42

D) Translate into a mathematical expression: four plus 3 times a number is less than or equal to 18
   four \text{ plus 3 times a number is less than or equal to 18}
   add multiply use a variable ≤
   \text{translation: } 4 + 3n \leq 18
Practice: Translate each phrase into a mathematical statement. Let \( n \) = a number.

1. Seven plus five times a number is greater than or equal to -9.

2. Eight times a number increased by 6 is 62.

3. One half of a number is equal to 14.

4. Six less than 8 times a number

5. A number divided by 9

6. A number decreased by 5

7. Twice a number decreased by 15 is equal to -27.

8. Nine less than 7 times a number is -6.

9. The sum of a number and eight is less than 2.

10. Eleven increased by a number is -12.

Matching – Put the letter of the algebraic expression that best matches the phrase.

11. two more than a number \( a. \ 2x \)

12. two less than a number \( b. \ x + 2 \)

13. half of a number \( c. \ 2 - x \)

14. twice a number \( d. \ x - 2 \)

15. two decreased by a number \( e. \frac{x}{2} \)

Careful! Pay attention to subtraction. The order makes a difference. Translate to an algebraic expression, then reread to check!
Section 9: Combining Like Terms

What is a **term**? The parts of an algebraic expression that are separated by an addition or subtraction sign are called **terms**.

What are **like terms**? Terms with the same variable factors are called **like terms**. 2n and 3n are **like terms**, but 4x and 3y are **NOT like terms** because their variable factors x and y are different.

To simplify an expression, you must combine the **like terms**.

**Examples:**

1. Simplify $5x + 8x$
   
   $5x + 8x = (5 + 8)x = 13x$

2. Simplify $3y - 6y$
   
   $3y - 6y = (3 - 6)y = -3y$

3. Simplify $3x + 4 - 2x + 3$
   
   $3x - 2x + 4 + 3 = (3 - 2)x + 4 + 3 = x + 7$

4. Simplify $2b + 5c + 3b - 6c$
   
   $2b + 3b + 5c - 6c = (2 + 3)b + (5 - 6)c = 5b - c$

**Practice.** Simplify each expression.

1. $6n + 5n$

2. $25b + 15b$

3. $37z + 4z$

4. $x - 5x$

5. $3n + 1 - 2n + 8$

6. $4f + 5f - 6 + 8$

7. $7t + 9 - 4t + 3$

8. $2k + 4 - 8k - 1$

9. $4r + 3r + 6y - 2y$

10. $8g + 9h - 4g - 5h$

11. $2m + 3n - 4m + 5n$

12. $a + 5b - 2a + 9b$
Section 10: Fractions

Write the fractions in lowest terms.

1. \( \frac{8}{24} = \)
2. \( \frac{18}{24} = \)

3. \( \frac{15x^2 y}{20xy} = \)
3. \( \frac{36abc^4}{45a^3 bc^2} = \)

Solve for \( x \).

5. \( \frac{16}{48} = \frac{x}{12} \)
6. \( \frac{12}{42} = \frac{4}{x} \)

7. \( \frac{20}{32} = \frac{x}{16} \)
8. \( \frac{6}{9} = \frac{12}{x} \)

Write as improper fractions.

9. \( 2 \frac{1}{3} = \)
10. \( -4 \frac{6}{7} = \)

Write as mixed numbers.

11. \( -9 \frac{9}{4} = \)
12. \( 38 \frac{3}{3} = \)
Addition and Subtraction

Find each sum or difference. Write your answer in simplest form.

13. \(-\frac{2}{3} + \frac{1}{4}\)  
14. \(\frac{5}{9} + 2\frac{1}{6}\)

15. \(\frac{3}{10} - \frac{4}{5}\)  
16. \(6\frac{7}{10} + \left(-1\frac{1}{5}\right)\)

17. \(5\frac{4}{11} - 2\frac{2}{3}\)  
18. \(2\frac{7}{12} - 9\frac{2}{3}\)

Multiplication and Division

Find each product or quotient. Write your answer in simplest form.

19. \(-\frac{5}{6} \cdot \frac{6}{15}\)  
20. \(-\frac{3}{4} \div \left(-\frac{9}{16}\right)\)

21. \(2\frac{2}{5} \cdot \left(-3\frac{3}{4}\right)\)  
22. \(-3\frac{3}{4} \div 4\frac{2}{3}\)

23. \(\frac{2}{9} \div \frac{3}{16} \cdot \frac{3}{6}\)  
24. \(6\frac{3}{4} \div 4\)
Section 11: Solving Basic Linear Equations

To solve an equation means to find the value of the variable. We solve equations by isolating the variable using opposite operations.

