Algebra Class

Algebraic Expressions

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Opening the Documents:

Thank you for downloading Algebra Class: Algebra Expressions Unit. This is the first step in really mastering the introductory concepts for Algebra 1. Please read these instructions carefully, as it will guide you through getting the most from the Algebra Class tutorials.

I highly recommend keeping a binder (notebook) of all the lessons. This will help to keep you organized and will allow you to find your notes and practice problems when studying for quizzes and tests.

Print this “Student Workbook”, punch holes, and store in a three-ring binder. Then, you will not need to open this file again.

Algebra Class Video Tutorials

You can access the video tutorials on the following webpage:

http://www.algebra-class.com/000200algebraic-expressions000200.html

On this webpage you will find a table of contents for the unit. Click on the lesson that you wish to watch. Use your notes worksheet (as described below) to take notes as you watch the videos.

Algebra Class Student Workbook

This student workbook contains lessons for the Algebra Expressions Unit. For each lesson within the unit, you will find a notes worksheet, practice problems, and a detailed answer key. This unit ends with a Chapter Test on Algebraic Expressions.

Notes Worksheet

For each lesson, you have the opportunity to view a video tutorial. (Instructions for how to access the videos is explained in the email that you received following your download.) Each video contains step-by-step explanations of various examples for the given skill. Your notes worksheet will help you to take organized notes as you view the video. By taking notes as you watch the videos, you will better understand and remember the concepts that are taught. (Each notes worksheet is numbered and titled in dark green.) The notes worksheets will also serve as a reference tool when completing the practice problems and when studying for quizzes and tests.
**Practice Problems**

After viewing the video tutorials and taking notes, you will have the opportunity to practice the skill on your own. I highly recommend completing most of the practice problems in order to help you gain a full understanding of the concept. Start by completing the first couple of problems and then stop to check your answers. If your answers are correct, continue practicing. If your answers are incorrect, use the answer key to identify your mistake before moving on. You may also need to review your notes or revisit the video tutorial before completing the remainder of the problems.

**Quizzes**

Quizzes should be completed in the order in which they are found in the Student Workbook. Quizzes are used to assess your knowledge at a given point in the lesson. You should monitor your progress closely. If you don’t score well on a quiz, be sure to go back and study the skills that were assessed on that quiz. If you do score well, then you are ready to move onto the next set of lessons.

**Chapter Tests**

This unit ends with a Chapter Test. This test assesses all of the skills for the Algebra Expressions Unit. Questions are presented in multiple choice and free response format. The answer key states how much each question is worth so that you can accurately grade the test. Revisit any lessons that you had difficulty with or did not score well on in the Chapter Test.

**Answer Keys**

For every lesson, there is a detailed, step by step answer key. If you have an incorrect answer on a practice problem, quiz, or test, check your answer against the detailed key to find your mistake. This resource allows you to identify each mistake that you make; and therefore, allows you to make continual progress.

I hope that you find these resources to be beneficial in your study of Algebra 1. If you have any questions or comments, I would love to hear them! Please contact me through my website: [http://www.algebra-class.com/contact-me.html](http://www.algebra-class.com/contact-me.html)

If you find this resource helpful, then you may be interested in purchasing *Algebra Class: Equations and Inequalities*. This 500 page tutorial series provides instruction for the following units in Algebra 1: Solving Equations, Graphing Equations, Writing Equations, Systems of Equations, and Inequalities. For more information on what’s included in this series, visit: [http://www.algebra-class.com/algebra-practice-worksheets.html](http://www.algebra-class.com/algebra-practice-worksheets.html)

I wish you much success in your studies,

Karin Hutchinson

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<td>Lesson 3:</td>
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</tbody>
</table>
Lesson 1: Integers

An integer is ______________________________________________________________

Adding Integers

Rule 1: When adding integers with signs that are the same _____________________________  __________________________________________________________________________

Examples  -3 +(-8) =   -7 +(-7) =   

Rule 2: When adding integers with signs that are different _____________________________  __________________________________________________________________________

Examples  -8 + 3 =       10 + (-4) =    2+(-6) =       -3 + 12 = 9

Quick Refresher on Absolute Value

Absolute Value is the distance between the number and 0 on the number line. It’s written as |n|.

|-6| =    |10| =    |-4| =    |-55| =   |90| = 5
## Subtracting Integers

**Rule:** When you subtract integers, you will ____________________________________________

We will rewrite the subtraction problem as an _____________________________

We can also remember the phrase: _________________ ___________________________

### Examples

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 – (-6)</td>
<td>18</td>
</tr>
<tr>
<td>-17 – 8</td>
<td>-25</td>
</tr>
<tr>
<td>-23 – (-11)</td>
<td>-12</td>
</tr>
<tr>
<td>8 – 25</td>
<td>-17</td>
</tr>
<tr>
<td>9 – (-27)</td>
<td>36</td>
</tr>
<tr>
<td>-12 – 14</td>
<td>-26</td>
</tr>
<tr>
<td>-23 – (-12)</td>
<td>-11</td>
</tr>
</tbody>
</table>

## Multiplying and Dividing Integers

**Rule 1:** If the signs are the same, then the answer is _____________________________.

**Rule 2:** If the signs are different, then the answer is _____________________________.

### Examples

<table>
<thead>
<tr>
<th>Signs that are the same</th>
<th>Signs that are different</th>
</tr>
</thead>
<tbody>
<tr>
<td>-8(-3)</td>
<td>-9(9)</td>
</tr>
<tr>
<td>-12/-3</td>
<td>3(-3)</td>
</tr>
<tr>
<td>-6(-2)</td>
<td>-36/9</td>
</tr>
<tr>
<td>-36/-6</td>
<td>18/-6</td>
</tr>
</tbody>
</table>
Guided Practice

1. \( 8 + (-6) = \)

2. \( 2(-4) = \)

3. \( 5 - (-8) = \)

4. \( -81/-9 = \)

5. \( 5(-2) + (-3) = \)

6. \( (-12 - 5) + 2 = \)

7. \( (12 - (-6)) + (-4/2) \)
Lesson 1 - Integers Practice

Addition

1. \(-3 + (-9) = \) 
2. \(19 + (-6) = \) 
3. \(-22 + 7 = \) 
4. \(-32 + (-21) = \) 
5. \(-28 + 16 = \) 
6. \(48 + (-90) = \) 
7. \(-28 + (-19) = \) 
8. \(-17 + 32 = \)

Subtraction

9. \(17 - 35 = \) 
10. \(-19 - (-32) = \) 
11. \(-18 - 22 = \) 
12. \(45 - (-21) = \) 
13. \(16 - 26 = \) 
14. \(19 - (-23) = \) 
15. \(-12 - (-16) = \) 
16. \(-39 - 12 = \)

Multiplication/Division

17. \(8(-9) = \) 
18. \(-60/-12 = \) 
19. \(44/-4 = \) 
20. \(-8 \cdot -13 = \) 
21. \(-5(15) = \) 
22. \(-22 / 2 = \) 
23. \(-39/-3 = \) 
24. \(-4(-12) = \)

Mixed Practice

25. \(3(-10) - (-5) = \) 
26. \(-18/-9 + (-12) = \) 
27. \(-14 + (-7) - 8 = \) 
28. \(10 - (-7) + (-12) = \) 
29. \((3-8) + (-12 -7) = \) 
30. \(2(-6) - (-14 + 8) = \) 
31. \((-9+1) - (9 - 14) = \) 
32. \(-3(-7) -(-15) = \) 
33. \(-22 - (-7) + (-8) = \) 
34. \(4(-6) +(-7) = \)
Lesson 2: Algebraic Expressions

An algebraic expression is _______________________________________________________
____________________________________________________________________________

Translating Algebraic Expressions

9y __________________________________________________________

2y − 5 __________________________________________________________

5x^2 -1 __________________________________________________________

(16a)/b __________________________________________________________

xy __________________________________________________________

Evaluating Expressions

Steps for evaluating expressions:

1. __________________________________________________________

2. __________________________________________________________

Examples

1. \( x^2 - 4y \) when \( x = -2 \) \( y = 3 \)

2. \( \frac{3a - b}{c} \) when \( a = 2 \) \( b = -4 \) \( c = 5 \)
A table of values is _____________________________________________________________

<table>
<thead>
<tr>
<th>a</th>
<th>2a - 5</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>

<table>
<thead>
<tr>
<th>y</th>
<th>3y² - 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1</td>
</tr>
</tbody>
</table>

Understanding Patterns

Find the next two terms in each pattern. Then write an algebraic expression that represents the pattern.

5, 7, 9, 11, __________,  __________     __________ ____________

3, 9, 21,45, __________,  __________     __________ _____________

4, 9, 16, 25, __________,  __________
Lesson 2 – Algebraic Expressions

Part 1: Translate the following expressions into words.

8y means 8 times y.

4r + s means ____________________________________________________________

5x$^2$ + y means __________________________________________________________

6x + 2 means ____________________________________________________________

16a/b means ____________________________________________________________

R(-2) – s means __________________________________________________________

8a means ________________________________________________________________

b

Part 2: Evaluate each expression for the given value.

3x – 6 when x = -3

2. x$^2$ – 5 when x = -2

2x$^2$ – 10 when x = 5

4. 4x – 6x + 2 when x = -4

Part 3: Complete the table with the value of the missing numbers.

