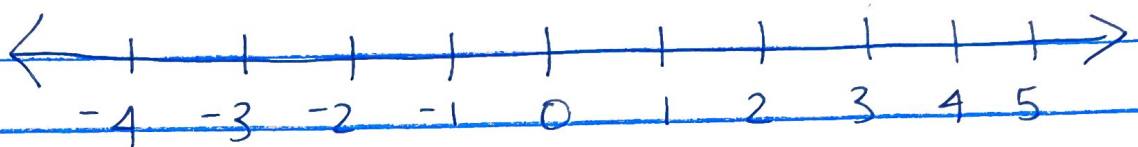


Section 5-1 Add + Sub of Integers

Integers $\{\dots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$

Number Line



Numbers increase as you move right
Numbers that are the same distance from 0 are called opposites.

ex 1 Find the opposite.

- a) 3 -3
- b) -2 2
- c) 0 0

positive → The absolute value of a number is the distance that number is from 0 on the number line. It is denoted $|x|$.

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

positive or zero (pointing to $x \geq 0$)
negative (pointing to $x < 0$)

ex 2 Evaluate the absolute value.

a) $|6| = 6$

b) $|-3| = 3$

c) $|-1| = 1$

d) $|0| = 0$

$\left[\begin{array}{l} \text{pos \#} = \text{same pos \#} \\ \text{neg \#} = \text{opposite} \end{array} \right]$ always ends up positive

Properties for Integer Add + Sub

1. closure for addition + subtraction

The sum or difference of any 2 integers is always an integer.

2. commutative for addition

$$-3 + 6 = 6 + (-3)$$

3. associative for addition

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

4. identity property for addition

$$-4 + 0 = -4 \text{ and } 0 + (-4) = -4$$

* Note: 0 is called the additive identity

5. additive inverse property for addition

$$9 + (-9) = 0$$

* We say $-a$ is the additive inverse of a .

Models for Integer Addition + Subtraction

1. Patterns

$$-5 + 3 = -2$$

$$-5 + 2 = -3$$

$$-5 + 1 = -4$$

$$-5 + 0 = -5$$

$$-5 + -1 = -6$$

$$-5 + -2 = -7$$

$$3 - 3 = 0$$

$$3 - 2 = 1$$

$$3 - 1 = 2$$

$$3 - 0 = 3$$

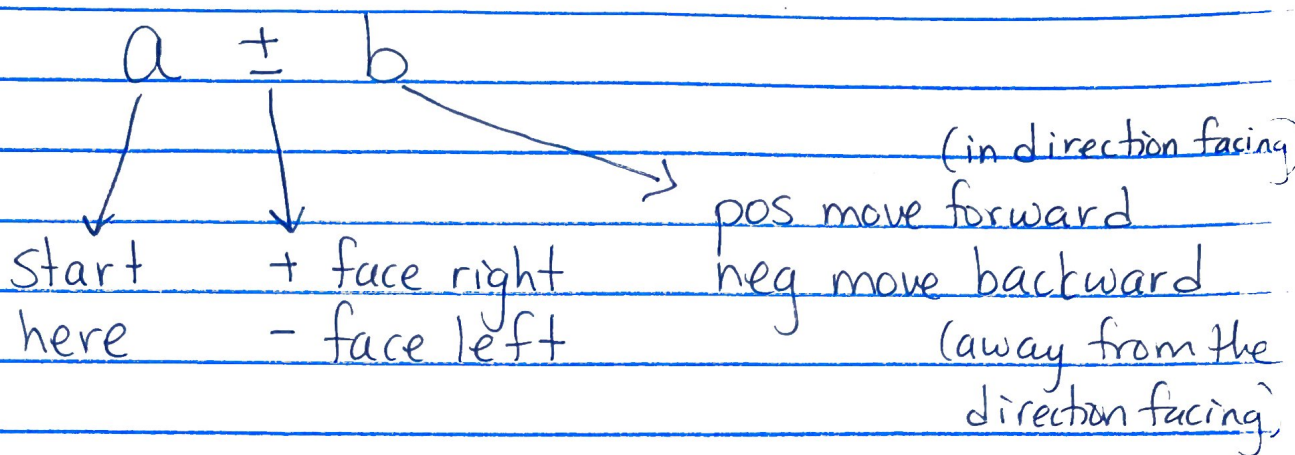
$$3 - (-1) = 4$$

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

Addition

Subtraction

2. Number Line



ex 1 Use a number line to model.

		start at:	face:	move:
a)	$4 + 2 = 6$	4	right	2 forward
b)	$-7 + 5 = -2$	-7	right	5 forward
c)	$5 - 2 = 3$	5	left	2 forward
d)	$3 - 5 = -2$	3	left	5 forward
e)	$1 + (-3) = -2$	1	right	3 backwards
f)	$-1 + (-4) = -5$	-1	right	4 backwards
g)	$-2 - (-3) = 1$	-2	left	3 backwards
h)	$0 - (-4) = 4$	0	left	4 backwards

* Make sure you watch the video to see the modeling of ex 1 on an actual number line. *

3. ^{pos}Black + ^{neg}Red Chips / Charged Field

ex 1 Model the following with B+R chips or charged field.

Charged Field

a) $4 + 3 = 7$

BBBB
BBB

++++
+++

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

RRR
RR

--

c) $-6 + 4 = -2$

~~RRR BB~~
~~RRR BB~~

--- ++
--- ++

d) $8 + (-3) = 5$

~~BBBB RR~~
~~BBBB R~~

e) $1 - 5 = -4$ (Hint: Same as $1 + (-5)$)

remove 5

B
BBBB
RRRR ← left

B
RRRRR

subtraction

addition

you have to add "zero"
in order to have 5B to remove

Addition Rules for Integers

1. When you add 2 numbers with the same sign, you add the absolute values and keep the common sign.
2. When you add 2 numbers with different signs, you subtract the absolute values and keep the "dominant sign" (i.e., the sign of the number with the larger absolute value.)

End 5-1

→ $-3 + -7 = -10$

→ $-3 + 7 = 4$