Example:

Solve.

\[3x - 2 = 10\]
\[3x + 2 = 12\]
\[x = 4\]

Isolate 3x by adding 2 to each side

Isolate x by dividing each side by 3

Simplify

Opposite Operations:
Addition (+) and Subtraction (-)
Multiplication (x) and Division (÷)

Please remember
To do the same step on each side of the equation

Check your answer.

\[3(4) - 2 = 10\]
\[12 - 2 = 10\]
\[10 = 10\]

Substitute the value in for the variable

Simplify

Is the equation true? If yes, you solved it correctly!

Always check your work by substitution!

Try these.

1. \[x + 3 = 5\]
2. \[w - 4 = 10\]
3. \[c - 5 = -8\]
4. \[3p = 9\]
5. \[-7k = 14\]
6. \[-x = -17\]
7. \[\frac{h}{3} = 5\]
8. \[\frac{m}{8} = 7\]
9. \[\frac{4}{5}d = 12\]
10. \[\frac{3}{9}j = 6\]
### 11. $2x - 5 = 11$

### 12. $4n + 1 = 9$

### 13. $5j - 3 = 12$

### 14. $2x + 11 = 9$

### 15. $-3x + 4 = -8$

### 16. $-6x + 3 = -9$

### 17. $\frac{f}{3} + 10 = 15$

### 18. $\frac{a}{7} - 4 = 2$

### 19. $\frac{b+4}{2} = 5$

### 20. $\frac{x-6}{5} = 3$

Use substitution to determine whether the solution is correct.

### 21. $4x + 5 = 7$

$x = 3$

### 22. $-2x + 5 = 13$

$x = 4$

### 23. $6 - x = 8$

$x = 2$

### 24. $1 - x = 9$

$x = -8$
**Section 12: Solving Multi-Step Equations**

**Procedure:** To solve multi-step equations...
1. Fully simplify both sides of the equation
2. Get all variables to one side of the equation.
3. Use inverse operations to isolate the variable
   ****undo addition and subtraction first**

Ex. \[
\begin{align*}
2x + 3 &= 7 \\
\underline{\quad \quad \quad -3} \\
2x &= 4 \\
\underline{\quad \quad 2} \\
x &= 2
\end{align*}
\]

Check: \[
\begin{align*}
2x + 3 &= 7 \\
2(2) + 3 &= 7 \\
4 + 3 &= 7 \\
7 &= 7 \text{ Check}
\end{align*}
\]

Ex. \[
\begin{align*}
2(x + 5) &= 3x - 5 \\
2x + 10 &= 3x - 5 \\
-2x &= -2x \\
10 &= x - 5 \\
+5 &= +5 \\
x &= 15
\end{align*}
\]

Solve and check each equation.

1. \[-2x + 7 = 25\]

2. \[3 - 8x = -141\]

3. \[15 - 2(w + 5) = 11\]

4. \[12 - 4r = 6r + 2\]

5. \[-4(n + 5) = -32\]

6. \[12 - 2x + 5 = -1\]

7. \[3 - 2x = 15\]

8. \[\frac{x}{2} - 7 = 12\]

9. \[17 + 3x = 4x - 9\]

10. \[-3(6x - 12) = 36 - 18x\]
Section 13: Inequalities

An inequality is a statement containing one of the following symbols:

\(<\) is less than \quad \langle\rangle is greater than \quad \leq\text{ is less than or equal to} \quad \geq\text{ is greater than or equal to}

An inequality has many solutions, and we can represent the solutions of an inequality by a set of numbers on a number line.

Examples:

\begin{align*}
    & X > 0 \\
    & X < 0 \\
    & X \geq 8 \\
    & X \leq -8
\end{align*}

Practice: Write an inequality to represent the solution set that is shown in the graph.

1. \[ \quad \]
2. \[ \quad \]
3. \[ \quad \]
4. \[ \quad \]
Graph each of the following inequalities on a number line.

5. \(x > 4\)

6. \(k \leq -6\)

7. \(5 > y\)

8. \(j < \frac{1}{2}\)

9. \(-2 \leq t\)

10. \(w \leq 15\)
Solving Multi-step Inequalities

Note: Solve a multi-step inequality just like you would solve a multi-step equation. However, if you multiply or divide both sides of an inequality by a negative number, then the inequality sign reverses.

