Good Morning!

Today you will need...

- Pencil
- Graph notebook
- Text book

- Note Page (I will pass out)

7.NS.1b

I can multiply negative and positive numbers. I can find patterns and use an algorithm to multiply these numbers.

Warm-Up

In your graph spiral, answer the following question:

Copy and study the number sentences below. What observations about the patterns in these number sentences can you make?

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

Investigation

3

Multiplying and Dividing Rational Numbers

In this Investigation, you will use time, distance, speed, and direction to think about multiplication and division of integers. You will also explore number patterns and develop algorithms for multiplying and dividing rational numbers.

You can use the times symbol, $\times$, the multiplication dot, $\bullet$, or parentheses, ( ), to show multiplication.

$$3 \times 5 = 3 \bullet 5 = 3(5)$$

3.2 Multiplication of Rational Numbers

You have already examined patterns in multiplication of rational numbers that are integers. Now you will use patterns to develop algorithms for multiplication of rational numbers that include fractions and decimals.

? Which of the following products will have the same value?

$4 \cdot 5$ $4 \cdot (-5)$ $-4 \cdot 5$ $-4 \cdot (-5)$

Let's continue the pattern...

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

As a team, answer the questions on <u>pages 58 and 59</u>.
Record the answers in your graph paper.

B Find the products in each group below. Does the order matter? Explain your reasoning.

2×3 and 3×2

Class Work Answers:

B. The answer to both sentences is 6.

Multiplication is commutative and the order of the numbers doesn't matter.

Let's examine a new pattern...

$$-4 \bullet 5 = -20$$
$$-4 \bullet 4 = -16$$
$$-4 \bullet 3 = -12$$
$$-4 \bullet 2 = -8$$
$$-4 \bullet 1 = -4$$
$$-4 \bullet 0 = 0$$

Ⓐ 1. What do the examples in each group below have in common?

Group 1
$^+5 \cdot {}^+5 = 25$
$^+3 \cdot {}^+5 = 15$
$-4 \cdot -3 = 12$
$-2 \cdot -4 = 8$

Group 2
$^+5 \cdot -3 = -15$
$^+2 \cdot -4 = -8$
$-5 \cdot {}^+1 = -5$
$-3 \cdot {}^+4 = -12$

Class Work Answers:

Ⓐ **1.** What do the examples in each group below have in common?

Group 1	Group 2
$^+5 \cdot {}^+5 = 25$	$^+5 \cdot -3 = -15$
$^+3 \cdot {}^+5 = 15$	$^+2 \cdot -4 = -8$
$-4 \cdot -3 = 12$	$-5 \cdot {}^+1 = -5$
$-2 \cdot -4 = 8$	$-3 \cdot {}^+4 = -12$

	Group 1	Group 2
	• all the problems are multiplication	• all the problems are multiplication
	• the sign is the same for both numbers	• the signs are different for the numbers
	• the answers are positive	• the answers are negative

multiply numbers with the **SAME SIGN**

1. Ignore the signs and multiply the two numbers

2. The answer will be positive

*examples:

$2 \cdot 7 =$ $-6 \cdot -5 =$

multiply numbers with DIFFERENT SIGNS

1. Ignore the signs and multiply the two numbers

2. The answer will be negative
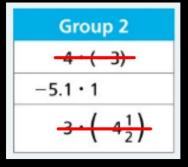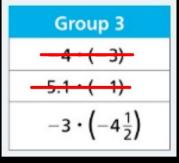
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*examples:

$2 \cdot -7 =$ $-6 \cdot 5 =$

Ⓐ **2.** Find the products in each group.

Group 1
$4 \cdot 3$
~~$5.1 \cdot 1$~~
~~$3 \cdot 4\frac{1}{2}$~~

Group 2
~~$4 \cdot (-3)$~~
$-5.1 \cdot 1$
~~$3 \cdot \left(-4\frac{1}{2}\right)$~~

Group 3
~~$-4 \cdot (-3)$~~
~~$5.1 \cdot (-1)$~~
$-3 \cdot \left(-4\frac{1}{2}\right)$

Class Work Answers:

A. 2.

Group 1	Group 2	Group 3
12	-12	12
5.1	-5.1	5.1
$13\frac{1}{2}$	$-13\frac{1}{2}$	$13\frac{1}{2}$

Real World Muliplication

In your graph spiral, answer the following question:

1. Each time Samantha rides the bus, the pass deducts $4 from her account. She rode the bus 13 times in one month.

    a. Write a multiplication sentence to show how much money she spent in that month.

    b. Describe your answer in words.

Ⓔ 1. Predict whether the sign of each product is positive or negative. Explain your reasoning.

b. $2 \cdot (-3) \cdot 4$

c. $2 \cdot (-3) \cdot 4 \cdot (-5)$

d. $-2 \cdot (-3) \cdot 4 \cdot (-5)$

e. $-2 \cdot (-3) \cdot (-4) \cdot (-5)$

3. Explain how to determine whether a product will be positive or negative.

Class Work Answers:

E. **1b.** negative   **c.** positive

     d. negative   **e.** positive

3. When there is an odd number of negatives, the answer will be negative. When there is an even number of negatives, the answer will be positive.

Homework:

**p.67 #9-10
(write number sentences to show work)**