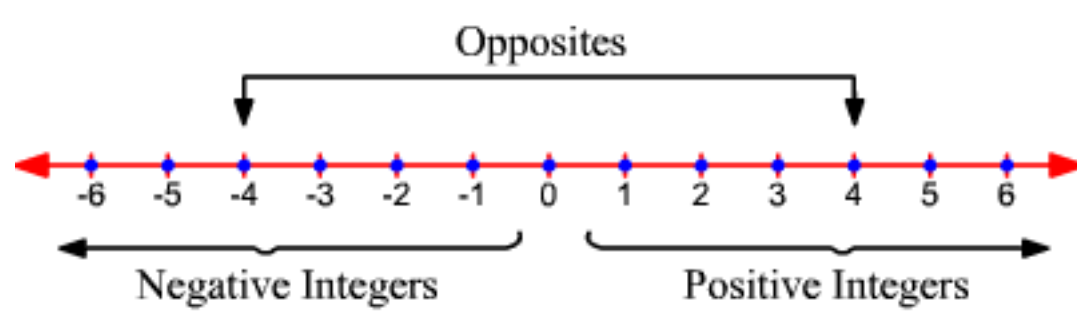
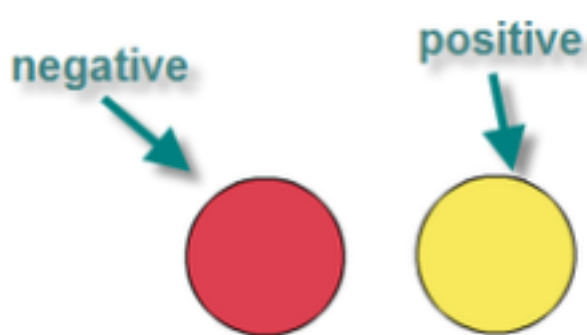




Multiplication of Integer



Multiplying Integers with Two Color Counters

$4 \times 2 =$
"Add 4 copies of 2."

Four identical groups are shown, each enclosed in a blue rounded rectangle. Each group contains two yellow circular counters, one above the other, with a black plus sign (+) in the center of each counter.

Integers

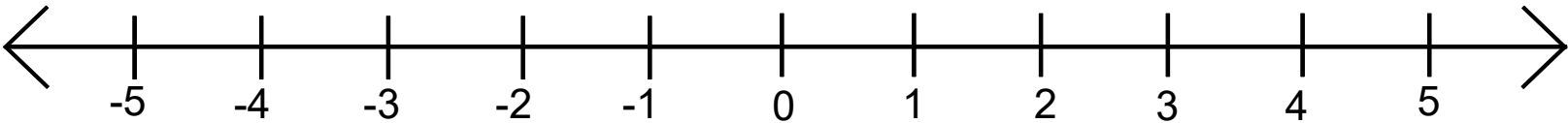
Integers are positive and negative whole numbers.ex. -4, +8, -25

Rational numbers are almost all negative and positive numbers, including decimals and fractions.

Opposite integers are the same number but have different signs. Ex. -9,+9 ; -16,+16; +24,-24; +7,-7

Integers can be displayed on a vertical or horizontal number line.

Horizontal Number line



When comparing integers on a number line, numbers to the left are negative and numbers to the right of zero are positive. The number to the right is always greater. Positive integers are always greater than negative integers.

The zero principle states that a positive and a negative together will always give you zero.

You can represent integers using algebra tiles. When you draw the tiles, shaded represent positive and unshaded represents negative.

Algebra Tiles

yellow
1

red
-1

textbook uses colors

Yellow $\Rightarrow \oplus$ Shaded $\bullet$

Red $\Rightarrow \ominus$ unshaded $\circ$

-1

1

Remember that we use shaded for + and unshaded for -

+ is yellow in the textbook

- is red in the textbook



Remember from last year Adding or Subtracting Integers

Adding (Draw in different levels both integers)

1) top Bottom

$(-9) + (+9) =$ $\bigcirc$

$\downarrow \quad \downarrow$

unshaded shaded

Subtracting (remove but may need to make zero pairs)

