

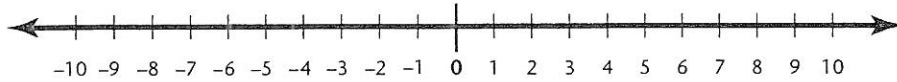
WORKSHEET

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MATH SKILLS

## Comparing Integers on a Number Line

An **integer** is any whole number (0, 1, 2, 3, . . .) or its opposite. A good way to compare integers is with a *number line*, which is used to represent positive and negative numbers in order. A number line looks like this:



The farther a number is to the right on a number line, the greater the number. The farther a number is to the left on a number line, the smaller the number.

**PROCEDURE:** To compare integers on a number line, simply place your values on the line, with positive numbers to the right of zero and negative numbers to the left of zero. The number that is the farthest to the right is the greatest number. The number that is the farthest to the left is the smallest number.

**SAMPLE PROBLEM:** Which is greater,  $-8$  or  $-3$ ?

**Step 1:** Draw your number line and select a point for 0. Then fill in the integer values on the line.

**Step 2:** Place the integers you are comparing on the number line. Because both numbers are negative, they will both be to the left of zero.



Because  $-3$  is farther to the right than  $-8$ ,  $-3$  is greater than  $-8$ .

### Practice Your Skills!

1. Locate the following integers on the number line. Then list them in order from smallest to greatest on the line below.

4, 12,  $-2$ , 7,  $-5$ , 2,  $-7$ , 9,  $-13$



2. Use a number line to correctly place the sign  $>$  (greater than) or  $<$  (less than) between the numbers in each of the following pairs.

a. 89 \_\_\_\_\_ 98    b.  $-89$  \_\_\_\_\_  $-98$     c.  $-98$  \_\_\_\_\_  $-69$

3. This table shows estimates of the mean temperatures on the surface of nine planets. List the planets on the line below in order from hottest to coldest.

Earth	Jupiter	Mars	Mercury	Neptune	Pluto	Saturn	Uranus	Venus
$8^{\circ}\text{C}$	$-150^{\circ}\text{C}$	$-37^{\circ}\text{C}$	$179^{\circ}\text{C}$	$-225^{\circ}\text{C}$	$-236^{\circ}\text{C}$	$-185^{\circ}\text{C}$	$-214^{\circ}\text{C}$	$453^{\circ}\text{C}$

## Arithmetic with Positive and Negative Numbers

The **absolute value** of a number is its distance from zero on the number line. For example,  $-7$  (a negative number) and  $7$  (a positive number) are the same distance from zero on the number line, and both have an absolute value of  $7$ . Using absolute values simplifies the process of doing arithmetic with positive and negative numbers.

1. Find the absolute value of the following numbers:

a.  $-7$  \_\_\_\_\_

b.  $14$  \_\_\_\_\_

c.  $325,000$  \_\_\_\_\_

d.  $-475$  \_\_\_\_\_

e.  $230$  \_\_\_\_\_

f.  $-52$  \_\_\_\_\_

### Part 1: Adding Positive and Negative Numbers

**PROCEDURE:** Determine if you are adding numbers that have the same or different signs. Then follow the appropriate set of directions below.

Adding same signs	Example $-3 + (-5)$	Adding opposite signs	Example $-3 + 5$
<b>Step 1:</b> Add their absolute values.	$3 + 5 = 8$	<b>Step 1:</b> Subtract the smaller absolute value from the larger.	$5 - 3 = 2$
<b>Step 2:</b> Make the sign of the answer the same as the sign of the original numbers.	Because $-3$ and $-5$ are both negative, the answer will be negative. <b>Answer:</b> $-3 + (-5) = -8$	<b>Step 2:</b> Choose the sign of the number with the greater absolute value.	Because $5$ has a greater absolute value than $3$ , and $5$ is positive, your answer will also be positive. <b>Answer:</b> $-3 + 5 = 2$

### Add It Up!

2. Complete the following equations. When finished, go back and check your signs.

a.  $14 + (-17) =$  \_\_\_\_\_

b.  $-9 + (-23) =$  \_\_\_\_\_

c.  $-16 + 21 =$  \_\_\_\_\_

d.  $-12 + 12 =$  \_\_\_\_\_

e.  $15 + (-4) =$  \_\_\_\_\_

f.  $-7 + (-7) =$  \_\_\_\_\_

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**Part 2: Subtracting Positive and Negative Numbers**

**PROCEDURE:** To subtract integers, find the opposite of the number you are subtracting. Then *add* this opposite to the number you are subtracting from. The result is your answer.