Ex.  
\[
\begin{align*}
2x + 5 & > 7 \\
-2 & \\
\frac{2x}{2} & > \frac{2}{-2} \\
x & > 1
\end{align*}
\]

Ex.  
\[
\begin{align*}
10 \leq -2(x - 4) \\
10 \leq -2x + 8 \\
-8 \leq -8 \\
\frac{10}{-2} \leq \frac{-5}{-2} \\
-5 \geq x \quad \text{or} \quad x \leq -5
\end{align*}
\]

Determine and graph the solution set of each inequality.

11. \(3x + 8 > 17\)  
12. \(-6y + 3 > 9 - 7y\)

13. \(2v + 7 \geq 11\)  
14. \(7 > 3 + \frac{b}{3}\)

15. \(\frac{c - 2}{3} \leq 4\)  
16. \(4b + 4 < 4(5 - 3b)\)

17. \(2z - 5 < -21 - 2z\)  
18. \(8b - 10 \geq 6(3 - b)\)

19. \(3x - 5 > 6x + 13\)  
20. \(7(y + 5) - 10 \leq 2y\)
Section 14: Word Problems

Translate each word problem into an algebraic equation, using “x” for the unknown, and solve. Process: Write a “Let x = for the unknown”; write an equation; solve the equation; substitute the value for x into the let statement to answer the question.

For example.

Kara is going to Maui on vacation. She paid $325 for her plane ticket and is spending $125 each night for her hotel. How many nights can she stay in Maui if she has $1200?

Step 1: What are you asked to find? Let variables represent what you are asked to find.
   How many nights can Kara stay in Maui?
   Let x = The number of nights Kara can stay in Maui

Step 2: Write an equation to represent the relationship in the problem
   \[ 325 + 125x = 1200 \]

Step 3: Solve the equation for the unknown
   \[
   \begin{align*}
   325 &+ 125x = 1200 \\
   -325 &-325
   \end{align*}
   \]
   \[ 125x = 875 \]
   \[ x = 7 \]
   Kara can spend 7 nights in Maui

Word Problems Practice Set

1. A video store charges a one-time membership fee of $12.00 plus $1.50 per video rental. How many videos can Steward rent if he spends $21?

2. Bicycle City makes custom bicycles. They charge $160 plus $80 for each day that it takes to build the bicycle. If you have $480 to spend on our new bicycle, how many days can it take Bicycle City build the bike?

3. Darell went to the mall and spent $41. He bought several t-shirts that each cost $12, and he bought 1 pair of socks for $5. How many t-shirts did Darell buy?
4. Janet weighs 20 pounds more than Anna. If the sum of their weights is 250 pounds, how much does each girl weigh?

5. Three-fourths of the student body attended the pep rally. If there were 1230 students at the pep rally, how many students are there in all?

6. Two-thirds of the Algebra students took the HSA for the first time. If 60 students took the Algebra HSA, how many algebra students are there in all?

7. The current price of a school t-shirt is $10.58. Next year the cost of a t-shirt will be $15.35. How much will the t-shirt increase next year?

8. The school lunch prices are changing next year. The cost of a hot lunch will increase $0.45 from the current price. If the next year’s price is $2.60, what did a hot lunch cost this year?

9. Next year the cost of gasoline will increase $1.25 from the current price. If the cost of a gallon of gasoline next year will be $4.50, what is the current price of gasoline?

10. Sarah drove 3 hours more than Michael on their trip to Texas. If the trip took 37 hours, how long did Sarah and Michael each drive?
Section 15: Graphing

Points in a plane are named using two numbers, called a coordinate pair. The first number is called the x-coordinate. The x-coordinate is positive if the point is to the right of the origin and negative if the point is to the left of the origin. The second number is called the y-coordinate. The y-coordinate is positive if the point is above the origin and negative if the point is below the origin.

The x-y plane is divided into four quadrants (four sections) as described below.

- All points in Quadrant 1 have a positive x coordinate and a positive y coordinate (+x, +y).
- All points in Quadrant 2 have a negative x coordinate and a positive y coordinate (-x, +y).
- All points in Quadrant 3 have a negative x coordinate and a negative y coordinate (-x, -y).
- All points in Quadrant 4 have a positive x coordinate and a negative y coordinate (+x, -y).

Plot each point on the graph below.
Remember, coordinate pairs are labeled (x, y).
Label each point on the graph with the letter given.