<table>
<thead>
<tr>
<th>y</th>
<th>6y - 8</th>
<th>a</th>
<th>-2(a + 4)</th>
<th>s</th>
<th>S$^2$ - 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-26</td>
<td>-5</td>
<td>2</td>
<td>-5</td>
<td>24</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>-3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td></td>
<td>-8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>3</td>
<td></td>
<td>5</td>
<td>-1</td>
</tr>
</tbody>
</table>

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**Part 4: Add three terms to each pattern. Write an algebraic expression that describes the pattern.**

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Algebraic Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>3, 6, 9, 12, ______, ______, ______</td>
<td>____________________</td>
</tr>
<tr>
<td>18, 13, 8, 3, ______, ______, ______</td>
<td>____________________</td>
</tr>
<tr>
<td>4, 12, 36, 108, ______, ______, ______</td>
<td>____________________</td>
</tr>
<tr>
<td>2, 5, 11, 23, ______, ______, ______</td>
<td>____________________</td>
</tr>
<tr>
<td>3, 8, 23, 68 ______, ______, ______</td>
<td>____________________</td>
</tr>
</tbody>
</table>

**Part 5: Evaluate each expression if: x = 3, y = -5, z = -2**

1. \( x - 2y + z \)
2. \( 3y - z \)
3. \( xyz \)
4. \( \frac{3x - z}{y} \)
5. \( \frac{y^2 - z}{z} \)
6. \( \frac{xyz}{z} \)
7. \( \frac{3z - y}{x} \)
8. \( 6 + 3y^2 \)
Lesson 3: Order of Operations

The Order of Operations is:

P ___________________________
E ___________________________
M ___________________________
D ___________________________
A ___________________________
S ___________________________

Example 1

\[(6-2)^2 + 16 \div 6\]

Example 2

Evaluate the expression:

\[\left[3(x-2)+1\right] + y(3)^2 -1\]

when \(x = 10\)

\(y = -1\)
Lesson 3: Order of Operations

Part 1: Evaluate the following expressions.

1. $3 + 3(6-9) + 18/-3$

2. $(-6+ 18) – 3(-7 +1) – 6/2$

3. $16/-8 – 5 + 3 \cdot (-2) + 4 – 18$

4. $(3+2) – 12/6 + 4 - (-6)$

5. $[(10-4)/-3] – (12-6) + 3(-3)$
Part 2: Evaluate the following expressions for the given values.

6. \(x^2 - 3x + 4/2\) when \(x = -4\)

7. \((5x - 7) + 2x - x^2\) when \(x = 2\)

8. \(3(y + 3) - 4(y^2 + 1) - y\) when \(y = 3\)

9. \(x^2 + 2(x-1) + 3(x^2 -1)\) when \(x = -4\)

10. \(x + 2^2 - (x+ y) -3y\) when \(x = 2\ & y = -5\)

Your next assignment will be a Quiz on Integers, Algebraic Expressions, and Order of Operations.
Algebraic Expressions – Quiz

1. If \( x = -3 \), what is the value of \( 2x + 15 \)?

2. Evaluate \( \frac{2x + y}{3} \) for \( x = -3 \) & \( y = 3 \)

3. Evaluate \( 2t - (12 + 4t) - (3t)^2 \) when \( t = -2 \)

4. Evaluate the following expression:
\[
(3-9) + 4^2 - 10/2 - 5^2 \cdot 2
\]

5. What will be the sixth term in the following pattern:
\[ 3, 7, 19, 55 \]

6. Complete the table of values.

<table>
<thead>
<tr>
<th>( y )</th>
<th>( y^2 - 2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
Lesson 4: Like Terms & The Distributive Property

Like terms are ______________________________

----------------------------------------------------------------------------------------------------------------------------------

Examples

You can combine (add or subtract) like terms!

Example 1
2y – 4 +8y +7

Example 2
9x – 4y + 1 – 3y + 6x - 8
The Distributive Property

Example 1
2(y + 5)

Example 2
-2(2k – 8)

Example 3
2(3x + 5) + 3(x – 1/3)
Lesson 4: Combining Like Terms & Distributive Property

Part 1: Simplify each expression.

1. 6x – 6 – 5x + 2
2. 8x + 5 – 3x – 18 + 2x
3. 3y + 9x – 2y – 6x – 8y -3
4. 8c – 3d +2 – 5d -10c
5. 5a + 3b – c – 2c + 5b
6. 9y – 8x +3 - 6x – 2y + 1

Part 2: Simplify using the distributive property.

1. 3(x -1) =
2. 6(y + 8) =
3. 2(2y – 6)
4. -6(x- 5) =
5. -3(2y – 7) =
6. -9(3a + 4) =
7. 20(x + ¼) =
8. -15(x – 1/3) =
Part 3: Simplify each expression.

1. \(3(x + 1) + 2(x -4)\)

2. \(5(y - 2) + 3(y - 4)\)

3. \(2(2x -7) + 3(x + 4)\)

4. \(2(2y -5) + 3(y - 1/3)\)

5. \(8(2y - ¼) + 3(y + 2/3)\)

6. \(9(4x -2) + 4(2x-6)\)
Lesson 5: More Distributive Property

Example 1

\[4(2x - 3) - 5(x - 1)\]

Example 2

\[3(2 - 6x) - (x - 1)\]

Example 3

\[6x - (x - 3) + 2(5x - 2)\]
Lesson 5: More Distributive Property

Part 1: Simplify each expression.

1. $3(x - 3) + 2(2x - 5)$
2. $6(y - 1/6) + 3(2y - 4)$

3. $5(y - 4) - 3(y + 2)$
4. $3(y + 2) - 4(2y + 3)$

5. $5(2x + 4) - 2(x - 6)$
6. $9(r - 3) - (2 - r)$

7. $6(x - 2) - 5(2 - 3x)$
8. $2(4 - 5x) - (x - 4)$
9. $8(2x -6) - (2 - 5x)$

10. $3x + 2(2x -6) - 2(x -4)$

11. $2x - 8(x-3) - (2-x)$

12. $3(x -4) - 2x + 3(3x-2)$

13. $3(4x - 2) - (x -5) + 2x$

14. $2(2x - 5x +3) - 2(2x -6)$
Lesson 6: Matrices

A matrix is _________________________________________________________________

________________________________________________________

Example 1

\[
\begin{bmatrix}
10 & -2 \\
-4 & 9 \\
\end{bmatrix} - \begin{bmatrix}
7 & 5 \\
-8 & 12 \\
\end{bmatrix} =
\]

Example 2

\[
\begin{bmatrix}
1 \\
2 \\
? \\
\end{bmatrix} + \begin{bmatrix}
? \\
-3 \\
-5 \\
\end{bmatrix} = \begin{bmatrix}
8 \\
? \\
-2 \\
\end{bmatrix}
\]
Example 3

\[
\begin{bmatrix}
2a + b & -a + b \\
\hline
a - b & 3a - 2b
\end{bmatrix}
- \begin{bmatrix}
2a - b & b \\
\hline
4a + b & 2b
\end{bmatrix}
\]

Example 4

\[
\begin{bmatrix}
10 & -2 \\
\hline
-4 & 9
\end{bmatrix}
- 3 \begin{bmatrix}
7 & 5 \\
\hline
-8 & 12
\end{bmatrix}
= \]
Lesson 6: Matrices

Part 1: Adding and Subtracting Matrices

1. \[
\begin{bmatrix}
9 & -3 \\
5 & -6
\end{bmatrix}
+ \begin{bmatrix}
-2 & 4 \\
-6 & -1
\end{bmatrix}
= \]

2. \[
\begin{bmatrix}
-2 & 5 \\
1 & -8
\end{bmatrix}
+ \begin{bmatrix}
0 & -5 \\
2 & -6
\end{bmatrix}
= \]

3. \[
\begin{bmatrix}
8 & 4 \\
2 & -2 \\
1 & -7
\end{bmatrix}
+ \begin{bmatrix}
9 & 1 \\
-8 & -4 \\
3 & -10
\end{bmatrix}
= \]

4. \[
\begin{bmatrix}
-7 & 2 \\
-3 & 3
\end{bmatrix}
- \begin{bmatrix}
5 & -6 \\
2 & 1
\end{bmatrix}
= \]

5. \[
\begin{bmatrix}
2 & -9 \\
1 & -3
\end{bmatrix}
- \begin{bmatrix}
8 & 4 \\
-7 & -12
\end{bmatrix}
= \]

6. \[
\begin{bmatrix}
-9 & 0 & -5 \\
3 & -6 & -12 \\
12 & -9 & -4
\end{bmatrix}
= \]

Part 2: Replace the ? with the correct answer.

