Part A – Basic Operations with Integers

INTEGER: A whole number that can be either positive or negative.
    ie. –2, -1, 0, 1, 2

Adding Integers

• If the signs are the same, add the numbers and keep the same sign.

Example #1

(a) (+6) + (+9) =  
(b) (–5) + (–3) =

• If the signs are different, subtract the numbers and keep the sign of the largest number.

Example #2

(a) (+7) + (–2) =  
(b) (–6) + (+3) =

Subtracting Integers

• Add the opposite sign (then follow addition rules)

Example #3

(a) (5) – (–3) =  
(b) (–6) – (+2) =

Multiplication and Division

Positive Number × or ÷ Positive Number = _________________________
Positive Number × or ÷ Negative Number = _________________________
Negative Number × or ÷ Negative Number = _________________________

Example #4

(a) (4) × (7) =  
(b) (6) × (–3) =
(c) (–28) ÷ (+7) =  
(d) (–18) ÷ (–6) =

Name: ____________________
Order of Operations

B ________  E _________  D _________  M ___________ A __________ S ______________

Steps:
-Brackets first
-Do division and multiplication in the order they appear from left to right
-Do addition and subtraction in the order they appear from left to right

Example #5

(a) 7 \times (9 - 6) + 6 =  
(b) 75 \div (9 - 12) - 13 \times 2 =

Part A Assignment

1. Perform the indicated operations with the following integers.

   (a) 3 + 9 =  
   (b) 3 + (-9) =  
   (c) -3 + 9 =  
   (d) -3 + (-9) =  
   (e) 2 - 7 =  
   (f) -2 - 7 =  
   (g) -2 - (-7) =  
   (h) 2 \times (-7) =  
   (i) (-65) + (+5) =

2. Calculate the following.

   (a) -24 \times 4 + 3 =  
   (b) -16 + 2 \times 3 =  
   (c) 16 + 4 + (-2) =  
   (d) 5 + 8 \times 2 - 7 =  
   (e) -7 \times 3 - 5 + 4 =  
   (f) 3 \times (-8) - 5 + 4 =

   (g) 13 + 28 + 4 \times 7 =  
   (h) -42 \times 3 + 14 - 6 =  
   (i) (64 - 8) + 4 =

   (j) 68 - 2(16 + 4) + 10 + 2 - 15 =  
   (k) 44 + \frac{44 + 11}{5} - 21 + 2(6 - 4) =
**Part B – Fractions**

- The top of the fraction is called the _______________.  \[\frac{1}{2}\]
- The bottom of the fraction is called the _____________.  \[\frac{1}{2}\]
- In general, we express fractions in ____________ form.  \[\text{i.e. } \frac{9}{27} \text{ should be written as } \frac{1}{3}\]
- \[\frac{3}{2}\] is an example of a ____________ fraction and is NOT commonly used in high school math. Instead, we express the fraction as an ____________fraction.  \[\text{i.e. } \frac{7}{2}\]
- \[\frac{0}{any\ number}\] is equal to ____ and \[\frac{any\ number}{0}\] is ____________________.
- \[\frac{3}{2}\] is the ____________ of \[\frac{2}{3}\].

**Adding and Subtracting Fractions**

When adding or subtracting fractions:
1. Find the lowest common denominator.
2. Rewrite each fraction with this new denominator.
3. Once the denominators are common, add or subtract the numerators and put the new number over the denominator.
   **Remember to reduce to lowest terms**

**Example #1**

(a) \[\frac{3}{5} + \frac{4}{5}\]  
(b) \[\frac{3}{5} - \frac{2}{5}\]  
(c) \[\frac{5}{6} - \frac{1}{3}\]  
(d) \[3\frac{2}{3} - 1\frac{3}{5}\]

**Multiplying Fractions**

When multiplying fractions:
1. Multiply the numerators
2. Multiply the denominators
3. Always reduce the fraction to its simplest form.

**Example #2**

(a) \[\frac{3}{5} \times \frac{5}{8} = \]

(b) \[\frac{7}{10} \times \frac{2}{3} = \]
Dividing Fractions

When dividing fractions:
1. Change the operation to multiplication.
2. Write the second fraction as its reciprocal (flipped over).
3. Multiply and reduce.

