

MULTIPLICATION AND DIVISION 4

Name: Key Date: _____ Period: _____

SECTION 4.1 MULTIPLICATION OF INTEGERS

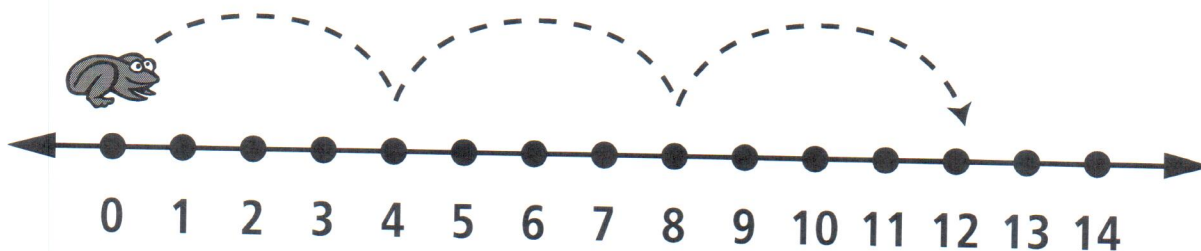
VOCABULARY

DEFINITION	EXAMPLE
Factor (noun): <i>A number multiplied to get a product</i>	$2 \cdot 3 = 6$ ↑ ↑

Big Idea: How do we use linear models to multiply integers? What patterns can lead to multiplication rules?

EXPLORATION 1: FROG JUMP MULTIPLICATION

- The first factor indicates which direction the frog should face and the length of each jump.
- The second factor indicates the number of jumps.



This model illustrates: $4 \cdot 3 = 12$

Table 4.1a

Length of Jump	Number of Jumps	Frog's Location
4	0	0
4	1	4
4	2	8
4	3	12
4	4	16
4	5	20
4	6	24
4	10	40
4	20	80
4	n	4n

1. Use a number line to fill in Table 4.1a. What patterns do you notice?

This looks like a multiplication table for 4.

Table 4.1b

Directed Length of Jump	Number of Jumps	Frog's Location
-4	0	0
-4	1	-4
-4	2	-8
-4	3	-12
-4	4	-16
-4	5	-20
-4	6	-24
-4	10	-40

2. Use a number line and frog jump multiplication to fill in Table 4.1b. What patterns do you notice?

Facing left, jumping "forward" 4 units

Use the number line to compute the following products:

a. $(-3)(6) = -18$

b. $(-3)(5) = -15$

c. $(-3)(3) = -9$

d. $(-3)(1) = -3$

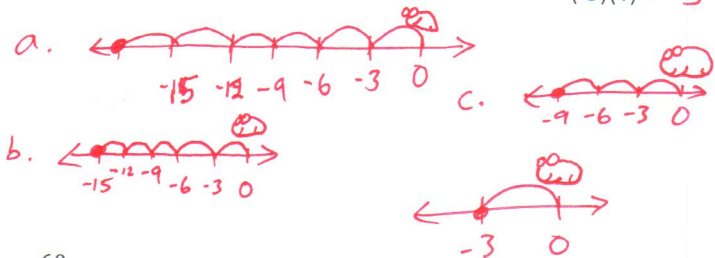


Table 4.1c

Directed Length of Jump	Number of Jumps	Frog's Location
3	-6	-18
3	-5	-15
3	-4	-12
3	-3	-9
3	-2	-6
3	-1	-3
3	0	0
3	1	3
3	2	6
3	3	9

3. Use the frog jump multiplication to fill in Table 4.1c. What patterns do you notice?

Frog faces right and jumps "backward" or "forward" for neg & pos factors

Use the number line to compute the following products:

- a. $(3)(-6) = -18$
- b. $(3)(-5) = -15$
- c. $(3)(-3) = -9$
- d. $(3)(-1) = -3$