7. \[
\begin{bmatrix}
-3 & ? \\
5 & ?
\end{bmatrix}
+ \begin{bmatrix}
-8 & ? \\
? & -9
\end{bmatrix}
= \]

8. \[
\begin{bmatrix}
2 & 6 & 9 \\
-5 & 3 & -4 \\
8 & 6 & 2
\end{bmatrix}
- \begin{bmatrix}
-2 & ? & 5 \\
? & -9 & ? \\
2 & 5 & ?
\end{bmatrix}
= \]

Part 3: Multiplying by a Scalar

9. \[ \begin{bmatrix} -2 & 5 \\ 10 & -7 \end{bmatrix} = \]

10. \[ -2 \begin{bmatrix} 3 & 7 \\ -9 & 5 \end{bmatrix} + 3 \begin{bmatrix} -2 & 3 \\ 2 & -1 \end{bmatrix} = \]

11. \[ \begin{bmatrix} x & 2x \\ 5x & -3x \end{bmatrix} - 2 \begin{bmatrix} 2x & -3x \\ x & 8x \end{bmatrix} = \]

12. \[ 3 \begin{bmatrix} 2x + y & -2x - y \\ x + y & x + 2y \end{bmatrix} - 2 \begin{bmatrix} x + y & 2x - y \\ -2x & x - y \end{bmatrix} = \]

Part 4. Real World Problems

13. The matrices show the number of students who participated in after school programs:

<table>
<thead>
<tr>
<th></th>
<th>FALL</th>
<th>SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>Soccer</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>Weight lifting</td>
<td>29</td>
<td>10</td>
</tr>
<tr>
<td>Volleyball</td>
<td>12</td>
<td>25</td>
</tr>
</tbody>
</table>

A. How many total students played soccer in the fall and spring?

B. How many students played volleyball and soccer in the fall and spring?
C. How many more boys participated in weightlifting in the fall than in the spring?

14. The following matrices show the number of tickets sold for performances of a school play.

<table>
<thead>
<tr>
<th></th>
<th>WEEK 1</th>
<th></th>
<th>WEEK 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fri</td>
<td>Sat</td>
<td>Sun</td>
<td>Fri</td>
</tr>
<tr>
<td>Child</td>
<td>52</td>
<td>75</td>
<td>83</td>
<td>Child</td>
</tr>
<tr>
<td>Senior</td>
<td>89</td>
<td>120</td>
<td>113</td>
<td>Senior</td>
</tr>
<tr>
<td>Adult</td>
<td>120</td>
<td>145</td>
<td>152</td>
<td>Adult</td>
</tr>
</tbody>
</table>

A. Write a 3x3 matrix to show the total number of child, senior, and adult tickets that were sold for performances on Friday, Saturday, and Sunday.

B. How many more adult tickets were sold on a Saturday than on a Friday?

C. Tickets prices are $10 for adults, $7 for seniors, and $5 for children. Determine the total dollar sales for the six performances. Use mathematics to explain how you determined your answer.
Lesson 7: Using Formulas

Steps for Solving Problems Using a Formula

1. ___________________________________________________________________________
2. ___________________________________________________________________________
3. ___________________________________________________________________________
4. ___________________________________________________________________________

Example 1

Using the formula: Density = mass/volume or \( D = \frac{m}{v} \)

Find the density of a rock that has a volume of 20 ml with a mass of 40 g.
**Formula Sheet**

**Perimeter of a Square**

The perimeter of a square is very simple to calculate. You could add all four sides together (ex: \(2 + 2 + 2 + 2 = 8\)). Since all four sides are the same measurement, it would be easier to multiply the measurement by 4 (ex \(4 \times 2 = 8\)).

\[ \text{Perimeter} = 4s \]

** Since a square has sides that are equal, we can multiply the length of the side by 4.

**Example:**

\[ \text{Perimeter} = 4s \]
\[ \text{Perimeter} = 4(8 \text{ in}) \]
\[ \text{Perimeter} = 32 \text{ in} \]
Perimeter of a Rectangle

For a rectangle, the dimensions of the lengths are the same and the dimensions of the widths are the same. Therefore, the following formula can be used for rectangles.

\[ \text{Perimeter} = 2L + 2W \]

Same as: \( L + L + W + W \)

Example:

\[ \begin{array}{c}
L \\
W
\end{array} \]

\[ \begin{array}{c}
9 \text{ in} \\
4 \text{ in}
\end{array} \]

\[ \text{Perimeter} = 2(9 \text{ in}) + 2(4 \text{ in}) \]
\[ \text{Perimeter} = 18 \text{ in} + 8 \text{ in} \]
\[ \text{Perimeter} = 26 \text{ in} \]
Circumference of a Circle

We do not call the distance around the outside of a circle, the perimeter. Instead, we call it the circumference. Same meaning, different terminology! Below you'll find definitions for "circle" vocabulary and the circumference formula.

- **π = 3.14**
- **Diameter** (the distance of any line segment that passes through the center of the circle and whose endpoints are on the circle.)
- **Radius** (the distance from the center of the circle to any point on the line.)

The radius multiplied by 2 is the same distance as the diameter.

The diameter divided by 2 is the same distance as the radius.

\[
\text{Circumference} = 2 \pi r \quad \text{OR} \\
\text{Circumference} = \pi d
\]

**Example:**

\[
\text{Circumference} = 2 \pi r \\
\text{Circumference} = 2 (3.14) (5 \text{ cm}) \\
\text{Circumference} = 31.4 \text{ cm}
\]
Area of a Square

A square has 4 sides that are all exactly the same size. Therefore, finding the area is pretty easy! Since the area of a square or rectangle is length x width, we can just square the length of the side! Take a look!

Area = $s^2$

**Area = length x width. For a square, the length and width are the same.**

Example:

Since I know that a square has sides that are the same length, every side of this square measures 6 in.

A = $s^2$
A = $6^2$
A = 36 in$^2$

Don’t forget to include the units in your answer! The units for area are always squared.

Area of a Rectangle

A rectangle is a 4 sided figure with two pairs of parallel lines. Each set of parallel lines has the same length. To find the area of a rectangle we are going to multiply the length x the width.

Area = $L \times W$

Example:

Area = $L \times W$
Area = $5 \text{ cm} \times 11 \text{ cm}$
Area = 55 cm$^2$
A parallelogram is another 4 sided figure with two pairs of parallel lines. To find the area of a parallelogram, we will multiply the base x the height. Let’s look at the formula and example.

Area = bh
Area = base x height

**The top and bottom of the parallelogram are the bases. The height is the distance from the top of the parallelogram, to the bottom of the parallelogram, but it must be a straight line. The red line indicates the height.

Example:

4 m

3.7 m

Area = bh
Area = 3.2 m x 3.7 m
Area = 11.84 m²
Area of a Trapezoid

A trapezoid is a 4 sided figure formed by one pair of parallel sides. This area formula is a little more complicated. Study the example carefully!

\[
\text{Area} = \frac{1}{2} h (b_1 + b_2)
\]

Example:

\[
\text{Area} = \frac{1}{2} \cdot 5(3 + 8)
\]

\[
\text{Area} = \frac{1}{2} \cdot 5(11)
\]

\[
\text{Area} = \frac{1}{2} \cdot 55
\]

\[
\text{Area} = 27.5 \text{ ft}^2
\]
Area of a Triangle

A triangle is a 3 sided figure. There are several different types of triangles. You must be careful when trying to locate the height of the triangle. Remember the height of the shape must be a straight, vertical line.

Area = \( \frac{1}{2} \) (bh)
Area = \( \frac{1}{2} \) (base x height)

** (The height must be a straight vertical line from the tip of the triangle to the base)

Example:

Area = \( \frac{1}{2} \) (bh)
Area = \( \frac{1}{2} \) (13cm \times 6cm)
Area = \( \frac{1}{2} \) (78 cm^2)
Area = 39 cm^2
A circle, of course, has no straight lines. We use pi (3.14) when we calculate the area of a circle.

\[ r = \text{radius (distance from the center of the circle to a point on the circle)} \]
\[ \pi = 3.14 \]

\[ \text{Area} = \pi r^2 \]

**Example:**

\[ r = 7 \text{ in} \]

\[ \text{Area} = \pi r^2 \]
\[ \text{Area} = (3.14)(7^2) \]
\[ \text{Area} = 3.14(49 \text{ in}^2) \]
\[ \text{Area} = 153.86 \text{ in}^2 \]
Volume of a Cube

Since a cube has sides that are all the same size, this is a very easy volume formula to remember. We are going to find the area of the bottom of the cube and multiply by the height. So, that’s length x width x height. Since the length, width and height are all the same dimensions, we can cube the length of the side. Take a look at the example.

Example:

![Cube Diagram]

Volume = s^3

3 cm

Volume = s^3
Volume = (3 cm)^3
Volume = (3 cm × 3 cm × 3 cm)
Volume = 27 cm^3

Volume units are always cubed.

Volume of a Rectangular Prism

A rectangular prism is your basic box that is not a cube. In order to find the volume, we will multiply the length x width x height. These dimensions may all be different, so there is no shortcut for this one!

Example:

![Rectangular Prism Diagram]

Volume = L × W × H
Volume = Length × Width × Height

13 in

Volume = L × W × H
Volume = 13 cm × 2 cm × 4 cm
Volume = 104 cm^3
Volume of a Cylinder

To find the volume of a cylinder, we must find the area of the base and multiply that by the height. Remember that the area of a circle (the base is a circle) is $\pi r^2$.

\[ V = \text{area of base} \cdot \text{height} \]
\[ V = \pi r^2 h \]

**Example:**

\[
\begin{align*}
\text{Volume} &= \pi r^2 h \\
\text{Volume} &= (3.14) \cdot (5 \text{ cm})^2 \cdot 10 \text{ cm} \\
\text{Volume} &= 785 \text{ cm}^3
\end{align*}
\]

Other formulas:

Cone: \[ V = \frac{1}{3} \cdot \text{area of base} \cdot \text{height} \]

The base is a circle

\[ V = \frac{1}{3} \cdot \pi r^2 h \]

Pyramid: \[ V = \frac{1}{3} \cdot (\text{area of base}) \cdot \text{height} \]

Sphere: \[ V = \frac{4}{3} \cdot \pi r^3 \]
Lesson 7: Using Formulas

1. Jessica bought a cylindrical container to store a friend’s birthday present. The container has a height of 12 inches and the area of the base is 25 square inches. Find the volume of the cylinder.