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

$\bigcirc \bigcirc$

$\bullet \bullet \bullet$

Remains $\bigcirc \bigcirc \bigcirc \bigcirc \bigcirc$

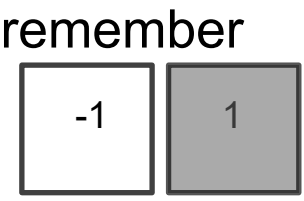
Step 1: Draw first integer

Step 2: Then subtract means to REMOVE the second integer

HINT: May need to use zero pairs

Multiplying Integers by Modeling

TILES



Ex1) What does $(+2) \times (+3)$ mean?
2 groups of ~~+3~~



or

$(+2) \times (+3) = (+6)$

Ex2) What does $(+4) \times (+2)$ mean?
4 groups of +2



$(+4) \times (+2) = (+8)$

Ex3) What does $(+3) \times (-3)$ mean?
3 groups of -3



$(+3) \times (-3) = (-9)$

Ex4) What about $(+6) \times (-1)$?
6 groups of -1



$(+6) \times (-1) = (-6)$

Ex5) What about $(-4) \times (+3)$?
3 groups of -4

You can use the Commutative rule when multiplying order does not matter

$(-4) \times (+3) = (+3) \times (-4)$



$(-4) \times (+3) = (-12)$

take away 4 groups of +3

$(-4) \times (+3)$

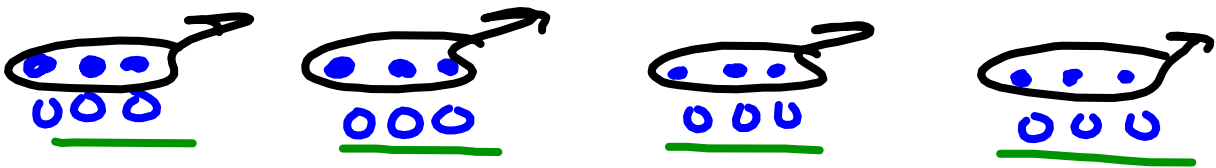
OR

If the first integer is positive it means lay down.....

But

If the first integer is NEGATIVE then it means take away groups (Since starting with negative you need zero pairs)

can also model $(-4) \times (+3)$ as follows (Always start with zero)



Remodel what is left



$(-4) \times (+3) = (-12)$

What is the rule for multiplying a positive integer by a positive integer?

★ When you multiply two positive integers, you simply multiply the numbers and your answer will always be positive.

~~$(+7) \times (+5)$~~ $(+35)$ ~~$(+12) \times (+10)$~~ $(+120)$

$(+) \times (+) = (+)$

What is the rule for multiplying a positive integer by a negative integer?
Does the order matter?

★ When you multiply a positive integer and a negative integer, you multiply the numbers, and your answer will always be negative.

$(+6) \times (-3) = -18$ $(+9) \times (-4) = -36$
 $(-8) \times (+6) = -48$ $(-4) \times (+9) = -36$

Rules

$(+) \times (-) = (-)$
 $(-) \times (+) = (-)$

$(+) \times (+) = (+)$

Your turn

Multiplying Two Negative Integers
Using TILES

We just said , $(+2) \times (-4)$ means 2 sets of -4, but we always start with zero,so what are we doing with the 2 sets of -4?

oooo oooo

$(+2) \times (-4) = (-8)$
 $(+2) (-4)$
 $(+2) \cdot (-4)$

If $(+2) \times (-4)$ means to put down 2 sets of -4, what does $(-2) \times (-4)$ mean? (Always start with zero)

It means to take away 2 groups of -4

$(-2) \cdot (-4)$
=

Rewrite what is left
=
oo oo $(+8)$
So $(-2) \times (-4) = (+8)$

What about $(-3) \times (-2)$? It means take away 3 groups of -2.


=
oo oo oo

So $(-3) \times (-2) = (+6)$

Now try $(-5) \times (-1)$


=
oo oo oo oo oo

$(-5) \times (-1) = (+5)$

So when you multiply two negative integers, multiply the numbers and your answer will always be positive.

