×	times symbol. This shows multiplication. Example: $4 \times 5$ 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.

 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

- 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.

×

÷

Tutor's Pal Book 7

- (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)

More examples of parentheses showing multiplication.

(2)(3)	
(2)3	
2(3)	these all mean two times three.
2(-3)	means two <b>times</b> negative three
	(it does <b>not</b> 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  $\times$  symbol and also having parentheses to show a positive or negative integer together with its sign.

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

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

#### Put an x in the correct column.

#### 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) × (-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.	_ integer times a	_ integer equals a

- 1. 2(-6) =
- 2. (-3)(-3) =
- 3. 4(-1) =
- 4.  $5 \times 5 =$
- 5. (-4)8 =
- 6. (-4)×2 =
- 7. (-5)(-5) =
- 8. (-4)×(-1) =
- 9.  $-8 \times 5 =$
- 10.  $3 \times (-2) =$

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

Example:	(4)(-3)(2) (-12)(2) (-24)	first multiply (4) times (-3) to get (-12) next multiply (-12) times (2) to get (-24)
	(-2)(-2)(-2)(-2) (4)(-2)(-2) (-8)(-2) (16)	first multiply $(-2)(-2)$ to get $(4)$ next multiply $(4)(-2)$ to get $(-8)$ 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:	$1 \times 2 \times 3$		
	$1 \times 6$	first multiply $2 \times 3$	
	7	next multiply $1 \times 6$	

### Solve two different ways.

- 1.  $2 \times 5 \times 6 =$
- 2. (-3)(2)(-10) =

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.

- 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) =

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  
$$\frac{(30)}{5} = 6$$
  
$$\frac{-45}{9} = -5$$
  
$$\frac{45}{(-9)} = -5$$
  
$$\frac{-60}{-6} = 10$$

#### 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

Rule 2. A \_\_\_\_\_ integer divided by a \_\_\_\_\_ integer equals a \_\_\_\_\_ integer equals a \_\_\_\_\_ integer divided by a \_\_\_\_\_ integer equals a \_\_\_\_\_ integer.

Rule 3. A \_\_\_\_\_ integer divided by a \_\_\_\_\_ integer equals a \_\_\_\_\_\_

- 1.  $36 \div (-6) =$
- 2.  $(-3) \div (-3) =$
- 3.  $4 \div (-1) =$
- 4.  $5 \div 5 =$
- 5.  $(-24) \div 8 =$
- $6. \qquad \underline{(-4)}_{(-2)} =$
- 7.  $\frac{-21}{7} =$
- 8.  $\frac{24}{-3} =$
- 9.  $\frac{4}{2} =$
- 10. (-16) = -8

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

- 1.  $plus \times plus = plus$
- 2.  $plus \times minus = minus$
- 3. minus  $\times$  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  $\div$  minus = plus so you get  $+\frac{2}{5}$  $\frac{-2}{5}$  minus  $\div$  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  $\frac{2}{5}$ 

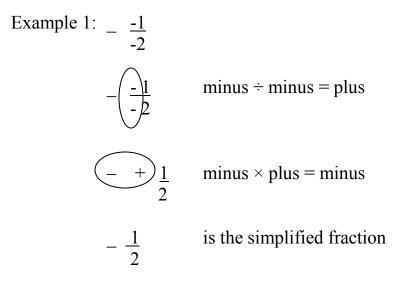
# Simplify.

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. 9 =

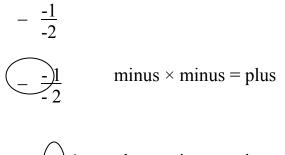
8. 
$$(-4) = -17$$

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.



or solve it this way





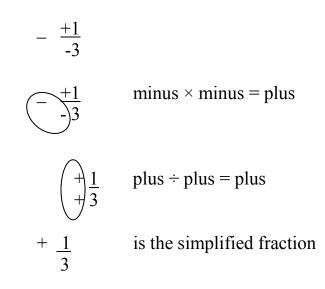
plus ÷ minus = minus

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

is the simplified fraction

Example 2:  $-\frac{1}{-3}$  Note: the 1 is really +1  $-\left(\frac{+1}{-3}\right)$  plus  $\div$  minus = minus  $\left(-\frac{-1}{3}\right)$  minus  $\times$  minus = plus  $+\frac{1}{3}$  is the simplified fraction.

or solve it this way



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

1. 
$$-\frac{-10}{-2} = \frac{10}{-2} = -5$$
  
2.  $-\frac{6}{-2} =$   
3.  $+\frac{(-16)}{8} =$   
4.  $-\frac{(-25)}{+5}$   
5.  $-\frac{(-30)}{-6}$ 

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.

1. $48 \div (-6) =$	11. 10 × (-10) =
2. (-4)(-4) =	12. $\frac{(-14)}{(-7)} =$
3. 6(-2) =	133 × 9 =
4. (-15) ÷ (-3) =	$14. + \frac{-33}{-11} =$
5. $(-2)^4 =$	
6. $\frac{-9}{3} =$	15. (4)(-5)(-1) =
5	16. 6÷(-3) =
7. (-1)(-1)(-1) =	17. $\frac{28}{-7} =$
8. $(-3)^3 =$	- /
9. $-\frac{-14}{7} =$	18. $-\frac{+12}{-3} =$
	19. $(-4)^2 =$ 20. $-7 \times 5 =$
$10. \ \underline{(-27)}_{(-9)} =$	20. $-7 \times 5 =$

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

1. 8 – 9 =	12. $(-15) = -3$
2. 62 =	13. (-2)(-2)(-2)(-2) =
3. (7)(-2) =	14. +4 - +6 =
4. $4 \div (-2) =$	14. $+4 - +6 =$ 15. $9 + (-4) =$ 16. $(-7) \times (-1) =$
5. 10 – 3 =	16. (-7) × (-1) =
6. (-2) + (-6) =	17. $(-1)^5 =$
7. $-3 \times 3 =$	183 × (-2) =
$8\frac{-10}{2} =$	19. $-\frac{4}{-2} =$
9. $-3 - (-3) =$	20. $(-2)^2 =$
10. $(-3)^3 =$	213 + 10 =
$11 \frac{(-8)}{(-4)} =$	229 + 2 =