2. Your medical insurance policy requires you to pay the first $100 on hospital expenses. The insurance company then pays 80% of the remaining expenses. The amount you must pay can be calculated using the formula, \( C = 0.2(t-100) + 100 \), where \( C \) represents your cost and \( t \) is the total hospital bill. Use the formula to calculate your expense for a hospital bill of $5000.

3. The sum, \( s \) of the measures of interior angles of a polygon is equal to: \( s = 180(n-2) \), where \( n \) is the number of sides.

   Find the sum of the interior angles of a hexagon.

   Find the sum of the interior angles of an octagon.
4. Use the formula: \( F = \frac{9}{5}C + 32 \) to convert 35 degrees Celsius to Fahrenheit.

\( F = \) Fahrenheit temperature and \( C = \) Celsius temperature.

5. You made a cone for part of a science fair project. If the cone has a height of 2 feet and the area of the base is 150 \( \text{ft}^2 \), determine the volume of the cone.

6. The formula, \( I = prt \) is used to calculate simple interest (\( p \) is the principal amount deposited, \( r \) is the annual rate, and \( t \) is the time in years). Find the interest on $18000 deposited for 2.5 years at an annual rate of 4.7%.
7. Find the area and perimeter of the triangle.

8. You are using a cylinder to package a presentation for work. Find the volume of the cylinder.

Your next assignment will be a Chapter Test on the Algebraic Expressions Unit.

Good Luck!
Part 1: For questions 1-8, circle the answer that best answers the problem.

1. Simplify the following expression: \(3^2 - 4(-5) + 2(-5 + 4) - 2/2\)
   
   A. 26  
   B. -14  
   C. 33  
   D. 12.5

2. Evaluate the following expression for the given values:
   \(3r - s^2 + rs - t\) for \(r = -2, s = 5, t = -4\)
   
   A. -45  
   B. -25  
   C. -37  
   D. -17

3. Simplify: \(8(x + 2)\)
   
   A. 8x + 2  
   B. 8x + 16  
   C. 16x  
   D. 10x
4. What will be the 6th term in the following pattern? 4, 9, 16, 25

A. 36
B. 64
C. 49
D. 35

5. Simplify: 3(2x-5) – 4(2x+2)

A. -2x -7
B. 2x – 23
C. -2x -3
D. -2x – 23

6. Determine the expression that makes the matrix true.

\[
\begin{bmatrix}
2x - y & 4x + 2y \\
3x + 2y & 3x - 3y
\end{bmatrix} + \begin{bmatrix}
x - y & 2x + 3y \\
? & 2x - 2y
\end{bmatrix} = \begin{bmatrix}
3x - 2y & 6x + 5y \\
5x & 5x - 5y
\end{bmatrix}
\]

A. 2x
B. 2x + 3y
C. 2x – 3y
D. 2x -2y
7. Lisa is ordering t-shirts for her cheerleading group. Use the table to determine the cost of 4 t-shirts.

<table>
<thead>
<tr>
<th>Cost</th>
<th>$11.00</th>
<th>?</th>
<th>$27.50</th>
<th>$33.00</th>
<th>$38.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of T-shirts</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

A. $16.50  
B. $22.00  
C. $16.00  
D. $22.50

8. The matrices show the number of students in each grade who participated in the summer math workshop for Algebra and Algebra 2.

Math Programs 2008

<table>
<thead>
<tr>
<th>Grade</th>
<th>Algebra</th>
<th>Algebra 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>9th</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>10th</td>
<td>34</td>
<td>8</td>
</tr>
</tbody>
</table>

Math Programs 2009

<table>
<thead>
<tr>
<th>Grade</th>
<th>Algebra</th>
<th>Algebra 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>9th</td>
<td>31</td>
<td>24</td>
</tr>
<tr>
<td>10th</td>
<td>18</td>
<td>10</td>
</tr>
</tbody>
</table>

How many more 9th grade students participated in the summer program for Algebra in 2009 than in 2008?

A. 9  
B. 12  
C. 19  
D. 16
Part 2: Solve each problem and circle your answer.

9. Simplify the following expression: \(4(x-3) - 2(x + 5)\)

10. Find \(n\) in the table.

<table>
<thead>
<tr>
<th>(x)</th>
<th>(\frac{3}{2}x + 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-9</td>
<td>-2</td>
</tr>
<tr>
<td>-6</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>(n)</td>
</tr>
</tbody>
</table>

11. Evaluate the expression \(\frac{3x-y}{y}\) when \(x = -9\) and \(y = 3\)

12. Given the pattern: 9, 14, 24, 44..., ...

If the pattern continues, what will be the sum of the next two terms?
13. At *Bowling Lanes*, bowlers who average fewer than 200 get a handicap added to their score. The handicap, \( H \), of a bowler with average, \( A \), is found using the following formula:

\[
H = 0.8(200-A)
\]

What is the handicap for a person who averages 165?

**Part 3: Short answer – Solve the following problems. ** **Make sure you answer every part of each question.**

14. The following display shows the number of ice cream cones sold at a fundraising event.

<table>
<thead>
<tr>
<th></th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Dip</td>
<td>2 Dips</td>
</tr>
<tr>
<td></td>
<td>1 Dip</td>
<td>2 Dips</td>
</tr>
<tr>
<td></td>
<td>1 Dip</td>
<td>2 Dips</td>
</tr>
<tr>
<td><strong>Chocolate</strong></td>
<td>45</td>
<td>65</td>
</tr>
<tr>
<td><strong>Vanilla</strong></td>
<td>23</td>
<td>54</td>
</tr>
<tr>
<td><strong>Strawberry</strong></td>
<td>18</td>
<td>33</td>
</tr>
<tr>
<td><strong>Chocolate</strong></td>
<td>21</td>
<td>43</td>
</tr>
<tr>
<td><strong>Vanilla</strong></td>
<td>36</td>
<td>42</td>
</tr>
<tr>
<td><strong>Strawberry</strong></td>
<td>12</td>
<td>55</td>
</tr>
</tbody>
</table>

- Create a 3x2 matrix to show the total number of each kind of ice cream cone sold for Thursday and Friday.

- If 2 dipped ice creams cost $1.89, what is the total amount earned on 2 dipped ice creams by the fundraiser for Thursday and Friday? Explain how you determined your answer.
15. John is creating a unique quadrilateral for a geometry project. The shape will be irregular with all sides and angles different measures.

- The sum, $s$ of the measures of interior angles of a polygon is equal to: $s = 180(n-2)$,
- Where $n$ is the number of sides. Find the sum of the interior angles of Johns’ quadrilateral.
- If the measures of three angles are 80°, 50°, and 90°, find the degree measure of the fourth angle. Explain how you determined your answer.
- If John decided to build a hexagon instead of a quadrilateral, how would the sum of the measures differ? Explain how you determined your answer.
Answer Keys
Lesson 1 - Integers Practice

Addition

1. \(-3 + (-9) = -12\)
2. \(19 + (-6) = 13\)
3. \(-22 + 7 = -15\)
4. \(-32 + (-21) = -53\)
5. \(-28 + 16 = -12\)
6. \(48 + (-90) = -42\)
7. \(-28 + (-19) = -47\)
8. \(-17 + 32 = 15\)

Subtraction

9. \(17 - 35 = 17 + (-35) = -18\)
10. \(-19 - (-32) = -19 + 32 = 13\)
11. \(-18 - 22 = -18 + (-22) = -40\)
12. \(45 - (-21) = 45 + 21 = 66\)
13. \(16 - 26 = 16 + (-26) = -10\)
14. \(19 - (-23) = 19 + 23 = 42\)
15. \(-12 - (-16) = -12 + 16 = 4\)
16. \(-39 - 12 = -39 + (-12) = -51\)

Multiplication/Division

17. \(8(-9) = -72\)
18. \(-60/-12 = 5\)
19. \(44/-4 = -11\)
20. \(-8 \times -13 = 104\)
21. \(-5(15) = -75\)
22. \(-22 / 2 = -11\)
23. \(-39/-3 = 13\)
24. \(-4(-12) = 48\)

Mixed Practice

25. \(3(-10) - (-5) = -30 + 5 = -25\)
26. \(-18/-9 + (-12) = 2 + (-12) = -10\)
27. \(-14 + (-7) - 8 = -21 + (-8) = -29\)
28. \(10 - (-7) + (-12) = 10 + 7 + (-12) = 5\)
29. \((3-8) + (-12 -7) = (3 + 8) + (-12 + -7)\)

\(\boxed{-5 + (-19) = -24}\)

30. \(2(-6) - (-14 + 8) = -12 - (-6) =\)

\(\boxed{-12 + 6 = -6}\)

31. \((-9+1) - (9 - 14) = -8 - (-5) = -8 + 5 = 3\)
32. \(-3(-7) - (-15) = 21 + 15 = 36\)
33. \(22 - (-7) + (-8) = 22 + 7 + (-8) = 21\)
34. \(4(-6) + (-7) = -24 + (-7) = -31\)
Lesson 2 – Algebraic Expressions

Part 1: Translate the following expressions into words.

