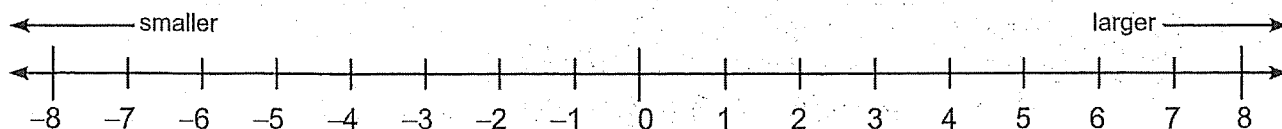


NS7-87 Integers

An **integer** is any one of these numbers: ..., -4, -3, -2, -1, 0, 1, 2, 3, 4, ...

Sometimes the numbers 1, 2, 3, 4, ... are written +1, +2, +3, +4, ...

An integer is **less than** another integer if it is **farther left** on the number line.



1. Write three integers that are less than zero. _____

Integers that are **greater than 0** are called **positive**. Integers that are **less than 0** are called **negative**.

2. Circle the integers that are positive. +5 8 -2 10 +3 +9 -4 -12

3. Circle the least integer in each pair.

a) -4 or +6

b) -7 or -4

c) 9 or 7

d) -2 or -4

e) 9 or -4

f) +7 or +2

g) -3 or -4

h) -7 or -5

4. Write < (less than) or > (greater than) in each box.

a) +2 +7

b) -6 +5

c) 5 -3

d) -2 -4

e) -4 -10

5. Write two integers that are between -8 and -3. _____ and _____

6. Mark each integer on the number line with an X and label it with the correct letter.

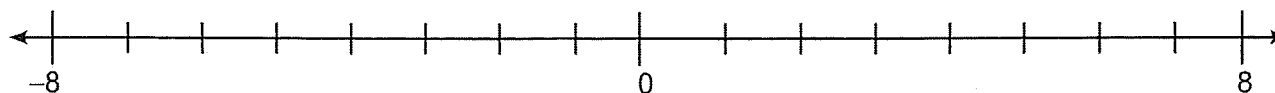
A +4

B -2

C +6

D -3

E -5



7. Put the integers into the boxes in **increasing** order.

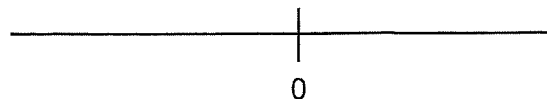
+6 -1 +10 -8 -3

8. Put the temperatures into the boxes in order from hottest to coldest.

14°C -16°C 27°C -15°C -41°C

9. a) If $0 < a < b$, mark possible places for a and b on the number line.

b) Mark $-a$ and $-b$ on the same number line.



c) Write the correct symbol (< or >) in each box.

If $0 < a < b$, then 0 $-a$ $-b$.

NS7-88 Adding Integers

A negative integer can represent a loss and a positive integer can represent a gain.

1. Write the gain or loss represented by the integer.

a) -6 loss of 6 b) $+4$ _____ c) -1 _____ d) $+9$ _____

Any sequence of gains and losses can be written as a sum of integers.

Example: $-3 + 4 - 5 = (-3) + (+4) + (-5)$
 $= (-3) + 4 + (-5).$

2. Write each sequence of gains and losses as a sum of integers.

a) $+4 - 3 - 5$ $4 + (-3) + (-5)$ b) $-2 + 6 - 3$ _____
 c) $+4 + 2 - 6$ _____ d) $+7 - 5 - 4$ _____
 e) $-3 + 2 + 4$ _____ f) $-3 + 5 - 4$ _____

3. Write each sum of integers as a sequence of gains and losses.

a) $(+2) + (-7) = +2 - 7$ b) $(+2) + (+7) =$ _____ c) $(-2) + (+7) =$ _____ d) $(-2) + (-7) =$ _____
 e) $(+a) + (-b) =$ _____ f) $(+a) + (+b) =$ _____ g) $(-a) + (+b) =$ _____ h) $(-a) + (-b) =$ _____

4. Add the integers by first writing the sum as a sequence of gains and losses.

a) $(+5) + (-2) = +5 - 2$ b) $(-3) + (+4) =$ _____ c) $(-5) + (-4) =$ _____
 $= +3$ $=$ _____ $=$ _____
 d) $(+3) + (+4) =$ _____ e) $(-3) + (-8) =$ _____ f) $(-7) + (+9) =$ _____
 $=$ _____ $=$ _____ $=$ _____
 g) $(+5) + (-2) + (+3) = +5 - 2 + 3$ h) $(-6) + (+3) + (+5) =$ _____
 $= +8 - 2 = +6$ $= + \underline{\quad} - \underline{\quad} = \underline{\quad}$

i) $3 + (-5) + (-2) + 6$ j) $(-2) + (-5) + 4 + 3$ k) $4 + 0 + (-5) + (-3)$ l) $3 + 5 + (-5) + (-3)$

Integers that add to 0 are called **opposite integers**.

Example: $+3$ and -3 are opposite integers because $(+3) + (-3) = +3 - 3 = 0$.

5. Write the opposite of each integer.

a) The opposite of $+2$ is _____. b) The opposite of -5 is _____.
 c) The opposite of 3 is _____. d) The opposite of -142 is _____.

BONUS ► The opposite of 0 is _____.

