Users should treat this material as a working draft. This material can be used in its current form, customized, and/or printed by the user.

The author(s) request feedback on all materials so that they can be continually improved and updated.

This material may contain references to additional resources and links to external websites

that are provided by the contributing author(s) as supplemental materials. The author(s)

neither endorse these references nor are responsible for their content or availability. Also,

the inclusion of any reference to an external resource or link to a website does not imply

endorsement by the author(s) of their owners, products or services.

This material is licensed under the Creative Commons Attribution-Share Alike license

(<http://creativecommons.org/licenses/by-sa/3.0/>).

**Author:**

**Kevin Hall**

Multiplying Integers

3.6c

1). Whole-class activity

5

0

-5

How could you take this picture of 4 and use it to show 4 • 3 ?

5

0

-5

Please draw a picture of 3 • 5

Our goal is to multiply with negatives. How do you think we could show that?

2). Small-group discussion

With your group, please decide how to show each problem, and give each answer:

5

0

-5

a). -2 • 5 = \_\_\_\_

5

0

-5

b). 5 • -2 = \_\_\_\_

5

0

-5

c). -3 • -4 = \_\_\_\_

5

0

-5

d). -3 + ‑4 = \_\_\_\_

Whole-class discussion

* Points for reflection:
  + Do you agree with the way other groups drew their pictures?
  + In general, how do you show multiplying by a negative?
  + For example, in pictures, what’s the difference between (6)(4) and (6)( -4) ?

Individual Practice

3). Please show that you understand by doing these on your own:

5

0

-5

10

-10

(8)(-3) = \_\_\_\_

5

0

-5

10

-10

(-8)(-3) = \_\_\_\_

5

0

-5

10

-10

(-8)(3) = \_\_\_\_

4). Try these without a picture:

a). (-2)(8) = \_\_\_\_ b). (-2)(-8) = \_\_\_\_ c). -2 + -8 = \_\_\_\_ d). (-2) + (8) = \_\_\_\_

Small-group activity

5).

* Please choose two integers so that when you multiply them, the sign (+ or -) of the answer is different than what you would get if you added them. Create a visual diagram explaining why the signs are different.
* Then, using pictures, diagrams, or a rap or other performance, summarize the difference between the rules for adding and multiplying integers. (Performances must be less than 3 minutes).

Individual practice

6). Please practice on your own. Be careful—the questions mix adding, subtracting, and multiplying.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| (-2)(9) = \_\_\_\_ | (-2)(-9) = \_\_\_\_ | (-2) + (-9) = \_\_\_\_ | -2 – -9 = \_\_\_\_ | (2)(-9) = \_\_\_\_ |
| -3 • -5 = \_\_\_\_ | -3 + 5 = \_\_\_\_ | 3 + -5 = \_\_\_\_ | -3 • 5 = \_\_\_\_ | 3 • -5 = \_\_\_\_ |
| ‑3 - -5 = \_\_\_\_ | -3 – 5 = \_\_\_\_ | (10)(-7) = \_\_\_\_ | 10 + (-7) = \_\_\_\_ | ‑10 + -7 = \_\_\_\_ |
| (-10)(-7) = \_\_\_\_ | 3\*-6 = \_\_\_\_ | -3\*(-6) = \_\_\_\_ | -3 + -6 = \_\_\_\_ | -3 + 6 = \_\_\_\_ |

7). Please use the order of operations to evaluate each expression. Check your work with the scrambled answers.

a). **-**3(4 + 5) – 1

**Example:**

**-**3( 9 ) + **-**1

**-**27 + **-**1

**-**28

b). **-**11 + (**-**4)(**-**6)

c). (**-**1 + **-**3)(4 + **-**2)

**Example:**

( **-**4 ) ( 2 )

**-**8

d). **-**4 + **-**2(**-**6+2)

e). 3 – 7 + 2(**-**2)

3 + **-**7 + **-**4

**-**3(4 + 5) + **-**1

3 + **-**7 + 2(**-**2)

**-**4 + **‑**4

**-**8

f). 4 – 3(5 + **-**9)

g). (2•**-**6 – 1) – 3(**-**2)

**Example:**

**Example:**

(2•**-**6 + **-**1) + **-**3(**-**2)

(**-**12 + **-**1) + 6

**-**13 + 6

**-**7

h). (2 – 8) – 5(5 + **-**8)

Scrambled Answers:

i). 2(-7) + **-**5(-3 – 1)

6

13

9

4

16

3.6c Extension

WHY Flip When Multiplying?

We can actually prove that a positive times a negative equals a negative. To understand, you have to know the Distributive Property. Please fill in the blanks below in the Distributive Property problems:

3(4 + 1) = 3(4) + 3(1)

5(2 + 6) = 5(2) + \_\_(6)

-8(5 + 4) = -8(5) + -8(4)

-3(4 + -2) = \_\_(4) + \_\_( )

Example:

Example:

You try:

You try:

1).

We’ve decided it makes sense to flip our pictures when multiplying by a negative, like this:

5

0

-5

3 • -2 = \_\_\_\_

Flip!

But can we prove that we’re supposed to flip?

The Hard Proof for Flipping when Multiplying

-3 + 3 = 0

We know this:

2(-3 + 3) = 2(0)

We can multiply both sides by 2:

2(-3) + 2(3) = 2(0)

Use the Distributive Property:

Multiply the parts we know:

2(-3) + 6 = 0

How does this prove that 2(-3) has to be negative? Please explain:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Challenge: Can you adapt this proof to prove that a negative times a negative equals a positive? Try it here: