UNIT 2

Integers

Just for Fun

Magic Square

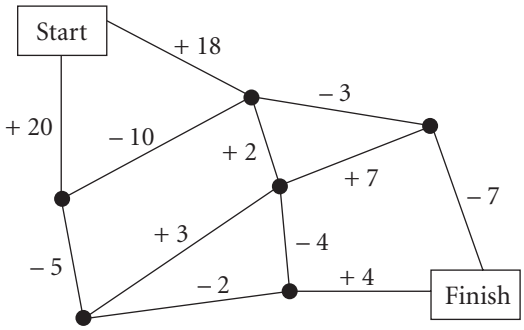
In this magic square, each row, column, and diagonal has a sum of 15.
Use each number from 1 to 9 once.
Complete the magic square.

9		
	3	8

The Square Route

Go from Start to Finish by adding and subtracting.
Do not pass through the same point twice.
Which route has the greatest total?

What is the total? _____

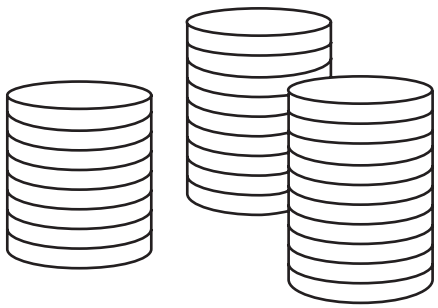


A Game for 2 to 4

The Three Towers

Use counters or coins to build three towers: one of 8, one of 9, and one of 10.

On a turn, a player can either
- take 1 counter from each tower, or
- take 2 counters from one tower



Score 1 point for every counter you collect.
Score 5 points every time you take the last counter from a tower.

Continue until the towers have gone.
If you have the most points, you win!

Variation: Use towers of different heights or a different number of towers.

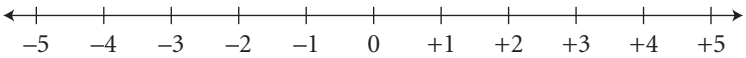
Activating Prior Knowledge

What Is an Integer?

➤ A **positive number** is greater than 0.
A **negative number** is less than 0.
0 is neither positive nor negative.

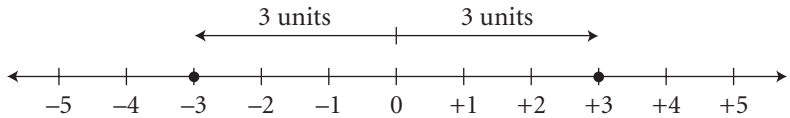
➤ The **integers** are the numbers
... –3, –2, –1, 0, +1, +2, +3, ...

You can show integers on a number line.



➤ **Opposite integers** are the same distance from 0 on a number line but are on opposite sides of 0.

For example, –3 and +3 are opposite integers.



Check

1. Use a positive or negative integer to represent each situation.

a) losing $15: _____

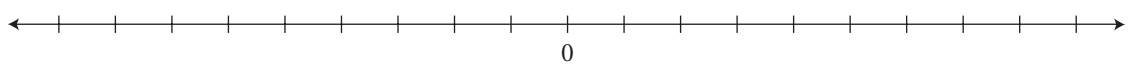
b) throwing a ball 9 m straight up: _____

c) seventeen days from now: _____

d) an elevator descending 8 floors: _____

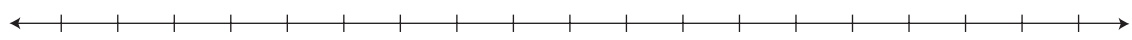
2. Mark each integer on the number line.

a) +2 **b)** –7 **c)** +8 **d)** –3



3. Write the opposite of each integer.
Show the pairs of opposite integers on the number line.

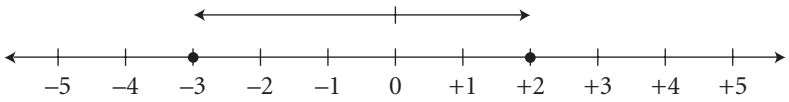
a) +1: _____ **b)** –5: _____ **c)** –7: _____



Comparing and Ordering Integers

➤ You can use a number line to compare integers.

Compare +2 and –3.

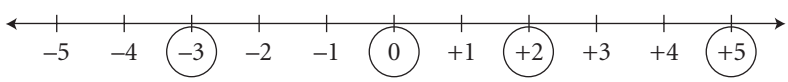


+2 is to the right of –3 on a number line.
+2 is greater than –3, so you write: +2 > –3
–3 is less than +2, so you write: –3 < +2
–3 < +2 or +2 > –3

➤ To order integers from least to greatest,
write them as they appear from left to right on a number line.

