Study the following.

× times symbol. This shows multiplication.
Example: 4×5 means you multiply 4 times 5.

÷ divided by symbol. This shows division.
Example: $10 \div 2$ means you take 10 divided by 2.

— fraction line.

1. shows division.

Example: $\frac{20}{5}$ means 20 divided by 5

2. shows a fraction

Example: $\frac{2}{7}$ means the fraction two sevenths

( ) parentheses.

1. These show multiplication when next to other parentheses or when next to a number.
   Examples: (4)(5) means 4 times 5
   3 (7) means 3 times 7

2. They can be used to more clearly show a positive or negative integer together with its sign.
   Examples: (-2) means negative 2
   (+9) means positive 9

3. parentheses group numbers and/or symbols.
   Examples: (4 + 5)
   2(3 + 5 – 1)

Write each definition in your own words.

×

÷

— (definition 1)

— (definition 2)

( ) (definition 1)

( ) (definition 2)

( ) (definition 3)

Write three examples of each.

×

÷

— (definition 1)

— (definition 2)

( ) (definition 1)

( ) (definition 2)

( ) (definition 3)

Study the following.

More examples of parentheses showing multiplication.

(2)(3)
(2)3
2(3) these all mean two times three.

2(-3) means two **times** negative three
(it does **not** mean 2 minus 3.)
-3(2)
(-3)(2)
(-3)2 these all mean negative three **times** two

Notice above that two parentheses touching, or a number touching a parentheses, shows times.

More examples of parentheses being used to more clearly show a positive or negative integer together with its sign.

(-1) means negative one
(+2) means positive two

4 + +1 can be written 4 + (+1)
10 – +2 can be written 10 – (+2)
+6 + +2 can be written (+6) + (+2) these are all addition or
-4 + -3 can be written (-4) + (-3) subtraction problems.

Examples of multiplication problems using the × symbol and also having parentheses to show a positive or negative integer together with its sign.

5 × (-2)
(-3) × 6
(-2)×(-7)
(+5) × 9 these are all multiplication problems.

Put an x in the correct column.

	Multiplication problem.	Addition or subtraction problem.
1. (2)(-4) 2. (-1) + (-2) 3. 8 × (-5) 4. 5 + (-3) 5. 9(-3) 6. (-3)2 7. 4 – (+6) 8. (5)(5) 9. (-4) × 3 10. (-8)+4		

Study the following.

Rules for multiplying integers.

Rule 1. A positive integer times a positive integer equals a positive integer.

Rule 2. A positive integer times a negative integer equals a negative integer.

Rule 3. A negative integer times a negative integer equals a positive integer.

Examples: $2 \times 3 = 6$ (positive 6) $(4)(5) = 20$

$2 \times (-3) = -6$ $(4)(-5) = -20$

$(-2) \times (-3) = 6$ $(-4)(-5) = 20$

Write three examples for each rule above.

Rule 1

Rule 2

Rule 3

Fill in the blanks.

Rule 1. A _____ integer times a _____ integer equals a _____ integer.

Rule 2. A _____ integer times a _____ integer equals a _____ integer.

Rule 3. A _____ integer times a _____ integer equals a _____ integer.

Solve.

1. $2(-6) =$

2. $(-3)(-3) =$

3. $4(-1) =$

4. $5 \times 5 =$

5. $(-4)8 =$

6. $(-4)\times 2 =$

7. $(-5)(-5) =$

8. $(-4)\times(-1) =$

9. $-8 \times 5 =$

10. $3 \times (-2) =$

Study the following.

When multiplying more than two numbers, multiply two at a time.

Example:	(4)(-3)(2)	
	(-12)(2)	first multiply (4) times (-3) to get (-12)
	(-24)	next multiply (-12) times (2) to get (-24)

(-2)(-2)(-2)(-2)	
(4)(-2)(-2)	first multiply (-2)(-2) to get (4)
(-8)(-2)	next multiply (4)(-2) to get (-8)
(16)	next multiply (-8)(-2) to get (16)

Solve.

1. (-3)(2)(5) =

2. (-1)(-1)(-1)(-1) =

3. (3)(-3)(-3) =

4. (-2)(-5)(-2) =

Study the following.

It doesn't matter which order you multiply in. You can pick any two to multiply first.

Example:	$1 \times 2 \times 3$	
	1×6	first multiply 2×3
	7	next multiply 1×6

Solve two different ways.

1. $2 \times 5 \times 6 =$

2. (-3)(2)(-10) =

Study the following.

Keep the parentheses around the results of the multiplication. This is to keep showing that we are multiplying and not subtracting.

Example: (-2)(-3)(4)

(-2)(-12)	first multiply the (-3) times (4) to get (-12)
(24)	next multiply (-2)(-12) to get (24)
	without the parentheses you get (-2)-12 which is subtraction. This is not correct.
24	the parentheses can be removed from the final answer.

Solve.

1. $6 \times (-3) \times (-2) =$

2. $(-4)(4)(-1) =$

3. $5(-9)(-1)(-1) =$

4. $(-2)(-1)(-2)(-1)(-2) =$

5. $(1)(-1)(5)(-5) =$

Study the following.

The rules for dividing integers are the same as the rules for multiplying integers.

Rules for dividing integers.

Rule 1. A positive integer divided by a positive integer equals a positive integer.

Rule 2. A positive integer divided by a negative integer equals a negative integer. And a negative integer divided by a positive integer is a negative integer.

Rule 3. A negative integer divided by a negative integer equals a positive integer.

Examples: $12 \div 3 = 4$ (positive 4)

$10 \div (-5) = -2$

$-8 \div 4 = -2$

$(-18) \div (-3) = 6$

$\left(\frac{30}{5}\right) = 6$

$\frac{-45}{9} = -5$ $\qquad$ $\frac{45}{(-9)} = -5$

$\frac{-60}{-6} = 10$

Write three examples for each rule above using the ÷ symbol.

Rule 1

Rule 2 (first sentence)

Rule 2 (second sentence)

Rule 3

Write three examples for each rule above using the fraction line symbol. (fraction line symbol —)

Rule 1

Rule 2 (first sentence)

Rule 2 (second sentence)

Rule 3

Fill in the blanks.

Rule 1. A _____ integer divided by a _____ integer equals a _____ integer.

Rule 2. A _____ integer divided by a _____ integer equals a _____ integer. And a _____ integer divided by a _____ integer equals a _____ integer.

Rule 3. A _____ integer divided by a _____ integer equals a _____ integer.

Solve.

1. $36 \div (-6) =$

2. $(-3) \div (-3) =$

3. $4 \div (-1) =$

4. $5 \div 5 =$

5. $(-24) \div 8 =$

6. $\dfrac{(-4)}{(-2)} =$

7. $\dfrac{-21}{7} =$

8. $\dfrac{24}{-3} =$

9. $\dfrac{4}{2} =$

10. $\dfrac{(-16)}{-8} =$

Study the following.

Here is an abbreviation of the rules for multiplying or dividing integers.

1. plus × plus = plus
2. plus × minus = minus
3. minus × minus = plus

and the same is true for division.

Memorize the three rules above.

Without looking above, write the three rules.

1.

2.

3.

Study the following.

Simplifying the signs on fractions.

The above three rules are used when simplifying the signs on fractions.

Examples: $\frac{-2}{-5}$ minus ÷ minus = plus so you get $+\frac{2}{5}$

$\frac{-2}{5}$ minus ÷ plus = minus so you get $-\frac{2}{5}$

Note: The positive or negative sign is written <u>in front</u> of the fraction when it is simplified.

$\frac{2}{-5}$ plus ÷ minus = minus so you get $-\frac{2}{5}$

Simplify.

1. $\frac{4}{-5} =$

2. $\frac{-1}{-8} =$

3. $\frac{-5}{7} =$

4. $\frac{2}{-3} =$

5. $\frac{(-6)}{(-11)} =$

6. $\frac{-1}{12} =$

7. $\frac{9}{-13} =$

8. $\frac{(-4)}{-17} =$

Study the following.

More simplifying signs of fractions.

Sometimes fractions have a minus sign in front, and negative integers in the fraction. To simplify apply the rules to any two signs at a time until you have one final sign.

