Name _____ Date _____

MODULE 2 SECTION 3 **STUDY GUIDE**

A Call for Help Integer Addition and Subtraction

GOAL **LEARN HOW TO:**
- use a model to work with integers
- add integers
- use properties of addition
- subtract integers

AS YOU:
- take and analyze hikes along a number line
- explore wind-chill temperatures

Exploration 1: Modeling Integer Operations

Number-Line Models

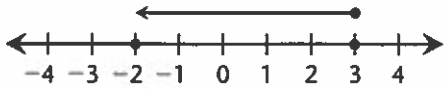
You can think of addition and subtraction as hikes on a number line.

Example

Find the sum 3 + (–5).

Sample Response

Start at 3, facing in the positive direction. Move backward 5 units.



So, 3 + (–5) = –2.

Exploration 2: Adding Integers

To add two integers with the *same sign*, add the absolute values of the integers. The sum has the same sign as the integers you are adding. For example, 9 + 3 = 12 and –5 + (–3) = –8.

To add two integers that have *different signs*, subtract the lesser absolute value from the greater one. The sum has the same sign as the integer with the greater absolute value. For example, 2 + (–3) = –1 and –5 + 9 = 4.

The sum of **0 and a number** is that number. For example, 0 + 6 = 6 and –3 + 0 = –3.

The sum of **a number and its opposite** is 0. For example, 8 + (–8) = 0.

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Properties of Addition

The **commutative property of addition** says that you can change the order of numbers in an addition problem and still get the same sum.

Example

$8 + 3 = 11$ and $3 + 8 = 11$

$-7 + 2 = -5$ and $2 + (-7) = -5$

$-3 + (-4) = -7$ and $-4 + (-3) = -7$

The **associative property of addition** says that you can change the grouping when you add numbers and still get the same sum.

Example

$3 + (4 + 5) = 3 + 9 = 12$ and $(3 + 4) + 5 = 7 + 5 = 12$

$-5 + [4 + (-3)] = -5 + 1 = -4$ and $[-5 + 4] + (-3) = -1 + (-3) = -4$

Exploration 3: Subtracting Integers

You can rewrite a subtraction problem as an addition problem. To subtract an integer, add its opposite.

Example

Find each difference.

a. $4 - (-7)$ **b.** $3 - 9$

Sample Response

a. Rewrite the subtraction as an addition and then add.

$4 - (-7) = 4 + 7$ ← Add the opposite of -7.
$= 11$

b. Rewrite the subtraction as an addition and then add.

$3 - 9 = 3 + (-9)$ ← Add the opposite of 9.
$= -6$