



## Quick Review

- You can use a number line to add integers.

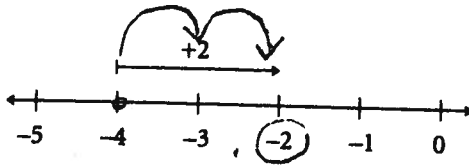
Find the first integer on the number line.

- To add a positive integer, move right on the number line. Number gets larger.
- To add a negative integer, move left on the number line. Number gets smaller.

To add:  $(-4) + (+2)$  →

Start at  $-4$ .

Move 2 units right for adding  $+2$ .



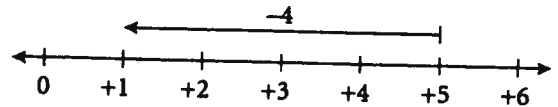
The arrow ends at  $-2$ .

So,  $(-4) + (+2) = -2$

To add:  $(+5) + (-4)$

Start at  $+5$ .

Move 4 units left for adding  $-4$ .



The arrow ends at  $+1$ .

So,  $(+5) + (-4) = +1$

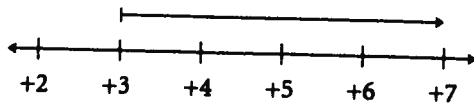
- When you use a calculator to add integers, look for the  $\boxed{-}$  or  $\boxed{+/-}$  key.

- You use the  $\boxed{-}$  key to input the negative sign of the negative number.
- You use the  $\boxed{+/-}$  key to change an input number to a negative number.

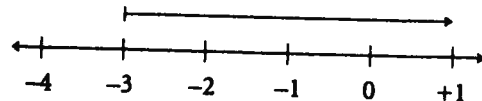
A number line is used to add integers.

Write the addition expression and sum modelled by each diagram.

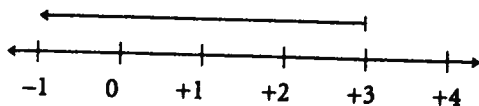
a)  $(+3) + (+4) = \underline{\hspace{2cm}}$



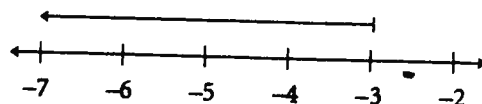
b)  $(-3) + (\underline{\hspace{1cm}}) = \underline{\hspace{2cm}}$



c)  $\underline{\hspace{2cm}}$



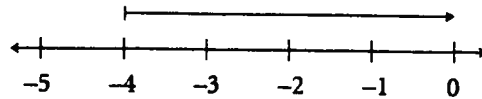
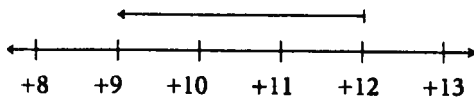
d)  $\underline{\hspace{2cm}}$



**2. Add. Use a number line if it helps.**

a)  $(+12) + (-3) =$  \_\_\_\_\_

b)  $(-4) + (+4) =$  \_\_\_\_\_



c)  $(-6) + (+5) =$  \_\_\_\_\_      d)  $(-6) + (+7) =$  \_\_\_\_\_      e)  $(-4) + (+13) =$  \_\_\_\_\_

f)  $(+9) + (+8) =$  \_\_\_\_\_      g)  $(-8) + (-3) =$  \_\_\_\_\_      h)  $(+7) + (-15) =$  \_\_\_\_\_

**3. Complete each addition equation and concluding statement.**

a)  $(+2) + (+7) =$  \_\_\_\_\_

b)  $(-2) + (-7) =$  \_\_\_\_\_

$(+3) + (+4) =$  \_\_\_\_\_

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

$(+8) + (+5) =$  \_\_\_\_\_

$(-8) + (-5) =$  \_\_\_\_\_

$(+10) + (+6) =$  \_\_\_\_\_

$(-10) + (-6) =$  \_\_\_\_\_

When you add 2 positive integers,  
the sign of the sum is \_\_\_\_\_.

When you add 2 negative integers,  
the sign of the sum is \_\_\_\_\_.