1. A (3,4)  
2. B (4,0)  
3. C (-4,2)  
4. D (-3,-1)  
5. E (0,7)

Example. F (-6,2)
Determine the coordinates for each point below:

Example: (2,3)

6. ( , )

7. ( , )

8. ( , )

9. ( , )

10. ( , )

11. ( , )

12. ( , )

13. ( , )
Complete the following tables. Then graph the data on the grid provided.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Work</th>
<th>Graph</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y = -2x - 3 )</td>
<td>( x = -3 ) &lt;br&gt;( y = -2(-3) - 3 = 6 - 3 = 3 ) &lt;br&gt;therefore ((x,y) = (-3,3))</td>
<td><img src="image1" alt="Graph" /></td>
</tr>
<tr>
<td>( x = -2 )</td>
<td>( y = -2(-2) - 3 = 4 - 3 = 1 ) &lt;br&gt;therefore ((x,y) = (-2,1))</td>
<td><img src="image2" alt="Graph" /></td>
</tr>
<tr>
<td>( x = -1 )</td>
<td>( y = -2(-1) - 3 = 2 - 3 = -1 ) &lt;br&gt;therefore ((x,y) = (-1,-1))</td>
<td><img src="image3" alt="Graph" /></td>
</tr>
<tr>
<td>( x = 0 )</td>
<td>( y = -2(0) - 3 = 0 - 3 = -3 ) &lt;br&gt;therefore ((x,y) = (0,-3))</td>
<td><img src="image4" alt="Graph" /></td>
</tr>
</tbody>
</table>

14. \( y = x + 2 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

15. \( y = 2x \)

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

16. \( y = -x \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Problem</td>
<td>Work</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
</tr>
</tbody>
</table>
| 17. \(y = 2x - 3\) | $\begin{array}{cc} 
 0 & Y \\
 1 & \\
 2 & \\
 3 & 
\end{array}$ | |
| 18. \(y = \frac{1}{2}x + 1\) | $\begin{array}{cc} 
 0 & Y \\
 2 & \\
 4 & \\
 6 & 
\end{array}$ | |
| 19. \(y = \frac{3}{2}x - 1\) | $\begin{array}{cc} 
 -2 & Y \\
 0 & \\
 2 & 
\end{array}$ | |
| 20. \(y = -\frac{2}{3}x + 1\) | $\begin{array}{cc} 
 -3 & Y \\
 0 & \\
 3 & 
\end{array}$ | |
Section 16: Linear Functions

Tell whether each ordered pair is a solution of the equation.

1. $3x + y = -11, \ (-4, 1)$
2. $2x - y = 4, \ (3, -2)$

Determine the $x$ and $y$-intercept of the following linear functions.

3. $3x - 4y = -12$
4. $y = -2x - 8$

Determine the slope $m = \frac{y_2 - y_1}{x_2 - x_1}$ through the given points.

5. $(4, 7), \ (-3, 6)$
6. $(-5, 7), \ (-5, -14)$

Determine the slope and $y$-intercept of the line with the given equation. Remember $y = mx + b$?

7. $y = 2x - 12$
8. $2x - 3y = -6$

Write an equation of the line that is parallel to the given line and passes through the given point. Remember parallel lines have the same slope but different $y$-intercepts.

9. $y = -2x - 6, \ (0, -4)$
10. $-2x + 3y = 12, \ (3, 2)$
Graph the equation using any method.

11. \( y = 2x - 3 \)

12. \(-2x - 3y = 12\)
Section 17: Polynomials

A polynomial is in **Standard Form** if it is simplified and the terms are arranged so the degree of each term increases (or stays the same) from left to right.

**Find the difference:**

\[(6x^2 - 5x + 2) - (-3x^2 - 8x + 3)\]

**First:** Turn the expression into an addition problem by distributing the negative to the second expression.

\[(6x^2 - 5x + 2) + (3x^2 + 8x - 3)\]

**Then:** Combine like terms

\[(6x^2 + 3x^2) + (-5x + 8x) + (2 + -3) = 9x^2 + 3x - 1\]

**Find the product:**

\[3x(2x^2 - 5) = 3x(2x^2) + 3x(-5) = 6x^3 - 15x\]

**Find the quotient:**

\[
\frac{8r^4 + 4r^2 - 6r}{2r} = \frac{8r^4}{2r} + \frac{4r^2}{2r} + \frac{-6r}{2r} = 4r^3 + 2r - 3
\]

**Find the product using the F.O.I.L. method (F: first, O: outer, I: inner, L: last):**

\[(2x - 3)(x + 5) = 2x(x) + 2x(5) - 3(x) - 3(5) = 2x^2 + 7x - 15\]