8y means 8 times y.
4r + s means 4 times r plus s.
5x^2 + y means 5 times x squared plus y.
6x + 2 means 6 times x plus 2.
16a/b means (16 times a) divided by b.
R(-2) – s means R times -2 minus s.
8a means (8 times a) divided by b.

Part 2: Evaluate each expression for the given value.

1. 3x – 6 when x = -3
   
   3(-3) – 6 =
   
   -9 +(-6) = -15

2. x^2 - 5 when x = -2
   
   (-2)^2 - 5 =
   
   4 + (-5) = -1

3. 2x^2 – 10 when x = 5
   
   2(5)^2 – 10 =
   
   2(25) – 10 = 40

4. 4x – 6x + 2 when x = -4
   
   4(-4) – 6(-4) +2 =
   
   -16 + 24 + 2 =
   
   -16 + 24 + 2 = 10

Part 3: Complete the table with the value of the missing numbers.

<table>
<thead>
<tr>
<th>y</th>
<th>6y -8</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-26</td>
</tr>
<tr>
<td>0</td>
<td>6(0) – 8 = -8</td>
</tr>
<tr>
<td>1</td>
<td>-2</td>
</tr>
<tr>
<td>5</td>
<td>6(5) – 8 = 22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a</th>
<th>-2(a + 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>2</td>
</tr>
<tr>
<td>-3</td>
<td>-2(-3+4) = -2(1) = -2</td>
</tr>
<tr>
<td>0</td>
<td>-8</td>
</tr>
<tr>
<td>3</td>
<td>-2(3+4) = -2(7) = -14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>s</th>
<th>S^2 - 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>24</td>
</tr>
<tr>
<td>3 (or -3)</td>
<td>8</td>
</tr>
<tr>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>5</td>
<td>(5)^2 - 1 25 -1 = 24</td>
</tr>
</tbody>
</table>
### Part 4: Add three terms to each pattern. Write an algebraic expression that describes the pattern.

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Algebraic Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>3, 6, 9, 12, 15, 18, 21</td>
<td>( n + 3 )</td>
</tr>
<tr>
<td>18, 13, 8, 3, -2, -7, -12</td>
<td>( n - 5 )</td>
</tr>
<tr>
<td>4, 12, 36, 108, 324, 972, 2916</td>
<td>( 3n )</td>
</tr>
<tr>
<td>2, 5, 11, 23, 47, 95, 191</td>
<td>( 2n + 1 )</td>
</tr>
<tr>
<td>3, 8, 23, 68, 203, 608, 1823</td>
<td>( 3n - 1 )</td>
</tr>
</tbody>
</table>

### Part 5: Evaluate each expression if: \( x = 3 \), \( y = -5 \), \( z = -2 \)

1. \( x - 2y + z \)
   - \[ 3 - 2(-5) + (-2) = 3(-5) - (-2) = 11 \]
2. \( 3y - z \)
   - \[ 3(-5) - (-2) = 13 \]
3. \( xyz \)
   - \[ (3)(-5)(-2) = 30 \]
4. \( \frac{3x - z}{y} \)
   - \[ \frac{3(3) - (-2)}{-5} = 27 \]
5. \( \frac{y^2 - z}{z} \)
   - \[ \frac{(-5)^2 - (-2)}{-2} = 27 \]
6. \( \frac{xyz}{z} \)
   - \[ \frac{(3)(-5)(-2)}{-2} = 15 \]

\[-27/2\]
7. \[ \frac{3z - y}{x} \]

\[ \frac{3(-2) - (-5)}{3} = \frac{-6 + 5}{3} = -\frac{1}{3} \]

8. \[ 6 + 3y^2 \]

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

\[ 6 + 3(25) = 81 \]

-1/3
Lesson 3: Order of Operations

Part 1: Evaluate the following expressions.

2. \((-6+18) - 3(-7+1) - 6/2\)
   \[\begin{align*}
   12 & -3(-6) - 6/2 \\
   12 & + 18 - 3 \\
   30 & - 3 \\
   27 &
   \end{align*}\]
   Answer: 27

3. \(\frac{16}{-8} - 5 + 3 \cdot (-2) + 4 - 18\)
   \[\begin{align*}
   -2 & - 5 + (-6) + 4 - 18 \\
   -7 & + (-6) + 4 - 18 \\
   -13 & + 4 - 18 \\
   -9 & - 18 \\
   -27 &
   \end{align*}\]
   Answer: -27

Order of Operations

- Parenthesis
- Exponents
- Multiply
- Divide
- Add
- Subtract

or

- Parenthesis
- Exponents
- Multiply
- Divide
- Add
- Subtract
4. \((3+2) - 12/6 + 4 - (-6)\)
5. \([(10-4)/-3] - (12-6) + 3(-3)\)

\[
\begin{align*}
5 - \frac{12}{6} + 4 - (-6) & \quad \text{Answer: 13} \\
5 - 2 + 4 - (-6) & \\
3 + 4 - (-6) & \\
7 - (-6) & \\
\hline
13 &
\end{align*}
\]

Part 2: Evaluate the following expressions for the given values.

6. \(x^2 - 3x + 4/2\) when \(x = -4\)
7. \((5x - 7) + 2x - x^2\) when \(x = 2\)

\[
\begin{align*}
(-4)^2 - 3(-4) + 4/2 & \quad \text{substitute -4 for x} \\
16 - 3(-4) + 4/2 & \\
16 - (-12) + 2 & \\
28 + 2u & \\
30 & \\
\hline
\end{align*}
\]

\[
\begin{align*}
(5 \cdot 2 - 7) + 2 \cdot 2 - 2^2 & \quad \text{substitute 2 for x} \\
3 + 2 \cdot 2 - 4 & \\
3 + 4 - 4 & \\
\hline
7 - 4 & \\
\hline
3 & \\
\end{align*}
\]

Answer: 30

Answer: 3
8. \[3(y + 3) - 4(y^2 + 1) - y\] when \(y = 3\)

\[3(3+3) - 4(3^2+1) - 3\] Substitute 3 for \(y\)

\[3(6) - 4(10) - 3\]

\[18 - 40 - 3\]

\[-22 - 3\]

\[-25\]

Answer: \(-25\)

9. \[x^2 + 2(x-1) + 3(x^2 -1)\] when \(x = -4\)

\[(-4)^2 + 2(-4-1) + 3((-4)^2 -1)\] Substitute -4

\[(-4)^2 + 2(-5) + 3(15)\]

\[16 + 2(-5) + 3(15)\]

\[16 + (-10) + 45\]

\[6 + 45\]

\[51\]

Answer: \(51\)

10. \[x + 2^2 - (x+y) -3y\] when \(x = 2\) & \(y = -5\)

\[2 + 2^2 - (2 + (-5)) - 3(-5)\]

\[2 + 2^2 - (-3) - 3(-5)\]

\[2 + 4 - (-3) - 3(-5)\]

\[2 + 4 - (-3) - (-15)\]

\[6 - (-3) - (-15)\]

\[9 - (-15)\]

\[24\]

Answer: \(24\)
Algebraic Expressions – Quiz

1. If \( x = -3 \), what is the value of \( 2x + 15 \)? (2 points)

\[
2(-3) + 15 \quad \text{Substitute } -3 \text{ for } x
\]
\[
-6 + 15
\]
\[
9
\]
Answer: 9

2. Evaluate \( \frac{2x + y}{3} \) for \( x = -3 \) & \( y = 3 \) (2 points)

\[
\frac{2(-3) + 3}{3} \quad \text{Substitute}
\]
\[
\frac{-6 + 3}{3}
\]
\[
-1
\]
Answer: -1

3. Evaluate \( 2t - (12 + 4t) - (3t)^2 \)
   when \( t = -2 \) (2 points)

\[
2(-2) - (12 + 4(-2)) - (3(-2))^2
\]
\[
2(-2) - 4 - (-6)^2
\]
\[
-4 - 4 - 36
\]
\[
-8 - 36
\]
\[
-44
\]
Answer: -44

4. Evaluate the following expression:

\[
(3-9) + 4^2 - 10/-2 - 5^2 \cdot 2
\]
\[
(3-9) + 4^2 - 10/-2 - 25 \cdot 2
\]
\[
-6 + 16 - 10/-2 - 25 \cdot 2
\]
\[
-6 + 16 - (-5) - 50
\]
\[
10 - (-5) - 50
\]
\[
15 - 50
\]
\[
-35
\]
Answer: -35
5. What will be the sixth term in the following pattern: 3, 7, 19, 55 (2 points)

The pattern is \( (n^3 - 2) \)

The sixth term in the pattern is 487.

6. Complete the table of values. (4 points)

<table>
<thead>
<tr>
<th>y</th>
<th>( y^2 - 2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>((-3)^2 - 2)</td>
</tr>
<tr>
<td>0</td>
<td>((0)^2 - 2)</td>
</tr>
<tr>
<td>1</td>
<td>(1^2 - 2)</td>
</tr>
<tr>
<td>5</td>
<td>(5^2 - 2)</td>
</tr>
</tbody>
</table>

This quiz is worth a total of 14 points.
Lesson 4: Combining Like Terms & Distributive Property

Part 1: Simplify each expression.