**4. Complete each addition equation and concluding statement.**

a)  $(-2) + (+7) =$  \_\_\_\_\_      b)  $(+2) + (-7) =$  \_\_\_\_\_      c)  $(+2) + (-2) =$  \_\_\_\_\_

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

$(+8) + (-5) =$  \_\_\_\_\_       $(-8) + (+5) =$  \_\_\_\_\_       $(-8) + (+8) =$  \_\_\_\_\_

$(+10) + (-6) =$  \_\_\_\_\_       $(-10) + (+6) =$  \_\_\_\_\_       $(+6) + (-6) =$  \_\_\_\_\_

When you add a positive integer and a negative integer, the sum is:

- positive when the numerically larger integer is \_\_\_\_\_.
- negative when the numerically larger integer is \_\_\_\_\_.
- zero when the integers are \_\_\_\_\_.

**Tip**

The numerical value of an integer is its value without the sign. The numerical value of +3 is 3 and the numerical value of -2 is 2.

5. Without adding, state if each sum is positive, negative, or zero.

a)  $(-8) + (-2)$

\_\_\_\_\_

b)  $(-5) + (+1)$

\_\_\_\_\_

c)  $(+3) + (-3)$

\_\_\_\_\_

d)  $(-2) + (+7)$

\_\_\_\_\_

e)  $(+3) + (-12)$

\_\_\_\_\_

f)  $(+6) + (-3)$

\_\_\_\_\_

6. Use a calculator to add.

a)  $(+45) + (-145)$

\_\_\_\_\_

b)  $(-832) + (+238)$

\_\_\_\_\_

c)  $(-492) + (+953) + (-641)$

\_\_\_\_\_

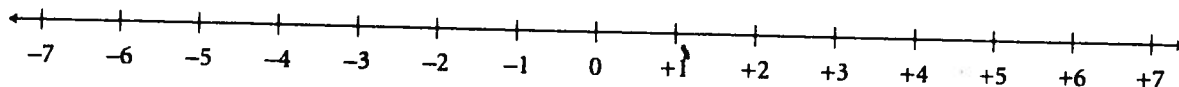
7. Write an expression that describes the changes in each situation. Then find the sum.

a) The initial temperature is  $+2^{\circ}\text{C}$ . Later, the temperature increases by  $3^{\circ}\text{C}$  and then drops  $8^{\circ}\text{C}$ .

$(+2) + (\text{_____}) + (\text{_____})$

**H I N T**

Show the changes on a number line.

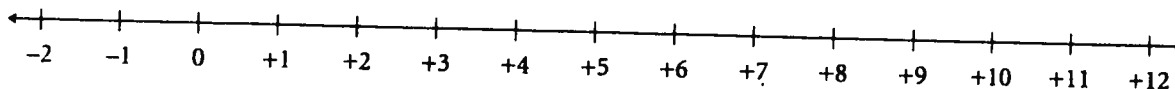


The final temperature is \_\_\_\_\_  $^{\circ}\text{C}$ .

b) An elevator is initially at level P2 that is 2 floors below ground level.

The elevator goes up 7 floors, up 6 more floors, then down 4 floors, and up 1 floor.

$(-2) + (\text{_____}) + (\text{_____}) + (\text{_____}) + (\text{_____})$



The elevator ends up on the \_\_\_\_\_ floor.

8. Complete each grid so that every row, column, and diagonal has the same sum. All integers in each grid are different.

a) Sum: \_\_\_\_\_

0            +2

-1

-2

b) Sum: \_\_\_\_\_

-2    -1

-4            +4

+2

## The Zero Principle

**Integers:** The name given to numbers that are *positive* or *negative*.  
Some examples are: -5, +8, -31, +75, -142, +262.

We can use coloured tiles to model integers.

One red tile  
represents -1



One yellow tile  
represents +1



Try these with coloured tiles:

+4	-3
+2	-5

Use your coloured tiles to represent the following integers:

-3	+3
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What is the same about these two integers?

What is different about these two integers?

Give the opposite integer for each of the following:

- +6 \_\_\_\_\_, +250 \_\_\_\_\_, -33 \_\_\_\_\_  
➤ -22 \_\_\_\_\_, -94 \_\_\_\_\_, +48 \_\_\_\_\_

Represent each of the following using your coloured tiles. Write the integers (standard form).

1. Six degrees Celsius below zero: \_\_\_\_\_
2. Eight degrees Celsius above zero: \_\_\_\_\_
3. Losing five dollars: \_\_\_\_\_
4. Earning ten dollars: \_\_\_\_\_
5. Losing four pounds: \_\_\_\_\_

*What happens when:* The temperature rises two degrees under the sun, and then falls two degrees when the clouds move in.