Example #3

(a) \( \frac{3}{4} \div \frac{5}{7} = \)  

(b) \( \frac{6}{10} \div \frac{9}{12} = \)  

Part B Assignment

1. Simplify. Express all answers in simplest form.

   (a) \( \frac{3}{7} + \frac{2}{7} = \)  
   (b) \( \frac{4}{9} - \frac{1}{4} = \)  
   (c) \( \frac{3}{7} + \frac{4}{21} = \)  

   (d) \( \frac{35}{36} - \frac{5}{18} - \frac{1}{3} = \)  
   (e) \( \frac{3}{5} + \frac{1}{8} + \frac{1}{10} = \)  
   (f) \( 5\frac{2}{3} - 1\frac{3}{4} = \)  

2. Simplify the following.

   (a) \( \frac{5}{8} \times \frac{3}{7} = \)  
   (b) \( \frac{4}{7} + \frac{2}{3} = \)  
   (c) \( \frac{3}{4} \times \frac{5}{6} \times \frac{8}{9} \times \frac{5}{12} = \)  

   (d) \( \frac{2}{3} + \frac{-2}{3} = \)  
   (e) \( \frac{8}{9} \times 3 = \)  
   (f) \( \frac{5}{6} + \frac{13}{16} = \)  

   (g) \( 2\frac{1}{3} \times 1\frac{3}{7} = \)  
   (h) \( \frac{3}{5} \div \frac{4}{5} + 6 = \)  
   (i) \( \frac{5}{8} \div \frac{7}{9} = \)
Part C – Working with Algebraic Expressions and Equations

An expression is a meaningful collection of numbers, variables, and signs, positive or negative, of operations that must make mathematical and logical sense.

Expressions:
• contain any number of algebraic terms
• use signs of operation—addition, subtraction, multiplication, and division.
• do not contain an equality sign (=)

An equation is a mathematical statement that two expressions are equal (must have an equal sign).

Evaluating Expressions

Example #1

Evaluate the following expressions for the given variables.

(a) \(2x^2 - 5y + 3; x = -2, y = -3\)  
(b) \(\frac{2a - b}{10c}; a = -1, b = 3, c = -2\)

Example #2

Solve for the variable in the following equations. Check your answer.

(a) \(k + 12 = 4\) Check:  
(b) \(3x + 2 = 4\) Check:

(c) \(3(y + 1) = 12 - 5(y - 3)\)  
(d) \(5 = \frac{p}{2} + 1\)
Part C Assignment

1. Evaluate the following expressions for the given variables.

(a) \(\frac{E+F}{EF}; \ E = -4, \ F = 2\)

(b) \(t = a \times r^{n-1}; \ a = 4, \ r = -2, \ n = 4\)

(c) \(A = \frac{1}{2}ab; \ a = 4\frac{1}{2}, \ b = 1\frac{1}{3}\)

2. Solve for the following unknown variables. Check your answer.

(a) \(\frac{k}{4} = 20\) 
(b) \(2k = 18\)

(c) \(5t + 9 = 3t - 21\) 
(d) \(2(x - 1) + 5 = 13\)

(e) \(3m - 2 + 4(m - 1) = 8\) 
(f) \(\frac{1}{2}x + 2 = 5\)

(g) \(3(2x + 1) = 9(x - 1)\) 
(h) \(\frac{36}{-x} = 4\)
Skills Review

1. Evaluate

(a) \( 40 + 27 + 3 - 15 \)
(b) \( 5 + 18 - 6 \times 2 + 4 \)

(c) \( 24 + (12 - 4) + \frac{4}{6} - \left( \frac{5 \times 2}{15} \right) \)
(d) \( \frac{14 + 6 - 9 \times 2}{(15 - 6) + (14 - 11)} \)

2. Evaluate

(a) \( \frac{3}{8} + \frac{5}{8} \)
(b) \( \frac{3}{5} - \frac{2}{3} \)
(c) \( \frac{3}{4} + \frac{1}{3} \)