1. \(6x - 6 - 5x + 2\)
   \[6x - 5x - 6 + 2\]
   \[x - 4\]

2. \(8x + 5 - 3x - 18 + 2x\)
   \[8x - 3x + 2x + 5 - 18\]
   \[7x - 13\]

3. \(3y + 9x - 2y - 6x - 8y - 3\)
   \[9x - 6x + 3y - 2y - 8y - 3\]
   \[3x - 7y - 3\]

4. \(8c - 3d + 2 - 5d - 10c\)
   \[8c - 10c - 3d - 5d + 2\]
   \[-2c - 8d + 2\]

5. \(5a + 3b - c - 2c + 5b\)
   \[5a + 3b + 5b - c - 2c\]
   \[5a + 8b - 3c\]

6. \(9y - 8x + 3 - 6x - 2y + 1\)
   \[-8x - 6x + 9y - 2y + 3 + 1\]
   \[-14x + 7y + 4\]

Part 2: Simplify using the distributive property.

1. \(3(x - 1)\)
   \[3x - 3\]

2. \(6(y + 8)\)
   \[6y + 48\]

3. \(2(2y - 6)\)
   \[4y - 12\]

4. \(-6(x - 5)\)
   \[-6x + 30\]

5. \(-3(2y - 7)\)
   \[-6y + 21\]

6. \(-9(3a + 4)\)
   \[-27a - 36\]

7. \(20(x + \frac{1}{4})\)
   \[20x + 5\]

8. \(-15(x - 1/3)\)
   \[-15x + 5\]
### Part 3: Simplify each expression.

1. \(3(x + 1) + 2(x - 4)\)
   \[3x + 3 + 2x - 8\]
   \[3x + 2x + 3 - 8\]
   \[5x - 5\]

2. \(5(y - 2) + 3(y - 4)\)
   \[5y - 10 + 3y - 12\]
   \[5y + 3y - 10 - 12\]
   \[8y - 22\]

3. \(2(2x - 7) + 3(x + 4)\)
   \[4x - 14 + 3x + 12\]
   \[4x + 3x - 14 + 12\]
   \[7x - 2\]

4. \(2(2y - 5) + 3(y - 1/3)\)
   \[4y - 10 + 3y - 1\]
   \[4y + 3y - 10 - 1\]
   \[7y - 11\]

5. \(8(2y - ¼) + 3(y + 2/3)\)
   \[16y - 2 + 3y + 2\]
   \[16y + 3y - 2 + 2\]
   \[19y\]

6. \(9(4x - 2) + 4(2x - 6)\)
   \[36x - 18 + 8x - 24\]
   \[36x + 8x - 18 - 24\]
   \[44x - 42\]
Lesson 5: More Distributive Property

Part 1: Simplify each expression.

1. $3(x - 3) + 2(2x - 5)$
   
   $3x - 9 + 4x - 10$
   
   $3x + 4x - 9 - 10$
   
   $7x - 19$

2. $6(y - 1/6) + 3(2y - 4)$
   
   $6y - 1 + 6y - 12$
   
   $6y + 6y - 1 - 12$
   
   $12y - 13$

3. $5(y - 4) - 3(y + 2)$
   
   $5y - 20 - 3y - 6$
   
   $5y - 3y - 20 - 6$
   
   $2y - 26$

4. $3(y + 2) - 4(2y + 3)$
   
   $3y + 6 - 8y - 12$
   
   $3y - 8y + 6 - 12$
   
   $-5y - 6$

5. $5(2x + 4) - 2(x - 6)$
   
   $10x + 20 - 2x + 12$
   
   $10x - 2x + 20 + 12$
   
   $8x + 32$

6. $9(r - 3) - (2 - r)$
   
   $9r - 27 - 2 + r$
   
   $9r + r - 27 - 2$
   
   $10r - 29$

7. $6(x - 2) - 5(2 - 3x)$
   
   $6x - 12 - 10 + 15x$
   
   $6x + 15x - 12 - 10$
   
   $21x - 22$

8. $2(4 - 5x) - (x - 4)$
   
   $8 - 10x - x + 4$
   
   $-10x - x + 8 + 4$
   
   $-11x + 12$
<table>
<thead>
<tr>
<th>Expression</th>
<th>Simplified Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. $8(2x -6) – (2 – 5x)$</td>
<td>$16x – 48 – 2 + 10x$</td>
</tr>
<tr>
<td></td>
<td>$16x + 10x – 48 – 2$</td>
</tr>
<tr>
<td></td>
<td>$26x – 50$</td>
</tr>
<tr>
<td>10. $3x + 2(2x -6) – 2(x -4)$</td>
<td>$3x + 4x – 12 – 2x + 8$</td>
</tr>
<tr>
<td></td>
<td>$3x + 4x – 2x – 12 + 8$</td>
</tr>
<tr>
<td></td>
<td>$5x - 4$</td>
</tr>
<tr>
<td>11. $2x – 8(x-3) – (2-x)$</td>
<td>$2x – 8x + 24 – 2 + x$</td>
</tr>
<tr>
<td></td>
<td>$2x – 8x + x + 24 – 2$</td>
</tr>
<tr>
<td></td>
<td>$-5x + 22$</td>
</tr>
<tr>
<td>12. $3(x -4) – 2x + 3(3x-2)$</td>
<td>$3x – 12 – 2x + 9x - 6$</td>
</tr>
<tr>
<td></td>
<td>$3x – 2x + 9x – 12 - 6$</td>
</tr>
<tr>
<td></td>
<td>$10x - 18$</td>
</tr>
<tr>
<td>13. $3(4x – 2) – (x -5) + 2x$</td>
<td>$12x – 6 – x + 5 + 2x$</td>
</tr>
<tr>
<td></td>
<td>$12x – x + 2x – 6 + 5$</td>
</tr>
<tr>
<td></td>
<td>$13x -1$</td>
</tr>
<tr>
<td>14. $2(2x – 5x +3) – 2(2x -6)$</td>
<td>$4x – 10x + 6 – 4x + 12$</td>
</tr>
<tr>
<td></td>
<td>$4x – 10x – 4x + 6 + 12$</td>
</tr>
<tr>
<td></td>
<td>$-10x + 18$</td>
</tr>
</tbody>
</table>
Lesson 6: Matrices

Part 1: Adding and Subtracting Matrices

1. \[
\begin{bmatrix}
9 & -3 \\
5 & -6 \\
\end{bmatrix} + \begin{bmatrix}
-2 & 4 \\
-6 & -1 \\
\end{bmatrix} = \begin{bmatrix}
7 & 1 \\
-1 & -7 \\
\end{bmatrix}
\]

2. \[
\begin{bmatrix}
-2 & 5 \\
1 & -8 \\
\end{bmatrix} + \begin{bmatrix}
0 & -5 \\
2 & -6 \\
\end{bmatrix} = \begin{bmatrix}
-2 & 0 \\
3 & -14 \\
\end{bmatrix}
\]

3. \[
\begin{bmatrix}
-8 & 4 \\
2 & -2 \\
1 & -7 \\
\end{bmatrix} + \begin{bmatrix}
9 & 1 \\
8 & -4 \\
3 & -10 \\
\end{bmatrix} = \begin{bmatrix}
1 & 5 \\
6 & -6 \\
4 & -17 \\
\end{bmatrix}
\]

4. \[
\begin{bmatrix}
-7 & 2 \\
-3 & 3 \\
\end{bmatrix} - \begin{bmatrix}
5 & -6 \\
2 & 1 \\
\end{bmatrix} = \begin{bmatrix}
-12 & 8 \\
-5 & 2 \\
\end{bmatrix}
\]

5. \[
\begin{bmatrix}
2 & -9 \\
1 & -3 \\
\end{bmatrix} - \begin{bmatrix}
8 & 4 \\
7 & -12 \\
\end{bmatrix} = \begin{bmatrix}
-6 & -13 \\
8 & 9 \\
\end{bmatrix}
\]

6. \[
\begin{bmatrix}
9 & 0 & -5 \\
3 & -6 & -12 \\
\end{bmatrix} - \begin{bmatrix}
7 & 9 & 2 \\
12 & -9 & -4 \\
\end{bmatrix} = \begin{bmatrix}
16 & -9 & -7 \\
9 & 3 & -8 \\
\end{bmatrix}
\]

Part 2: Replace the ? with the correct answer.

7. \[
\begin{bmatrix}
-3 \\
5 \\
1 \\
\end{bmatrix} + \begin{bmatrix}
-5 \\
-8 \\
-10 \\
\end{bmatrix} = \begin{bmatrix}
8 \\
-3 \\
-9 \\
\end{bmatrix}
\]

8. \[
\begin{bmatrix}
2 & 6 & 9 \\
-5 & 3 & -4 \\
8 & 6 & 2 \\
\end{bmatrix} - \begin{bmatrix}
2 & 8 & -2 \\
-2 & -2 & 5 \\
6 & -9 & -3 \\
\end{bmatrix} = \begin{bmatrix}
0 & -2 & 11 \\
-3 & 5 & -9 \\
2 & 15 & 5 \\
\end{bmatrix}
\]
Part 3: Multiplying by a Scalar

9. \( \begin{bmatrix} -2 & 5 \\ 10 & -7 \end{bmatrix} \times \begin{bmatrix} -6 & 15 \\ 30 & -21 \end{bmatrix} = \begin{bmatrix} 30 & -21 \\ 160 & -18 \end{bmatrix} \)

10. \( -2 \begin{bmatrix} 3 \\ -9 \end{bmatrix} + 3 \begin{bmatrix} -2 \\ 2 \end{bmatrix} = \begin{bmatrix} -6 \\ 18 \end{bmatrix} \)

Part 4. Real World Problems

13. The matrices show the number of students who participated in after school programs:

<table>
<thead>
<tr>
<th></th>
<th>FALL</th>
<th>SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>Soccer</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>Weight lifting</td>
<td>29</td>
<td>10</td>
</tr>
<tr>
<td>Volleyball</td>
<td>12</td>
<td>25</td>
</tr>
</tbody>
</table>
A. How many total students played soccer in the fall and spring?