Model this with your coloured tiles.

What was the change in temperature (final outcome)? \_\_\_\_\_

When a positive integer and a negative integer result in zero, we call this a *zero pair*.

Does it work for the sum of all opposite integers?

Try it! Write some examples of zero pairs:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

## Subtracting Integers

When subtracting integers, simply change the subtraction sign to addition, and change to the opposite integer.

Example:

Find the difference.

$$(+4) - (-1)$$

$$\begin{array}{l} \text{opposites} \\ (+4) - (-1) = (+4) + (+1) \\ = +5 \end{array}$$

$$(-7) - (+2)$$

$$\begin{array}{l} \text{opposites} \\ (-7) - (+2) = (-7) + (-2) \\ = -9 \end{array}$$

$$(+2) - (+9)$$

$$\begin{array}{l} \text{opposites} \\ (+2) - (+9) = (+2) + (-9) \\ = -7 \end{array}$$

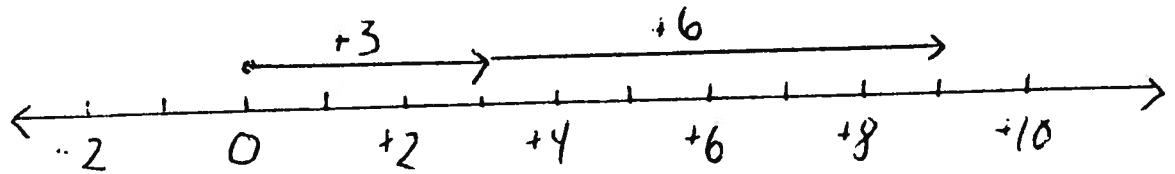
\* to subtract an integer, we add the opposite integer

Use a number line to show subtraction...

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

↳ change to

$$(+3) + (+6)$$

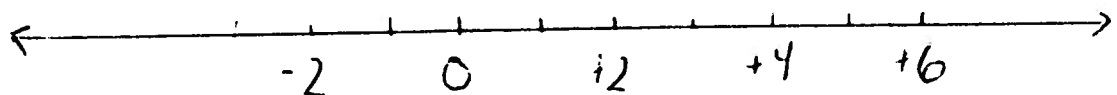


$$\therefore (+3) - (-6) = +9$$

$$(-2) - (-5)$$

↳ change to

$$(-2) - (\quad)$$



$$\therefore (-2) - (-5) = \underline{\quad}$$

# Subtracting Integers Using Coloured Tiles

## Subtracting Positive Integers

$(+7) - (+5) =$	$(+8) - (+4) =$
$(+6) - (+4) =$	$(+5) - (+3) =$

## Subtracting Positive Integers Using the Zero Principle

$(+2) - (+4) =$	$(+4) - (+7) =$
$(+3) - (+6) =$	$(+5) - (+6) =$



## Subtracting Negative Integers Using Coloured Tiles

$(-4) - (-1) =$	$(-4) - (-6) =$
$(-5) - (-2) =$	$(-3) - (-4) =$

Create two different subtraction number sentences. The difference must be (+3).

$(-5) - \underline{\quad\quad} = +3$	$(-5) - \underline{\quad\quad} = +3$
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## ✓ Check

4. Use tiles to add.

a)  $(+1) + (+3) =$  \_\_\_\_\_

b)  $(-2) + (-3) =$  \_\_\_\_\_

c)  $(-4) + (+3) =$  \_\_\_\_\_

d)  $(+4) + (-2) =$  \_\_\_\_\_

5. Add. Use tiles if they help.

a)  $(+2) + (-2) =$  \_\_\_\_\_

b)  $(+11) + (-5) =$  \_\_\_\_\_

c)  $(+7) + (+9) =$  \_\_\_\_\_

d)  $(-3) + (-8) =$  \_\_\_\_\_

e)  $(-12) + (+5) =$  \_\_\_\_\_

f)  $(+7) + (-15) =$  \_\_\_\_\_

## Using Models to Subtract Integers

To add, you combine tiles.

To subtract, you take away tiles.

### Example 3

Use tiles to subtract.  $(-4) - (-3)$

#### Solution

Model the first integer.

Take away tiles that represent the second integer.

Model  $-4$  with 4 black tiles.