**Write the expression in standard form.**

1. \[13 - 4x + 3x^3\]

2. \[4y^3 - 2(2y - 3) + y\]

**Find the sum or difference.**

3. \[(3x^2 - 5x + 2) + (5x^2 + 9x - 5)\]

4. \[(8y^2 + 2y - 6) - (3y^2 - 5y + 2)\]

**Find the product or quotient.**

5. \[3x(x^2 - 5)\]

6. \[(4z^3 - 5z + 2)6z\]

7. \[
\frac{8y^3 - 4y^2 + 6y}{2y} = 4y^2 - 2y + 3\]

8. \[
\frac{18z^6 - 9z^4 - 3z^2}{-3z^2} = -6z^4 + 3z^2 + 1
\]

9. \[(x + 2)(x + 3)\]

10. \[(y - 3)(y + 10)\]
Section 18: Exponents

Negative Exponents & Simplifying Monomials

Zero Exponent: Any number raised to the zero power equals 1  

\[ y^0 = 1 \]

Negative Exponent: Move the base to the opposite side of the fraction line and make the exponent positive  

\[ x^{-4} = \frac{1}{x^4} \]

Monomial x Monomial: Multiply the coefficients and add the exponents of like bases  

\[ (4x^3)(2x^5) = 8x^8 \]

Monomial ÷ Monomial: Divide the coefficients and subtract the exponents of like bases  

\[ \frac{a}{a^6} = a^{-5} = \frac{1}{a^5} \]

Power of a Monomial: Raise each base (including the coefficient) to that power. If a base already has an exponent, multiply the two exponents  

\[ (-2fg^5)^3 = -8f^3g^{15} \]

Power of a Quotient: Raise each base (including the coefficient) to that power. If a base already has an exponent, multiply the two exponents  

\[ \left( \frac{5d^3}{c} \right)^2 = \frac{25d^6}{c^2} \]

Scientific Notation

Standard Form to Scientific Notation: move the decimal after the first non-zero digit and eliminate any trailing zeros. Multiply by 10 to the power equal to the number of places you moved the decimal point. If the original number was greater than 1, the exponent is positive. If the number was less than 1, the exponent is negative.

\[ 0.00000571 = 5.71 \times 10^{-5} \]

Original number < 1, so negative exponent

Scientific Notation to Standard Form: move the decimal point the number of places indicated by the exponent. If the exponent is positive, move the decimal right. If negative, move left.

\[ 3.5 \times 10^3 = 3,500 \]
### Convert each number to Scientific Notation.

1. \(67,000,000,000\)
2. \(0.0009213\)
3. \(0.00000000004\)
4. \(3,201,000,000,000,000\)

### Convert each number to Standard Form.

5. \(5.92 \times 10^5\)
6. \(1.1 \times 10^7\)
7. \(6.733 \times 10^6\)
8. \(3.27 \times 10^2\)

### Simplify each expression. Write your answers using only positive exponents.

9. \(w^4\)
10. \(\frac{m^5}{m^2}\)
11. \(f^5 \cdot f^3\)
12. \(\left(\frac{h^2}{g}\right)^3\)
13. \((x^5)^2\)
14. \(\frac{1}{b^{-3}}\)
15. \(z^6\)
16. \(4r^6 \cdot 3r \cdot 2r^2\)
17. \(\frac{q^{-2}}{3q^{-3}}\)
18. \(\frac{8d^3}{2cd^{-2}}\)
19. \((g^4h)^2 \cdot (2g^3h)^2\)
20. \((6a)^0\)
21. \((-3n^3k^4)^2\)
22. \(\left(\frac{w^5x^{-2}y^2}{w^2xy^4}\right)^3\)
23. \(6 \cdot 10^7\)
24. \((1.5 \cdot 10^6) \cdot (4 \cdot 10^9)\)
**Section 19: Solving Systems of Linear Equations**

A system of equations is two equations with two variables, usually \( x \) and \( y \). You can’t solve each equation individually, but with 2 equations you can solve either graphically or algebraically (substitution or elimination). The solution of the system is the ORDERED PAIR that works in both equations. If you remember that each equation represents a line, you are just trying to find the ordered pair where the two lines intersect.

**Example**

\[
\begin{align*}
    y &= 2x + 2 \\
    y &= x - 1
\end{align*}
\]

Graph the equations in a coordinate plane.

The two lines intersect in \((-3, 4)\) which is the solution to this system of equations.
Solve each system by graphing.