**SAMPLE PROBLEM:**  $-3 - (-5) = \underline{\quad? \quad}$

**Step 1:** Find the opposite of the number you want to subtract.

The opposite of  $-5$  is  $5$ .

**Step 2:** Add this opposite to the number you are subtracting from.

$$-3 - (-5) = -3 + 5 = 2$$

**Take It Away!**

3. Complete the following subtraction problems. Remember to check your work.

a.  $5 - (-7) = \underline{\hspace{2cm}}$

b.  $-11 - 5 = \underline{\hspace{2cm}}$

c.  $-1 - 1 = \underline{\hspace{2cm}}$

d.  $22 - (-8) = \underline{\hspace{2cm}}$

e.  $14 - (-3) = \underline{\hspace{2cm}}$

f.  $-9 - 4 = \underline{\hspace{2cm}}$

**Part 3: Multiplying and Dividing Positive and Negative Numbers**

**PROCEDURE:** To multiply or divide two integers, multiply or divide their absolute values. Then apply the following rule to determine if the answer is positive or negative:

- The product or quotient of two *same-sign* numbers is *positive*.
- The product or quotient of two *opposite-sign* numbers is *negative*.

**SAMPLE PROBLEM A:**  $-7 \times 11 = \underline{\quad? \quad}$

**Step 1:** Multiply the absolute values to find the absolute value of the product.

$$7 \times 11 = 77$$

**Step 2:** Apply the rule of signs: Because you are finding the product of *opposite-sign* numbers, the product will be *negative*.

$$-7 \times 11 = -77$$

**SAMPLE PROBLEM B:**  $-12 \div (-4) = \underline{\quad? \quad}$

**Step 1:** Divide the absolute values to find the absolute value of the quotient.

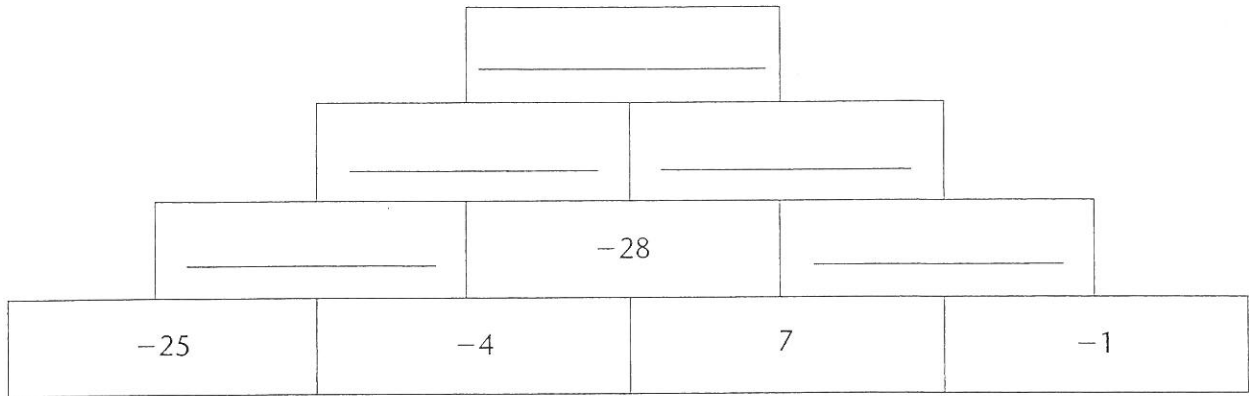
$$12 \div 4 = 3$$

**Step 2:** Apply the rule of signs: Because you are finding the quotient of *same-sign* numbers, the quotient will be *positive*.

$$-12 \div (-4) = 3$$

**Challenge Yourself: Multiply Your Way up the Pyramid!**

4. Each brick's number is the product of the two numbers under it. Starting on the bottom row, multiply to complete the empty bricks.



**Divide Your Way down Again!**

5. Each brick's number is the quotient of the two numbers above it. Starting from the top left brick, divide each brick by the number on its right side. Place the quotient in the empty brick below. Continue until all the bricks are filled.