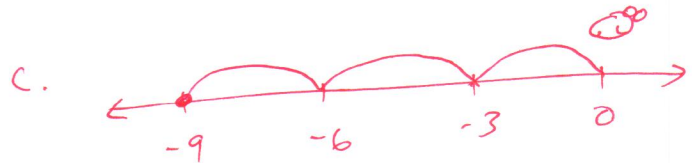
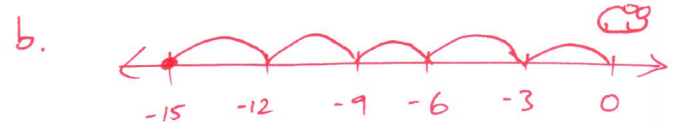
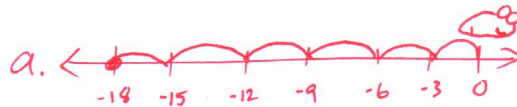


Table 4.d

Directed Length of Jump	Number of Jumps	Frog's Location
-3	-6	18
-3	-5	15
-3	-4	12
-3	-3	9
-3	-2	6
-3	-1	3
-3	0	0
-3	1	-3
-3	2	-6
-3	3	-9

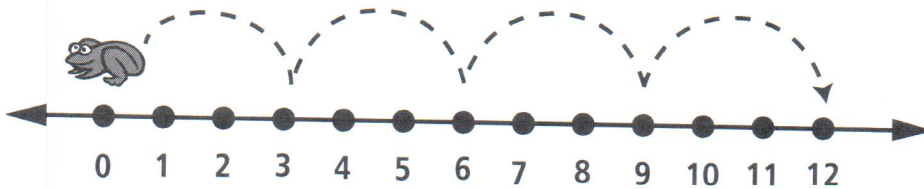
4. Use the frog jump multiplication to fill in Table 4.1d. What patterns do you notice?

Face left & jump backwards for negatives and jump forward for positive 2nd factors

Use the table to compute the following products:

a. $(-3)(-6) = 18$ c. $(-3)(-3) = 9$

b. $(-3)(-5) = 15$ d. $(-3)(-1) = 3$



Rules for multiplying integers:

1. A positive factor times a positive factor gives a positive product.
2. A positive factor times a negative factor gives a negative product.
3. A negative factor times a positive factor gives a negative product.
4. A negative factor times a negative factor gives a positive product.

PRACTICE EXERCISES

1. Apply the rules for multiplying that we just discovered.

a. $(-25)(12)$
 -300

b. $(13)(-22)$
 -286

c. $(-63)(-21)$
 1323

d. $(-2)(-3)(-4)$
 $(6)(-4)$
 -24

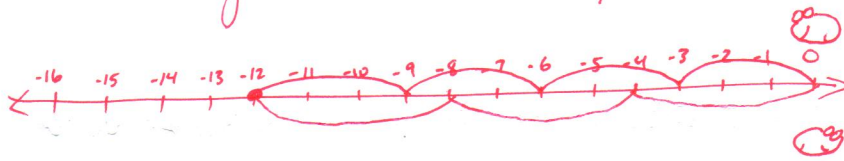
e. $(-2)(3)(-4)$
 $(-6)(-4)$
 24

f. $(2)(-3)(-4)$
 $(-6)(-4)$
 24

g. $(-2)(-3)(4)$
 $(6)(4)$
 24

2. Explain why $(-3)(4)$ is equivalent to $(3)(-4)$. Use the number line to justify your answer.

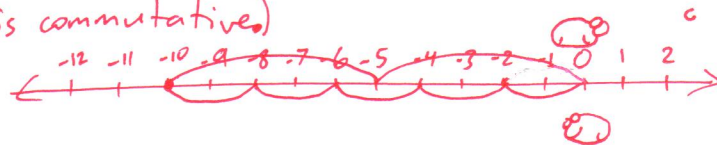
A positive times a negative is negative and a negative times a positive is negative.



3. Explain why $(5)(-2)$ is equivalent to $(-2)(5)$. Use the number line to justify your answer.

Jumping "backwards" is the same as jumping left "forward"

(Multiplication is commutative)



SUMMARY (What I learned today)