1) \( y = -\frac{5}{3}x + 3 \)
   \( y = \frac{1}{3}x - 3 \)

2) \( y = 4x + 3 \)
   \( y = -x - 2 \)

3) \( y = -\frac{1}{2}x - 1 \)
   \( y = \frac{1}{4}x - 4 \)

4) \( y = -1 \)
   \( y = -\frac{5}{2}x + 4 \)
5) \( y = 3x - 4 \)
\[ y = -\frac{1}{2}x + 3 \]

6) \( y = -2x + 2 \)
\[ y = -2x - 2 \]

---

Solve using the SUBSTITUTION method. Solutions must be written as an ordered pair, no solution \( \emptyset \), or the equation of the line!

Here is an EXAMPLE if you are stuck:

\[ y = x - 1 \]
\[ 2x - y = 1 \]

Since \( y \) is the same as \( x - 1 \), we can replace \( y \) with \( x - 1 \) in the second equation!

\[ 2x - (x - 1) = 1 \]
\[ 2x - x + 1 = 1 \]
\[ x = 0 \]

Now that you know \( x \), you can just plug \( x \) into either equation to find the value of \( y \).

\[ y = (0) - 1 \]
\[ y = -1 \]

SOLUTION: \( (0, -1) \)

---

7. \( y = x + 8 \)
\[ 2y + x = 1 \]

8. \[ x = \frac{1}{2}y \]
\[ 4x - 2y = 12 \]
10. \[ \begin{align*} x + 4y &= 5 \\ 5x - 7y &= -2 \end{align*} \]

Solve using the **ELIMINATION** method. **Solutions must be written as an ordered pair, no solution \( \emptyset \), or the equation of the line!**

Here are two **EXAMPLES** if you are stuck:

**A.**

\[ \begin{align*} x + y &= 5 \\ +x - y &= 1 \end{align*} \]

\[ \begin{align*} 2x &= 6 \\ x &= 3 \end{align*} \]

Now that you know \( x \), you can just plug \( x \) into either equation to find the value of \( y \).

\[ \begin{align*} (3) + y &= 5 \\ y &= 2 \end{align*} \]

**SOLUTION:** \((3, 2)\)

**B.**

\[ \begin{align*} 2x + 4y &= -18 \\ 3x - y &= 1 \end{align*} \]

\[ \begin{align*} 2x + 4y &= -18 \\ +12x - 4y &= 4 \end{align*} \]

\[ \begin{align*} 14x &= -14 \\ x &= -1 \end{align*} \]

Now that you know \( x \), you can just plug \( x \) into either equation to find the value of \( y \).

\[ \begin{align*} 2(-1) + 4y &= -18 \\ -2 + 4y &= -18 \\ 4y &= -16 \\ y &= -4 \end{align*} \]

**SOLUTION:** \((-1, -4)\)

11. \[ \begin{align*} 2x + y &= 1 \\ 3x - y &= 14 \end{align*} \]

12. \[ \begin{align*} x - 2y &= 6 \\ x - 3y &= 4 \end{align*} \]
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
</table>
| 13. | \[5x + 3y = -9\]  
     | \[2x - 5y = -16\] |   |
| 14. | \[x + 2y = 8\]  
     | \[2x - 3y = -19\] |   |
| 15. | \[8y = x - 1\]  
     | \[2x = 10y + 5\] |   |
| 16. | \[8x - 5y = 14\]  
     | \[10x - 2y = 9\] |   |