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soccer</td>
<td>57</td>
<td>38</td>
<td>95</td>
</tr>
<tr>
<td>Weight Lifting</td>
<td>57</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Volleyball</td>
<td>38</td>
<td>63</td>
<td></td>
</tr>
</tbody>
</table>

95 students played soccer in the fall & spring.

B. How many students played volleyball and soccer in the fall and spring?

196 students played volleyball & soccer in the fall and spring.

\[38 + 63 + 95 = 196\]

C. How many more boys participated in weightlifting in the fall than in the spring?

1 more boy participated in weightlifting in the fall than in the spring.

\[29 - 28 = 1\]

14. The following matrices show the number of tickets sold for performances of a school play.

**WEEK 1**

<table>
<thead>
<tr>
<th></th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child</td>
<td>52</td>
<td>75</td>
<td>83</td>
</tr>
<tr>
<td>Senior</td>
<td>89</td>
<td>120</td>
<td>113</td>
</tr>
<tr>
<td>Adult</td>
<td>120</td>
<td>145</td>
<td>152</td>
</tr>
</tbody>
</table>

**WEEK 2**

<table>
<thead>
<tr>
<th></th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child</td>
<td>45</td>
<td>90</td>
<td>77</td>
</tr>
<tr>
<td>Senior</td>
<td>78</td>
<td>99</td>
<td>130</td>
</tr>
<tr>
<td>Adult</td>
<td>114</td>
<td>168</td>
<td>155</td>
</tr>
</tbody>
</table>
A. Write a 3x3 matrix to show the total number of child, senior, and adult tickets that were sold for performances on Friday, Saturday, and Sunday.

<table>
<thead>
<tr>
<th></th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child</td>
<td>97</td>
<td>165</td>
<td>160</td>
</tr>
<tr>
<td>Senior</td>
<td>167</td>
<td>219</td>
<td>243</td>
</tr>
<tr>
<td>Adult</td>
<td>234</td>
<td>313</td>
<td>307</td>
</tr>
</tbody>
</table>

B. How many more adult tickets were sold on a Saturday than on a Friday?

Saturday – Friday

\[(165 + 219 + 313) - (97 + 167 + 234)\]

\[697 - 498 = 199\]

199 more tickets were sold on Saturday than on Friday.

C. Tickets prices are $10 for adults, $7 for seniors, and $5 for children. Determine the total dollar sales for the six performances. Use mathematics to explain how you determined your answer.

Adults: \(10(234 + 313 + 307)\)  
Seniors: \(7(167 + 219 + 243)\)  
Child: \(5(97 + 165 + 160)\)

\[10(854) = 8540\]  
\[7(629) = 4403\]  
\[5(422) = 2110\]

Totals: \$8540 + \$4403 + \$2110 = \$15053\

The ticket sales for all 6 performances amounted to \$15053.00. In order to determine my answer, I used the 3x3 matrix that I created for part A. I added the total number of tickets sold for each group (for Fri, Sat & Sun). Then I multiplied that number by the cost of the ticket. Last, I added the total sales for all three groups.
Lesson 7: Using Formulas

1. Jessica bought a cylindrical container to store a friend’s birthday present. The container has a height of 12 inches and the area of the base is 25 square inches. Find the volume of the cylinder.

The volume formula for a cylinder is:
Volume = Area of the base • height

### Area of the base = 25 in\(^2\)  Height = 12 in

\[
V = 25 \text{ in}^2 \cdot 12 \text{ in}
\]

Substitute 25 for area of the base and 12 for the height

\[
V = 300 \text{ in}^3
\]

Simplify

2. Your medical insurance policy requires you to pay the first $100 on hospital expenses. The insurance company then pays 80% of the remaining expenses. The amount you must pay can be calculated using the formula, \(C = 0.2(t-100) + 100\), where \(C\) represents your cost and \(t\) is the total hospital bill. Use the formula to calculate your expense for a hospital bill of $5000.

\[
C = 0.2(t-100) + 100
\]

Substitute 5000 for \(t\)

\[
C = 0.2(5000 -100) +100
\]

Simplify within the parenthesis first.

\[
C = 0.2(4900) + 100
\]

\[
C = 980 + 100
\]

\[
0.2(4900) = 980
\]

\[
C = 1080
\]

Simplify: 980 + 100 = 1080

The cost would be $1080 on the hospital bill of $5000.
3. The sum, s of the measures of interior angles of a polygon is equal to: \( s = 180(n-2) \), where \( n \) is the number of sides.

Find the sum of the interior angles of a hexagon.

Find the sum of the interior angles of an octagon.

\[
\begin{align*}
S &= 180(n-2) \\
S &= 180(6-2) && \text{A hexagon has 6 sides.} \\
S &= 180(4) \\
S &= 720 \\
&= 720° \\
&= \text{The sum of the interior angles of a hexagon is } 720°
\end{align*}
\]

\[
\begin{align*}
S &= 180(n-2) \\
S &= 180(8-2) && \text{An octagon has 8 sides} \\
S &= 180(6) \\
S &= 1080 \\
&= \text{The sum of the interior angles of an octagon is } 1080°.
\end{align*}
\]

4. Use the formula: \( F = \frac{9}{5}C + 32 \) to convert 35 degrees Celsius to Fahrenheit.

\( F \) = Fahrenheit temperature and \( C \) = Celsius temperature.

\[
\begin{align*}
F &= \frac{9}{5}C + 32 \\
F &= \frac{9}{5}(35) + 32 && \text{Substitute 35 for } C \\
F &= 95
\end{align*}
\]

35 degrees Celsius is equivalent to 95 degrees Fahrenheit.
5. You made a cone for part of a science fair project. If the cone has a height of 2 feet and the area of the base is 150 ft$^2$, determine the volume of the cone.

The volume formula for a cone is:

$$V = \frac{1}{3} \cdot \text{area of the base} \cdot \text{height}$$

Area of the base = 150 ft$^2$  
Height = 2 ft

$$V = \frac{1}{3} \cdot 150 \text{ ft}^2 \cdot 2 \text{ ft}$$

$$V = 100 \text{ ft}^3$$

The volume of the cone is 100 ft$^3$.

6. The formula, $I = \text{prt}$ is used to calculate simple interest ($p$ is the principal amount deposited, $r$ is the annual rate, and $t$ is the time in years). Find the interest on $18000 deposited for 2.5 years at an annual rate of 4.7%.

$$I = \text{prt}$$

$I = 18000(.047)(2.5)$  
Substitute 18000 for $p$; change 4.7% to a decimal and substitute for $r$; substitute 2.5 for $t$.  

$I = 2115$

The interest on $18000 at 4.7% for 2.5 years is $2115.$
7. Find the area and perimeter of the triangle.

Perimeter (Add all sides together)

\[ P = S_1 + S_2 + S_3 \]
\[ P = 8 \text{ cm} + 8 \text{ cm} + 8 \text{ cm} \]
\[ P = 24 \text{ cm} \]

The perimeter is 24 cm.

Area = \( \frac{1}{2}(\text{base} \cdot \text{height}) \)

\[ A = \frac{1}{2} \cdot 8\text{cm} \cdot 6.9 \text{ cm} \]
\[ A = 27.6 \text{ cm}^2 \]

The area is 27.6 cm²

8. You are using a cylinder to package a presentation for work. Find the volume of the cylinder.

Volume of a cylinder:

\[ V = \pi r^2 h \]
\[ \pi = 3.14 \quad r = 15 \text{ in} \quad h = 10.5 \text{ in} \]
\[ V = 3.14 \cdot (15 \text{ in})^2 \cdot 10.5 \text{ in} \]
\[ V = 7418.25 \text{ in}^3 \]

The volume of the cylinder is 7418.25 in³
Algebraic Expressions- Chapter Test – Answer Key

Part 1: For questions 1-8, circle the answer that best answers the problem. (1 Point each)

1. Simplify the following expression: \[3^2 - 4(-5) + 2(-5 + 4) - \frac{2}{2}\]

A. 26
B. -14
C. 33
D. 12.5

2. Evaluate the following expression for the given values:
\[3r - s^2 + rs - t\] for \(r = -2, s = 5, t = -4\)

A. -45
B. -25
C. -37
D. -17

3. Simplify: \[8(x + 2)\]

A. 8x + 2
B. 8x + 16
C. 16x
D. 10x
4. What will be the 6th term in the following pattern? 4, 9, 16, 25

A. 36  
B. 64  
C. 49  
D. 35

5. Simplify: $3(2x-5) - 4(2x+2)$

A. $-2x - 7$  
B. $2x - 23$  
C. $-2x - 3$  
D. $-2x - 23$

6. Determine the expression that makes the matrix true.

$$
\begin{bmatrix}
2x - y & 4x + 2y \\
3x + 2y & 3x - 3y
\end{bmatrix} + 
\begin{bmatrix}
x - y & 2x + 3y \\
? & 2x - 2y
\end{bmatrix} = 
\begin{bmatrix}
3x - 2y & 6x + 5y \\
5x & 5x - 5y
\end{bmatrix}
$$

A. $2x$  
B. $2x + 3y$  
C. $2x - 3y$  
D. $2x - 2y$
7. Lisa is ordering t-shirts for her cheerleading group. Use the table to determine the cost of 4 t-shirts.