6. Add the integers by cancelling the opposite integers.

a) $(+5) + (-5) + (+3) = \underline{+3}$

b) $(-5) + 7 + (-7) = \underline{\hspace{2cm}}$

c) $(+5) + (-4) + (+4) = \underline{\hspace{2cm}}$

d) $(-4) + (+6) + (-6) = \underline{\hspace{2cm}}$

e) $(+4) + (-1) + (+1) = \underline{\hspace{2cm}}$

f) $(+8) + (-8) + (+2) = \underline{\hspace{2cm}}$

g) $(-6) + 6 + (-3) = \underline{\hspace{2cm}}$

h) $(+9) + (-9) + (+4) = \underline{\hspace{2cm}}$

All integers can be written as sums of +1s or -1s.

Examples: $3 = (+1) + (+1) + (+1) = 1 + 1 + 1$ $-3 = (-1) + (-1) + (-1) = -1 - 1 - 1$

7. Write each number as a sum of +1s and -1s. Then find the sum by cancelling pairs of +1s and -1s.

a) $(+4) + (-2) = \underline{+2}$
 $+1 + 1 + \cancel{+1} + \cancel{-1} \cancel{-1}$

b) $(-2) + (-1) = \underline{\hspace{2cm}}$

c) $(+6) + (-7) = \underline{\hspace{2cm}}$

d) $(+5) + (-3) = \underline{\hspace{2cm}}$

e) $(+4) + (+5) = \underline{\hspace{2cm}}$

f) $(-1) + (-2) = \underline{\hspace{2cm}}$

g) $(-3) + (-2) = \underline{\hspace{2cm}}$

h) $(-2) + (+2) = \underline{\hspace{2cm}}$

Remember: Two losses add to a bigger loss. Example: $-7 - 2 = -9$

A gain and a loss cancel each other. Example: $-8 + 6 = -2$

8. Add the integers mentally. Hint: Start by writing + or - to show whether you have a net gain or a net loss.

a) $(+5) + (-6)$
 $= -1$

b) $(+2) + (-6)$
 $=$

c) $(+2) + (+4)$
 $=$

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

e) $(-7) + (+10)$
 $=$

f) $(-3) + (+3)$
 $=$

g) $(-2) + (-8)$
 $=$

h) $(-3) + (-4)$
 $=$

i) $(-4) + (-8)$
 $=$

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

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

l) $(-15) + (+20)$
 $=$

9. Decide whether each statement is true or false. If you circle false, give a counter-example.

a) The sum of two negative integers is negative.

T F

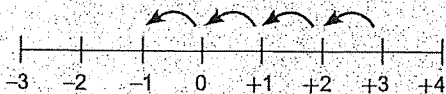
b) If you add a negative integer to a positive integer, the result is negative.

T F

NS7-89 Adding Integers on a Number Line

To add a negative integer, **move left**.

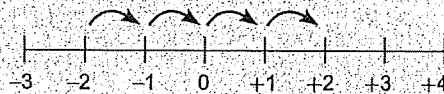
Example: $(+3) + (-4) = +3 - 4$, so subtract 4 from +3. Start at +3 and move left 4 places.



$$(+3) + (-4) = (-1) \text{ or } 3 - 4 = -1$$

To add a positive integer, **move right**.

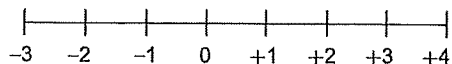
Example: $(-2) + (+4) = -2 + 4$, so add 4 to -2. Start at -2 and move right 4 places.



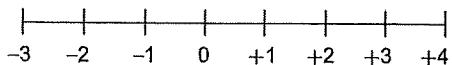
$$(-2) + (+4) = (+2) \text{ or } -2 + 4 = 2$$

1. Use a number line to add the integers.

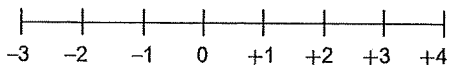
a) $(+3) + (-5) = \underline{\hspace{2cm}}$



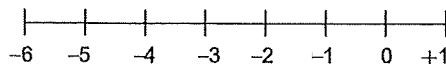
c) $(+1) + (+3) = \underline{\hspace{2cm}}$



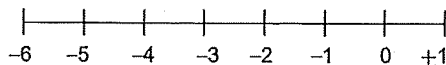
e) $(+2) + (-2) = \underline{\hspace{2cm}}$



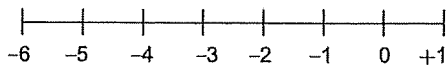
b) $(-4) + (-1) = \underline{\hspace{2cm}}$



d) $(-3) + (+2) = \underline{\hspace{2cm}}$



f) $(-3) + (+3) = \underline{\hspace{2cm}}$



2. Write each addition from Question 1 as a sequence of gains and losses to check your answers.

INVESTIGATION ▶ Does adding integers in a different order affect the answer?

A. Draw a number line to add the integers in a different order.

a) $(-3) + (-5)$ and $(-5) + (-3)$

b) $(+8) + (-2)$ and $(-2) + (+8)$

c) $(-3) + (-7)$ and $(-7) + (-3)$

d) $(-6) + (+2)$ and $(+2) + (-6)$

e) $(+3) + (-4) + (+2) + (-5) + (+1)$ and $(+3) + (+2) + (+1) + (-4) + (-5)$

B. Look at your answers in part A. Does adding integers in a different order affect the answer?

3. Use a number line to continue the pattern.

a) $+11, +8, +5, +2, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}$ b) $-10, -8, -6, -4, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}$