Objective Using Multiplying and Dividing Integers

Warm-Up

Determine each sum.

1. $-3 + 8 + (-2)$

2. $5 - 16 + 7 + (-1)$

Analyze the sequence of products with 4.

1. What pattern do you notice in the products as the numbers multiplied by 4 decrease?

2. Continue the pattern to determine each product.

a. $4 \times (-1) =$ _____   b. $4 \times (-2) =$ _____

c. $4 \times (-3) =$ _____

3. Describe the pattern(s) that you notice in the new products.

$$-5 \times 5 = -25$$
$$-5 \times 4 = -20$$
$$-5 \times 3 = -15$$
$$-5 \times 2 = -10$$
$$-5 \times 1 = -5$$
$$-5 \times 0 = 0$$

Analyze the sequence of products with -5.
4. Describe the pattern and then extend it by writing the next three number sentences.

5. How do these products change as the numbers multiplied by -5 decrease?

Look back at the products you have determined in this lesson to answer each question.

6. Describe the sign of the product of two integers when:

a. they are both positive.   b. they are both negative.
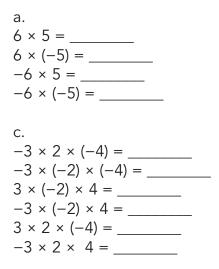
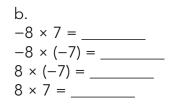c. one is positive and   d. one is zero.
one is negative.

7. If you know that the product of two integers is negative, what can you say about the two integers? Give examples.

8. Describe a rule that will help you multiply any two integers.

9. Use your rule to evaluate each expression.

a.
$6 \times 5 =$ _____
$6 \times (-5) =$ _____
$-6 \times 5 =$ _____
$-6 \times (-5) =$ _____

b.
$-8 \times 7 =$ _____
$-8 \times (-7) =$ _____
$8 \times (-7) =$ _____
$8 \times 7 =$ _____

c.
$-3 \times 2 \times (-4) =$ _____
$-3 \times (-2) \times (-4) =$ _____
$3 \times (-2) \times 4 =$ _____
$-3 \times (-2) \times 4 =$ _____
$3 \times 2 \times (-4) =$ _____
$-3 \times 2 \times 4 =$ _____

10. Describe the sign of each product and how you know.

a. the product of three negative integers

b. the product of four negative integers

c. the product of seven negative integers

d. the product of ten negative integers

11. What is the sign of the product of any odd number of negative integers? Explain your reasoning.

12. What is the sign of the product of three positive integers and five negative integers? Explain your reasoning.

When you studied division in elementary school, you learned that multiplication and division were inverse operations. For every multiplication fact, you can write a corresponding division fact.

> ### WORKED EXAMPLE
>
> Consider the fact family for 4, 5, and 20.
>
> $$4 \times 5 = 20$$
> $$5 \times 4 = 20$$
> $$20 \div 4 = 5$$
> $$20 \div 5 = 4$$
>
> Similarly, you can write fact families for integer multiplication and division.
>
> EXAMPLES:
>
> | | |
> |---|---|
> | $-7 \times 3 = -21$ | $-8 \times (-4) = 32$ |
> | $3 \times (-7) = -21$ | $-4 \times (-8) = 32$ |
> | $-21 \div (-7) = 3$ | $32 \div (-8) = -4$ |
> | $-21 \div 3 = -7$ | $32 \div (-4) = -8$ |

1. What pattern(s) do you notice in each fact family?

2. Write a fact family for −6, 8, and −48.

3. Fill in the unknown numbers to make each number sentence true.

a. $56 \div (-8) = $ _____

b. $28 \div (-4) = $ _____

c. $-63 \div $ _____ $ = -7$

d. $24 \div $ _____ $ = -8$

e. _____ $ \div (-8) = -4$

f. $-105 \div $ _____ $ = -5$

g. _____ $ \div (-8) = 0$

h. $-26 \div $ _____ $ = -1$

4. Describe the sign of the quotient of two integers when:

a. both integers are positive.

b. one integer is positive and one integer is negative.

c. both integers are negative.

d. the dividend is zero.

5. How do the answers to Question 4 compare to the answers to the same questions about the multiplication of two integers?
Explain your reasoning.

What's Your Sign?

Think about patterns in the signs of sums, differences, products, and quotients of integers.

1. Determine two different sets of single-digit integers that make each number sentence true.

a. _____ × _____ = −42

b. _____ × _____ = 56

c. _____ × _____ = 63

d. _____ × _____ = −48

2. Complete the table by writing the sign (1, 2, or 1/2)

Description of Integers	Addition (Sum)	Subtraction (Difference)	Multiplication (Product)	Division (Quotient)
two positive integers				
two negative integers				
one positive and one negative integer				

3. Create a true multiplication or division number sentence that meets the given condition.

a. positive product

b. negative product

c. positive quotient

d. negative quotient

Homework HW

LESSON 6.1b
Equal Groups

Objective Using Multiplying and Dividing Integers

Practice

Draw a two-color counter model to determine each product. Describe the expression in words.

1. $6 \times (-3)$
2. -2×5
3. $-4 \times (-2)$

Complete a number line model to determine each product.

4. -2×7
5. $-5 \times (-3)$
6. $3 \times (-3)$

Determine each product.

7. 5×11
    $5 \times (-11)$
    -5×11
    $-5 \times (-11)$

8. $3 \times 4 \times 5$
    $-3 \times (-4) \times 5$
    $-3 \times 4 \times 5$
    $-3 \times (-4) \times (-5)$
    $3 \times 4 \times (-5)$
    $3 \times (-4) \times (-5)$

Determine the integer that makes each number sentence true.

9. _____ $\times (-9) = -36$

10. $3 \times$ _____ $= -24$

11. $14 \times$ _____ $= 56$

12. _____ $\times (-6) = 30$

13. $9 = (-63) \div$ _____

14. $-40 \div$ _____ $= -8$

15. $16 \div$ _____ $= -8$

16. _____ $\div (-6) = -4$