Example 1: $-\frac{-1}{-2}$

$-\frac{-1}{-2}$ minus ÷ minus = plus

$-\frac{1}{2}$ minus × plus = minus

$-\frac{1}{2}$ is the simplified fraction

or solve it this way

$-\frac{-1}{-2}$

$-\frac{-1}{-2}$ minus × minus = plus

$\frac{+1}{-2}$ plus ÷ minus = minus

$-\frac{1}{2}$ is the simplified fraction

Example 2: $-\frac{1}{-3}$ Note: the 1 is really +1

$-\frac{+1}{-3}$ plus ÷ minus = minus

$-\,-\frac{1}{3}$ minus × minus = plus

$+\frac{1}{3}$ is the simplified fraction.

or solve it this way

$-\frac{+1}{-3}$

$-\frac{+1}{-3}$ minus × minus = plus

$\frac{+1}{+3}$ plus ÷ plus = plus

$+\frac{1}{3}$ is the simplified fraction

Simplify.

1. $-\frac{(-4)}{(7)} =$

2. $-\frac{(+5)}{-6} =$

3. $-\frac{(-7)}{(-8)} =$

4. $+ \frac{(-2)}{(-9)} =$

5. $- \frac{6}{-13} =$

6. $- \frac{+3}{-8} =$

7. $- \frac{+4}{+7} =$

8. $- \frac{-8}{-17} =$

9. $+ \frac{-3}{19} =$

Solve.

1. $- \frac{-10}{-2} = \frac{10}{-2} = -5$

2. $- \frac{6}{-2} =$

3. $+ \frac{(-16)}{8} =$

4. $- \frac{(-25)}{+5}$

5. $- \frac{(-30)}{-6}$

Study the following.

Integers with exponents.

Exponents mean the number of times another number is multiplied by itself.

Examples: $2^3 = 2 \times 2 \times 2 = 8$
$3^2 = (3)(3) = 9$

When simplifying exponent problems with integers, be sure to include the negative sign in your multiplication step.

Examples: $(-2)^3 = (-2)(-2)(-2) = -8$
$(-3)^2 = (-3)(-3) = 9$
$(-4)^3 = (-4)(-4)(-4) = -64$

Simplify. Show the multiplication step.

1. $(-2)^5 =$

2. $(-5)^2 =$

3. $(-1)^6 =$

4. $(-1)^5 =$

5. $(4)^2 =$

6. $(-6)^2 =$

7. $(-3)^3 =$

8. $(-1)^3 =$

Review of Multiplying Integers, Dividing Integers, and taking exponents of integers.

Solve.

1. $48 \div (-6) =$	11. $10 \times (-10) =$
2. $(-4)(-4) =$	12. $\frac{(-14)}{(-7)} =$
3. $6(-2) =$	13. $-3 \times 9 =$
4. $(-15) \div (-3) =$	14. $+ \frac{-33}{-11} =$
5. $(-2)^4 =$	15. $(4)(-5)(-1) =$
6. $\frac{-9}{3} =$	16. $6 \div (-3) =$
7. $(-1)(-1)(-1) =$	17. $\frac{28}{-7} =$
8. $(-3)^3 =$	18. $- \frac{+12}{-3} =$
9. $_ \frac{-14}{7} =$	19. $(-4)^2 =$
10. $_ \frac{(-27)}{(-9)} =$	20. $-7 \times 5 =$

Review of Integers. Includes addition, subtraction, multiplication division and exponents.

Solve

1. $8 - 9 =$	12. $\frac{(-15)}{-3} =$
2. $6 - -2 =$	13. $(-2)(-2)(-2)(-2) =$
3. $(7)(-2) =$	14. $+4 - +6 =$
4. $4 \div (-2) =$	15. $9 + (-4) =$
5. $10 - 3 =$	16. $(-7) \times (-1) =$
6. $(-2) + (-6) =$	17. $(-1)^5 =$
7. $-3 \times 3 =$	18. $-3 \times (-2) =$
8. $-\frac{-10}{2} =$	19. $-\frac{4}{-2} =$
9. $-3 - (-3) =$	20. $(-2)^2 =$
10. $(-3)^3 =$	21. $-3 + 10 =$
11. $-\frac{(-8)}{(-4)} =$	22. $-9 + 2 =$