Final Multiplying rule $(-) \times (-) =$

Number line Modeling think jumps

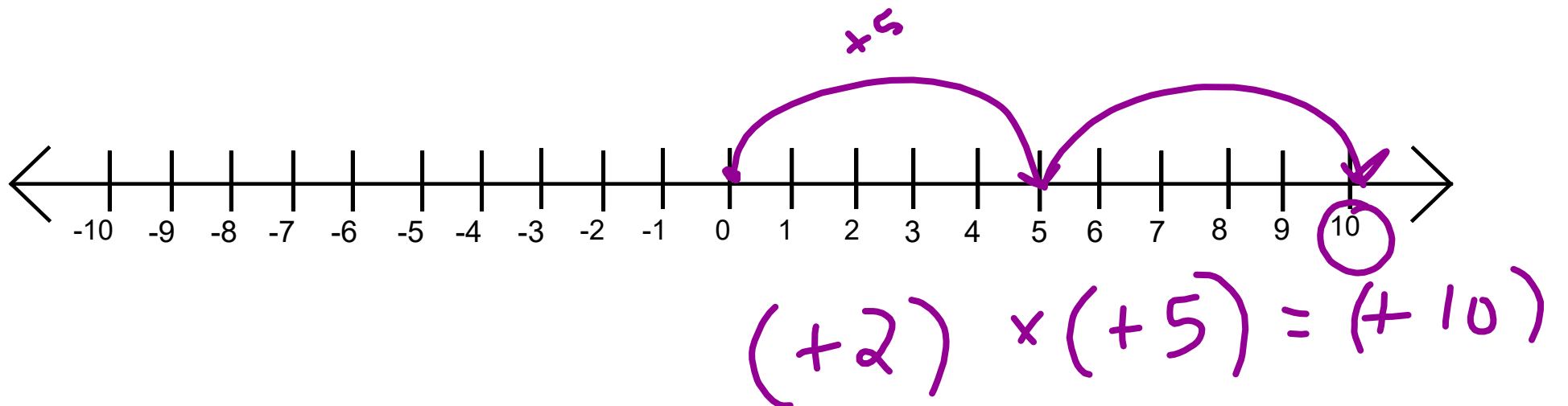
- we will focus on $(+) \times (-)$ or $(+) \times (+)$

of Jumps
Jump Size

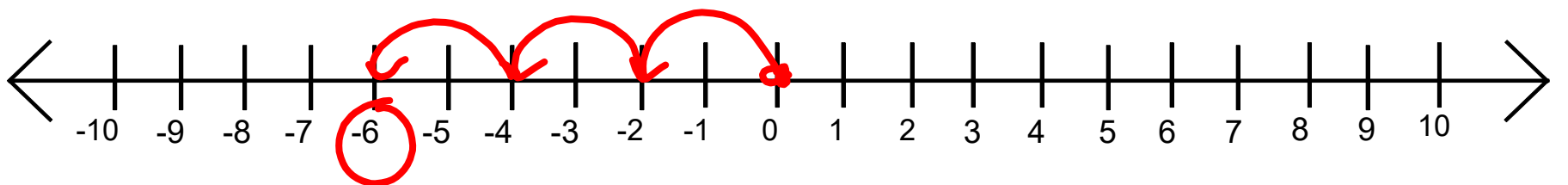
$$(+2) \times (+5)$$

Always start at zero

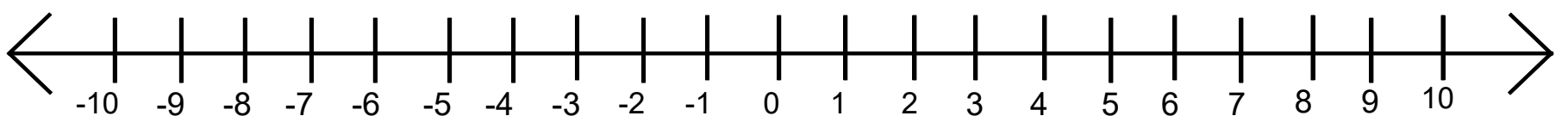
2 Jumps of $(+5)$



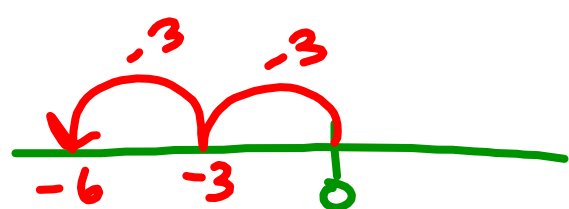
$$\text{Ex 2) } (+3) \times (-2) = (-6)$$



$$\text{Ex 3) } (-2) \times (+4) \text{ use commutative rule}$$



$$(+2)(-3)$$



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5, 6, 7, 8(a,c)

Homework/ Class Work

$$5a) (-1) + (-1) + (-1)$$

$$3 \times (-1)$$

$$6a) (+7) \times (-4)$$

$$(-4) + (-4) + (-4) + (-4) + (-4) + (-4) + (-4)$$

$$\# 7) \# \text{ Jumps (arrows)} \times \text{Arrow size} = \text{Stops}$$

$$(\quad) \times (\quad) = \text{Stops}$$