(d) \( 5\frac{2}{3} - 2\frac{1}{4} \)
(e) \( \frac{2}{5} \times \frac{5}{3} \)
(f) \( \frac{8}{9} \times 3 \)

(g) \( 48 + \frac{16}{13} \)
(h) \( \frac{2}{3} + \frac{5}{2} + \frac{1}{30} \)

(i) \( \frac{5}{12} - \frac{1}{6} + 2 \)
(j) \( \left( \frac{1}{2} + \frac{3}{7} \right) \times \frac{4}{5} + \frac{4}{7} \)

3. Solve the following equations.

(a) \( x + 5 = 25 \)
(b) \( 2p = 6 \)
(c) \( \frac{3z}{2} = 9 \)
(d) \[3x + 4 = 10\]  
(e) \[m + 8 = 3(m - 4)\]

(f) \[4b - 10 = 6b + 58\]  
(g) \[-4x + 6 = -3(x + 5)\]

**Part A Answer Key**

1. (a) 12 \hspace{1cm} (b) –6 \hspace{1cm} (c) +6 \hspace{1cm} (d) –12 \hspace{1cm} (e) –5 \hspace{1cm} (f) –9 \hspace{1cm} (g) +5 \hspace{1cm} (h) –14 \hspace{1cm} (i) –13

2. (a) –32 \hspace{1cm} (b) –24 \hspace{1cm} (c) 14 \hspace{1cm} (d) 14 \hspace{1cm} (e) –22 \hspace{1cm} (f) –25 \hspace{1cm} (g) 62 \hspace{1cm} (h) –15 \hspace{1cm} (i) 14 \hspace{1cm} (j) 50 \hspace{1cm} (k) 38

**Part B Answer Key**

1. (a) \[\frac{5}{7}\] \hspace{1cm} (b) \[\frac{7}{36}\] \hspace{1cm} (c) \[\frac{13}{21}\] \hspace{1cm} (d) \[\frac{13}{36}\] \hspace{1cm} (e) \[\frac{33}{40}\] \hspace{1cm} (f) \[\frac{47}{12}\]

2. (a) \[\frac{15}{56}\] \hspace{1cm} (b) \[\frac{6}{7}\] \hspace{1cm} (c) \[\frac{25}{108}\] \hspace{1cm} (d) –1 \hspace{1cm} (e) \[\frac{8}{3}\]

(f) \[\frac{40}{39}\] \hspace{1cm} (g) \[\frac{10}{3}\] \hspace{1cm} (h) \[\frac{1}{8}\] \hspace{1cm} (i) \[\frac{27}{8}\]

**Part C Answer Key**

1. (a) \[\frac{1}{4}\] \hspace{1cm} (b) –32 \hspace{1cm} (c) 3

2. (a) \[k = 80\] \hspace{1cm} (b) \[k = 9\] \hspace{1cm} (c) \[t = −15\] \hspace{1cm} (d) \[x = 5\] \hspace{1cm} (e) \[m = 2\] \hspace{1cm} (f) \[x = 6\] \hspace{1cm} (g) \[x = 4\] \hspace{1cm} (h) \[x = −9\]

**Skills Unit Review Answer Key**

1. (a) 34 \hspace{1cm} (b) 20 \hspace{1cm} (c) 3 \hspace{1cm} (d) \[\frac{2}{3}\]

2. (a) 1 \hspace{1cm} (b) \[\frac{1}{15}\] \hspace{1cm} (c) \[\frac{49}{12}\] \hspace{1cm} (d) \[\frac{41}{12}\] \hspace{1cm} (e) \[\frac{2}{3}\] \hspace{1cm} (f) \[\frac{8}{3}\] \hspace{1cm} (g) 39 \hspace{1cm} (h) \[\frac{3}{10}\] \hspace{1cm} (i) \[\frac{1}{3}\] \hspace{1cm} (j) \[\frac{13}{10}\]

3. (a) \[x = 20\] \hspace{1cm} (b) \[p = 3\] \hspace{1cm} (c) \[z = 6\] \hspace{1cm} (d) \[x = 2\] \hspace{1cm} (e) \[m = 10\] \hspace{1cm} (f) \[b = −34\] \hspace{1cm} (g) \[x = 21\]

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