<table>
<thead>
<tr>
<th>Cost</th>
<th>$11.00</th>
<th>?</th>
<th>$27.50</th>
<th>$33.00</th>
<th>$38.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of T-shirts</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

33.00 – 27.50 = 5.50 38.50-33 = 5.50

I found the pattern by finding the difference in prices. Since the difference (5.50) is consistent, I know that for each shirt, you add $5.50 more.

Each shirt costs $5.50.

5.50 • 4 = 22.00

A. $16.50
B. $22.00
C. $16.00
D. $22.50

8. The matrices show the number of students in each grade who participated in the summer math workshop for Algebra and Algebra 2.

Math Programs 2008

<table>
<thead>
<tr>
<th>Grade</th>
<th>8th grade</th>
<th>9th grade</th>
<th>10th grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>17</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>Algebra 2</td>
<td>32</td>
<td>15</td>
<td>8</td>
</tr>
</tbody>
</table>

Math Programs 2009

<table>
<thead>
<tr>
<th>Grade</th>
<th>8th grade</th>
<th>9th grade</th>
<th>10th grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>22</td>
<td>31</td>
<td>18</td>
</tr>
<tr>
<td>Algebra 2</td>
<td>18</td>
<td>24</td>
<td>10</td>
</tr>
</tbody>
</table>

How many more 9th grade students participated in the summer program for Algebra in 2009 than in 2008?

A. 9
B. 12
C. 19
D. 16

Alg 2009 (9th grade) – Alg 2008(9th grade)

31 – 12 = 19

19 more students participated in 9th grade Algebra in 2009 than in 2008.
Part 2: Solve each problem and circle your answer. (2 Points each)

9. Simplify the following expression: \( 4(x-3) - 2(x + 5) \)

\[
\begin{align*}
4(x-3) - 2(x + 5) &\quad \text{Distribute throughout both sets of parenthesis} \\
4x - 12 - 2x - 10 &\quad \text{Re-write like terms together} \\
2x - 22 &\quad \text{Combine like terms.} \\
\text{Answer: } 2x - 22
\end{align*}
\]

10. Find \( n \) in the table.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( \frac{2}{3}x + 4 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-9</td>
<td>-2</td>
</tr>
<tr>
<td>-6</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>( n )</td>
</tr>
</tbody>
</table>

\( \frac{2}{3}(12) + 4 \quad \text{Substitute 12 for } x \text{ and simplify.} \\
12 \|

\text{Answer: } n = 12

11. Evaluate the expression \( \frac{3x-y}{y} \) when \( x = -9 \) and \( y = 3 \)

\[
\begin{align*}
\frac{3x-y}{y} &\quad x = -9 \quad y = 3 \\
\frac{3(-9)-3}{3} &\quad \text{Substitute values for } x \text{ and } y \\
\frac{-30}{3} &\quad \text{Simplify.} \\
-10 &\quad \text{Answer: } -10
\end{align*}
\]
12. Given the pattern: 9, 14, 24, 44...

If the pattern continues, what will be the sum of the next two terms?

<table>
<thead>
<tr>
<th>9,</th>
<th>14,</th>
<th>24,</th>
<th>44...</th>
<th>84</th>
<th>164</th>
</tr>
</thead>
<tbody>
<tr>
<td>9×2 – 4 = 14</td>
<td>14×2 – 4 = 24</td>
<td>24×2 – 4 = 44</td>
<td>44×2 – 4 = 84</td>
<td>84×2 – 4 = 164</td>
<td></td>
</tr>
</tbody>
</table>

The pattern is n×2 – 4.

The next two numbers in the pattern are 84 and 164. The question asks for the sum of the next two terms, so

84 + 164 = 248.

Answer: 248

13. At Bowling Lanes, bowlers who average fewer than 200 get a handicap added to their score. The handicap, H, of a bowler with average, A, is found using the following formula:

\[ H = 0.8(200-A) \]

What is the handicap for a person who averages 165?

\[
\begin{align*}
H &= 0.8(200-A) & \text{Given Formula} & A = 165 \\
H &= 0.8(200-165) & \text{Substitute 165 for A} \\
H &= 0.8(35) & \text{Simplify: 200-165 = 35} \\
H &= 28 & \text{Simplify: 0.8(35) = 28}
\end{align*}
\]

The handicap of 28 will be added to a bowler's score.
Part 3: Short answer – Solve the following problems. **Make sure you answer every part of each question.**

14. The following display shows the number of ice cream cones sold at a fundraising event. (3 points)

<table>
<thead>
<tr>
<th></th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Dip</td>
<td>2 Dips</td>
</tr>
<tr>
<td>Chocolate</td>
<td>45</td>
<td>65</td>
</tr>
<tr>
<td>Vanilla</td>
<td>23</td>
<td>54</td>
</tr>
<tr>
<td>Strawberry</td>
<td>18</td>
<td>33</td>
</tr>
</tbody>
</table>

- Create a 3x2 matrix to show the total number of each kind of ice cream cone sold for Thursday and Friday.
- If 2 dipped ice creams cost $1.89, what is the total amount earned on 2 dipped ice creams by the fundraiser for Thursday and Friday? Explain how you determined your answer.

<table>
<thead>
<tr>
<th>Total Ice cream cones sold</th>
<th>1 Dip</th>
<th>2 Dips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate</td>
<td>66</td>
<td>108</td>
</tr>
<tr>
<td>Vanilla</td>
<td>59</td>
<td>96</td>
</tr>
<tr>
<td>Strawberry</td>
<td>30</td>
<td>88</td>
</tr>
</tbody>
</table>

\[
108 + 96 + 88 = 292
\]

\[
292 \times 1.89 = 551.88
\]

The total amount earned on 2 dipped ice creams was $551.88.

First I added the number of 2 dips for chocolate, vanilla, and strawberry.

- Chocolate – 108
- Vanilla -  96
- Strawberry -  88
- Total -  292

Then I multiplied the total (292) by the price of $1.89.

\[
292 \times 1.89 = 551.88
\]

Therefore, they earned a total of $551.88 on the sales of 2 dipped ice cream cones.
15. John is creating a unique quadrilateral for a geometry project. The shape will be irregular with all sides and angles different measures. (4 points)

- The sum, $s$ of the measures of interior angles of a polygon is equal to: $s = 180(n-2)$,
- Where $n$ is the number of sides. Find the sum of the interior angles of John’s quadrilateral.
- If the measures of three angles are $80^\circ$, $50^\circ$, and $90^\circ$, find the degree measure of the fourth angle. Explain how you determined your answer.
- If John decided to build a hexagon instead of a quadrilateral, how would the sum of the measures differ? Explain how you determined your answer.

A quadrilateral is a shape that has 4 sides.

\[ S = 180(n-2) \]

\[ S = 180(4-2) \quad \text{Substitute 4 for } n \text{ since } n \text{ is the number of sides.} \]

\[ S = 180(2) \quad \text{Simplify } (4-2 = 2) \]

\[ S = 360 \]

The sum of the interior angles of John’s quadrilateral is $360^\circ$. (This means that when you add the 4 angle measures together, they will equal $360^\circ$.)

The measures of three of the angles are $80 + 50 + 90 = 220$. The fourth angle must be the difference of 360 and 220. $(360-220 = 140)$

The fourth angle must be $140^\circ$. We know the total of the 3 known angles is $220^\circ$. $(80+50+90 = 220)$ Since the angles must add up to 360, we can subtract 360-220 to find the missing angle measure. $(360-220 = 140)$

A hexagon has 6 sides. Therefore, the sum of the angles would be $720^\circ$.

We would need to use the formula to find the sum of the angles of a hexagon.

\[ S = 180(n-2) \quad \text{Given Formula} \]

\[ S = 180(6-2) \quad \text{Substitute 6 for } n \text{ since a hexagon has 6 sides.} \]

\[ S = 720 \quad \text{Simplify.} \]
Thank you for downloading Algebra Class – Algebraic Expressions Unit. I hope that you were able to better understand the basics of Algebra in order to prepare for Algebra 1.

When you are ready to start studying Algebra 1, make sure you get a copy of Algebra Class: Equations and Inequalities. This 500 page e-book and video tutorial set contains lessons for the following units:

1. Solving Equations
2. Graphing Equations
3. Writing Equations
4. Systems of Equations
5. Inequalities

This set follows the same format as this Algebraic Expressions Unit. The e-book is over 500 pages long. But don’t be intimidated, typing all the steps to every problem in the answer keys takes up a lot of room! Plus don’t miss out on the video tutorials for every lesson!

If you have any questions or comments, please contact me via Algebra-class.com.

Best of luck in your studies,

Karin Hutchinson