To subtract  $-3$ , take away 3 black tiles.



1 black tile remains. It models  $-1$ .

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

If there are not enough tiles to remove, add zero pairs.

#### Example 4

Use tiles to subtract  $(-3) - (+2)$

#### Solution

Model  $-3$  with 3 black tiles.

To take away  $+2$ , 2 white tiles are needed.

Add 2 zero pairs of tiles to provide 2 white tiles.



5 black tiles remain. They model  $-5$ .

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

**H I N T**

Adding a zero pair is equivalent to adding 0. It does not change the value represented by the tiles.



#### Check

6. Use tiles to subtract.

a)  $(+3) - (+2) =$  \_\_\_\_\_

b)  $(+5) - (-3) =$  \_\_\_\_\_

c)  $(-2) - (+2) =$  \_\_\_\_\_

d)  $(-1) - (-3) =$  \_\_\_\_\_

7. Subtract. Use tiles if they help.

a)  $(-9) - (+2) =$  \_\_\_\_\_

b)  $(-8) - (-7) =$  \_\_\_\_\_

c)  $(-3) - (+7) =$  \_\_\_\_\_

d)  $(+2) - (+3) =$  \_\_\_\_\_

e)  $(+3) - (-1) =$  \_\_\_\_\_

f)  $0 - (+3) =$  \_\_\_\_\_

## Subtracting Integers

1. Complete the following questions using the counter method and/or number line.

a)  $(-2) - (+9) =$

b)  $(-10) - (+10) =$

c)  $(-5) - (-5) =$

d)  $(+10) - (-4) =$

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

f)  $(-3) - (-4) =$

2. Are there any observations that can be made about subtracting integers? Explain. Give an example(s) if possible.

# 6.2

## Relating Integer Subtraction to Addition

► **GOAL:** Subtract integers by measuring the distance between them.

1. a) Nathan was asked to calculate  $(-15) - 1$ . He wrote the equivalent addition statement as  $15 + 1$ . Was he correct? \_\_\_\_\_
- b) Selena was asked to calculate  $2 - 4$ . She rewrote the question as  $2 + (-4)$ . Was she correct? \_\_\_\_\_
- c) Annika and Denis were asked to calculate  $4 - (-4)$ . Annika said this difference was equivalent to  $4 + 4$ . Denis said it was equivalent to  $4 + (-4)$ . Who is correct? \_\_\_\_\_

### At-Home Help

Any integer subtraction statement can be rewritten as an equivalent addition statement. Sometimes the addition statement is easier to solve. For example:

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

$$(-1) - 4 = (-1) + (-4) \\ = (-5)$$

$$0 - 4 = 0 + (-4) \\ = (-4)$$

2. Write the equivalent addition statement for each difference. Then calculate.

a)  $7 - (-2) =$  \_\_\_\_\_  $=$  \_\_\_\_\_

b)  $(-3) - 5 =$  \_\_\_\_\_  $=$  \_\_\_\_\_

c)  $0 - 5 =$  \_\_\_\_\_  $=$  \_\_\_\_\_

d)  $1 - 3 =$  \_\_\_\_\_  $=$  \_\_\_\_\_

e)  $10 - (-11) =$  \_\_\_\_\_  $=$  \_\_\_\_\_

f)  $(-4) - 3 =$  \_\_\_\_\_  $=$  \_\_\_\_\_

g)  $(-2) - (-4) =$  \_\_\_\_\_  $=$  \_\_\_\_\_

h)  $7 - 10 =$  \_\_\_\_\_  $=$  \_\_\_\_\_

3. Calculate.

a)  $0 - 9 =$  \_\_\_\_\_

g)  $(-6) - (-7) =$  \_\_\_\_\_

b)  $(-1) - 3 =$  \_\_\_\_\_

h)  $13 - 13 =$  \_\_\_\_\_

c)  $7 - (-3) =$  \_\_\_\_\_

i)  $4 - 12 =$  \_\_\_\_\_

d)  $4 - (-7) =$  \_\_\_\_\_

j)  $(-16) - (-18) =$  \_\_\_\_\_

e)  $(-3) - 6 =$  \_\_\_\_\_

k)  $20 - (-10) =$  \_\_\_\_\_

f)  $(-9) - (-4) =$  \_\_\_\_\_

l)  $11 - 19 =$  \_\_\_\_\_