**NOW CHOOSE THE METHOD YOU WANT TO USE TO SOLVE THE SYSTEM!**
### Answers

<table>
<thead>
<tr>
<th>Section 1</th>
<th>12. 13</th>
<th>Section 6</th>
<th>8. $7n - 9 = -6$</th>
<th>22. $-45/56$</th>
</tr>
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<tbody>
<tr>
<td>1. 6</td>
<td>13. 15</td>
<td>1. 15</td>
<td>9. $n + 8 = 2$</td>
<td>23. $3/48$</td>
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<tr>
<td>2. $6xy$</td>
<td>14. 7</td>
<td>2. 50</td>
<td>10. $11 + n = -12$</td>
<td>24. $27/16$</td>
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<tr>
<td>3. $9x^2$</td>
<td>15. -3</td>
<td>3. 71</td>
<td>11. $b$</td>
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<td>4. 1</td>
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<td>4. 26</td>
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<td>13. $e$</td>
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<tr>
<td>6. $90xy$</td>
<td>18. -2</td>
<td>6. 24</td>
<td>14. $a$</td>
<td>2. $w = 14$</td>
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<tr>
<td>7. $45xy^2$</td>
<td>19. 3</td>
<td>7. -14</td>
<td>15. $c$</td>
<td>3. $c = -3$</td>
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<tr>
<td></td>
<td>21. 5</td>
<td>9. 17</td>
<td>17. $k = 2$</td>
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<tr>
<th>Section 2</th>
<th>22. 20</th>
<th>10. -10</th>
<th>1. $11n$</th>
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<tbody>
<tr>
<td>1. 18.62</td>
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<td>11. 77</td>
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<tr>
<td>2. 0.3</td>
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<td>12. 20</td>
<td>3. $41z$</td>
<td>8. $m = 56$</td>
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<td>3. 25.05</td>
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<td>4. 100.9</td>
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<td>14. 53</td>
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<td>5. 3.92</td>
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<tr>
<td>6. 20.0</td>
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<td>16. -12</td>
<td>7. $3t + 12$</td>
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<td>7. 36.99</td>
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<td>8. $-6k + 3$</td>
<td>13. $j = 3$</td>
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<td>8. 17.1</td>
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<td>9. $7r + 4y$</td>
<td>14. $x = -1$</td>
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<tr>
<th>Section 3</th>
<th>8. 1</th>
<th>4. $Ident Prop of +$</th>
<th>18. $a = 42$</th>
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<tbody>
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<td>1. Mean = 353.5</td>
<td>9. 61</td>
<td>5. $Ident Prop of ·$</td>
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<tr>
<td>Median = 318</td>
<td>10. 9</td>
<td>6. $Comm Prop of +$</td>
<td>20. $x = 21$</td>
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<tr>
<td>Range = 673</td>
<td>12. 31</td>
<td>8. $Ident Prop of ·$</td>
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<td></td>
<td>13. 20</td>
<td>9. $Assoc Prop of +$</td>
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<td>4. $3x^2$</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>4. $4c^2/5d^2$</td>
<td>23. No</td>
</tr>
<tr>
<td>2. Mean = 31.66</td>
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<td>10. $Comm Prop of ·$</td>
<td>5. $x = 4$</td>
</tr>
<tr>
<td>Median = 35.5</td>
<td>15. -326</td>
<td>11. $3b + 27$</td>
<td>24. Yes</td>
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<tr>
<td>Mode = 35.5</td>
<td>16. 0.5</td>
<td>12. $10x - 30$</td>
<td></td>
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<tr>
<td>Range = 33.2</td>
<td>17. 8</td>
<td>13. $12x - 27$</td>
<td>8. $x = 18$</td>
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<td></td>
<td>18. 13</td>
<td>14. $2x^2 + 4x$</td>
<td>9. $7/3$</td>
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<td>14. $9/3$</td>
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<tr>
<th>Section 4</th>
<th>19. 30</th>
<th>15. $2r - 6$</th>
<th>10. $-34/7$</th>
<th>3. $w = 3$</th>
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<tbody>
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<td>1. 5</td>
<td>20. -18</td>
<td>16. $-6p + 11$</td>
<td>11. $-2 \frac{1}{2}$</td>
<td>4. $r = 1$</td>
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<td>2. 26</td>
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<td>12. $12/3$</td>
<td>5. $n = 3$</td>
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<td>22. -7</td>
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<td>13. $-5/2$</td>
<td>6. $x = 9$</td>
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<tr>
<td>4. -3</td>
<td>23. 6</td>
<td>1. $7 + 5n \geq -9$</td>
<td>14. $5/13$</td>
<td>7. $x = -6$</td>
</tr>
<tr>
<td>5. -20</td>
<td>24. 6</td>
<td>2. $8n + 6 = 62$</td>
<td>15. $1/2$</td>
<td>8. $x = 38$</td>
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<tr>
<td>6. 1</td>
<td>25. 180</td>
<td>3. $5n = 14$</td>
<td>16. $5 \frac{1}{2}$</td>
<td>9. $x = 26$</td>
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<tr>
<td>7. -39</td>
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<td>4. $8n - 6$</td>
<td>17. $2/33$</td>
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<td>5. $n/9$</td>
<td>18. $-7/12$</td>
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<td>9. -6</td>
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<td>6. $n - 5$</td>
<td>19. $-1/3$</td>
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| 11. 9     | 8. $7n - 9 = -6$  | 21. $-9$  |
Answers Continued