➤ To order integers from greatest to least,
write them as they appear from right to left on a number line.

Order +2, –3, 0, and +5 from least to greatest.



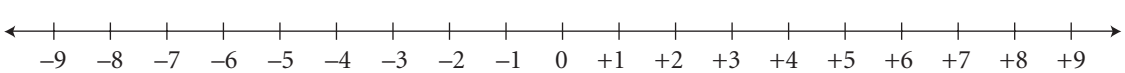
From left to right, or from least to greatest: –3, 0, +2, +5

Check

4. Place either > or < between the integers. Use a number line if it helps.

a) +9 _____ 0 **b)** +7 _____ +2 **c)** +4 _____ +8

d) –10 _____ –1 **e)** –2 _____ +10 **f)** +2 _____ –10



5. Order the integers in each set from greatest to least.

a) +2, +4, –3 **b)** –3, +1, –4 **c)** +2, –7, –18

_____ _____ _____

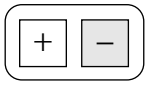
Quick Review

At Home At School

➤ You can use tiles to represent integers.

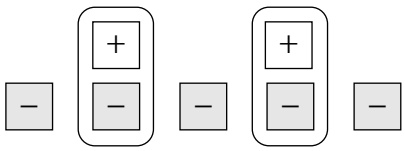
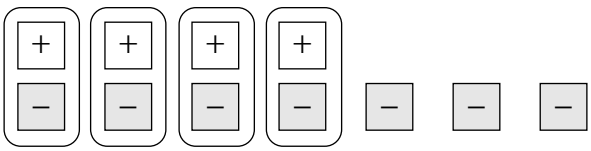
represents +1.

represents –1.



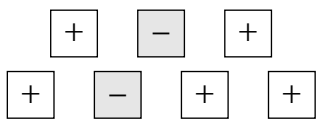
This is a zero pair.

Here are 3 ways to model –3.

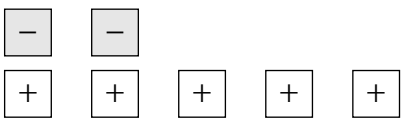
- 
- 
- 

Each set models –3.

➤ Write the integer modelled by these tiles.

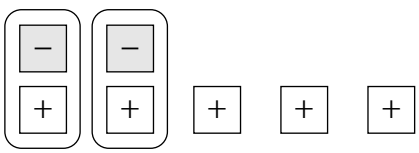


Arrange the tiles in rows.



There are 3 [+] tiles left. They model +3.

Circle the zero pairs.



Practice

1. Write the integer modelled by each set of tiles.

a) _____ [+] [+] [+] [+]

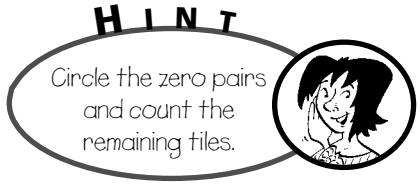
b) _____ [−] [−] [−] [−] [−]

c) _____ [+] [+] [+] / [−] [−]

d) _____ [+] / [−] [−] [−] [−]

e) _____ [+] [+] [+] / [−] [−] [−] [−]

f) _____ [+] [+] [+] [+] [+] [+] / [−]



2. Draw tiles to model each integer.

a) +2

b) +5

c) –1

d) –3

e) +8

f) –7

3. Use tiles representing +1 and tiles representing –1.
Draw tiles to model +2 two more ways.

[+] [+] [+] [+]
[−] [−]

4. Explain why you cannot model +2 using three tiles.

_____

_____

_____

_____

2.2 Adding Integers with Tiles

Quick Review

You can add integers by modelling with tiles.

- Add: (–2) + (–4)

–2: [–] [–]

–4: [–] [–] [–] [–]

There are 6 [–] tiles.

They model –6.

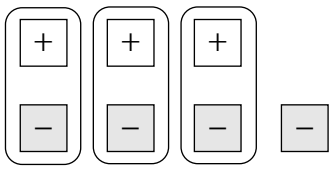
So, (–2) + (–4) = –6

- Add: (+3) + (–4)

+3: [+] [+] [+]

–4: [–] [–] [–] [–]

Circle the zero pairs. Count the tiles that are left.



There are 3 zero pairs.

There is 1 [–] tile left.

It models –1.

So, (+3) + (–4) = –1

Practice

1. Use tiles representing +1 and tiles representing –1 to add (+4) + (–6).

Circle zero pairs.