<table>
<thead>
<tr>
<th>Section 13</th>
<th>Section 14</th>
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<tbody>
<tr>
<td>1. $x &lt; -1$</td>
<td>1. 6 videos</td>
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<tr>
<td>2. $x &gt; 3$</td>
<td>2. 4 days</td>
</tr>
<tr>
<td>3. $x \geq -3$</td>
<td>3. 3 t-shirts</td>
</tr>
<tr>
<td>4. $x \leq -6$</td>
<td>4. Janet 135 pounds Anna 115 pounds</td>
</tr>
<tr>
<td>5.</td>
<td>5. 1640 students</td>
</tr>
<tr>
<td>6.</td>
<td>6. 90 students</td>
</tr>
<tr>
<td>7.</td>
<td>7. $4.77</td>
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<td>9. $3.25</td>
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<td>10.</td>
<td>10. Michael 17 hours Sarah 20 hours</td>
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<td>Section 15 Answers are at the end.</td>
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11. 11. & 12. Next Column

12. 11. & 12. Next Column

13. 11. & 12. Next Column

14. 11. & 12. Next Column

15. 11. & 12. Next Column

16. 11. & 12. Next Column

17. 11. & 12. Next Column

18. 11. & 12. Next Column

19. 11. & 12. Next Column

20. 11. & 12. Next Column
### Section 17
1. $3x^2 - 4x + 13$
2. $4y^3 - 3y + 6$
3. $8x^2 + 4x - 3$
4. $5y^2 + 7y - 8$
5. $3x^3 - 15x$
6. $24z^4 - 30z^2 + 12z$
7. $4y^2 - 2y + 3$
8. $-6z^4 + 3z^2 + 1$
9. $x^2 + 5x + 6$
10. $y^2 + 7y - 30$

### Section 18
1. $6.7 \cdot 10^{10}$
2. $9.213 \cdot 10^{-4}$
3. $4 \cdot 10^{-11}$
4. $3.201 \cdot 10^{15}$
5. $0.0000592$
6. $11,000,000$
7. $0.0000006733$
8. $327$
9. $\frac{1}{w^3}$
10. $m^3$
11. $f^8$
12. $\frac{h^6}{g}$
13. $a^{10}$
14. $b^3$
15. $1$
16. $24r^9$
17. $\frac{3q^3}{p^2}$
18. $\frac{4d^5}{c}$
19. $4g^{14}$
20. $1$
21. $9n^4k^8$
22. $\frac{w^9}{x^3y^9}$
23. $3 \cdot 10^4$
24. $6 \cdot 10^3$

### Section 19
1. (3, -2) \hspace{1cm} y = -\frac{5}{3}x + 3
2. (-1, -1) \hspace{1cm} y = 4x + 3
3. (4, -3) \hspace{1cm} y = \frac{1}{4}x - 4
4. (2, -1) \hspace{1cm} y = -\frac{5}{2}x + 4

### Other Equations
- $y = 1/3x - 3$
- $y = x - 2$
- $y = -1/2x - 1$
- $y = -1$
5. (2, 2)

6. No solution – the lines are parallel

7. (-5, 3)
   8. No solution
   9. (2, 1)
   10. (1, 1)
   11. (3, -5)
   12. (10, 2)
   13. (-3, 2)
   14. (-2, 5)
   15. (5, 1/2)
   16. (1/2, -2)

Section 15

#s 1 – 5

6. (3, 2)   7. (-1, 4)
8. (0, 1)   9. (4, 3)
10. (-1, -1) 11. (-4, 0)
12. (-3, 1) 13. (-4, -3)
14. $y = x + 2$

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<th>$Y$</th>
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<tbody>
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<tr>
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<td>3</td>
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<tr>
<td>2</td>
<td>4</td>
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</tbody>
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15. $y = 2x$

<table>
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<th>$Y$</th>
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<tbody>
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<td>6</td>
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16. $y = -x$

<table>
<thead>
<tr>
<th>$X$</th>
<th>$Y$</th>
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<tbody>
<tr>
<td>-3</td>
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<tr>
<td>1</td>
<td>-1</td>
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17. $y = 2x - 3$

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18. $y = \frac{1}{2}x + 1$

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<th>$Y$</th>
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<td>3</td>
</tr>
<tr>
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<td>4</td>
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19. $y = \frac{3}{2}x - 1$

<table>
<thead>
<tr>
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<th>$Y$</th>
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<tbody>
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<td>-1</td>
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</table>
20. \( y = -\frac{2}{3} x + 1 \)

<table>
<thead>
<tr>
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<th>Y</th>
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