What tiles are left? _____

So, (+4) + (–6) = _____

2. Use tiles to add (–5) + (+3).

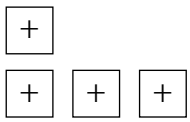
Circle zero pairs.

What tiles are left? _____

(–5) + (+3) = _____

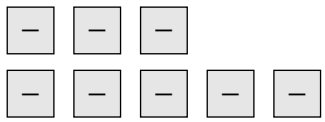
3. What sum does each set of tiles model?

a)



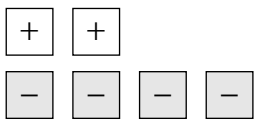
(+1) + (+3) = _____

b)



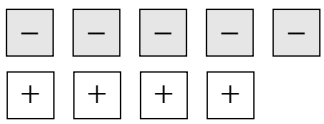
(–3) + _____ = _____

c)



_____ + _____ = _____

d)



_____ + _____ = _____

4. Draw tiles to represent each sum. Complete the addition equation.

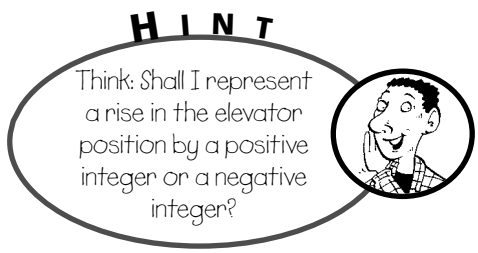
a) (+3) + (+4) = _____

b) (–2) + (+5) = _____

c) (–7) + (+2) = _____

d) (–3) + (+4) = _____

5. A mine elevator was at level –5 (5 levels below ground).
It went up 3 levels.
What level is it at now? _____



2.3 Adding Integers on a Number Line

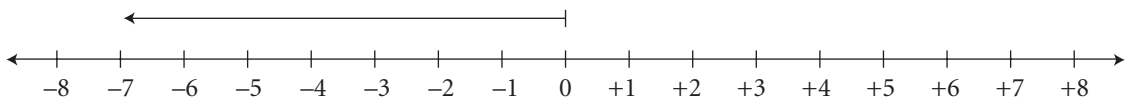
Quick Review

At Home
At School

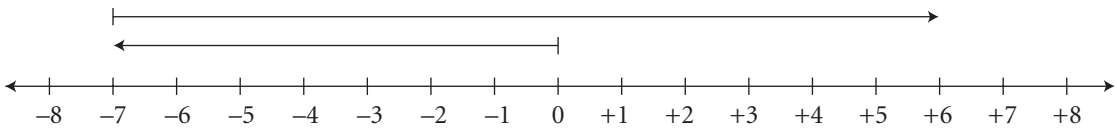
➤ You can add integers using a number line.

To add a positive integer, move right.
To add a negative integer, move left.

To add: (–7) + (+13)
Start at –7.
This is 7 units to the left of 0.



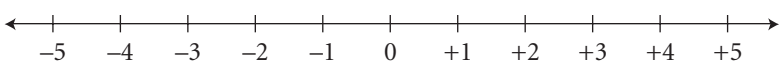
Then, add +13.
Move 13 units to the right.



(–7) + (+13) = +6

Practice

1. Use the number line to add (+3) + (–7).



Start at 0. Move 3 units right.

Move _____ units left.

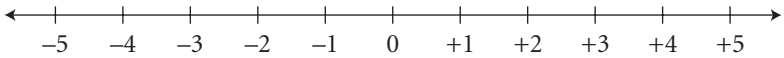
So, (+3) + (–7) = _____

Key to Success

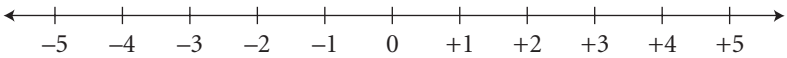
If you know different methods, you can solve a problem in one way, and check the answer in another way.

2. Use the number line to add.

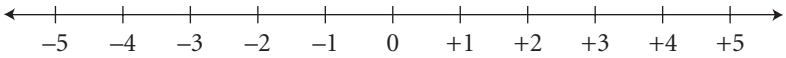
a) (+4) + (–5) = _____



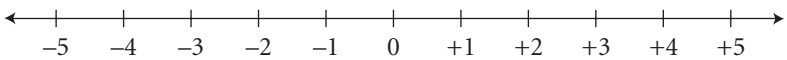
b) (–2) + (–2) = _____

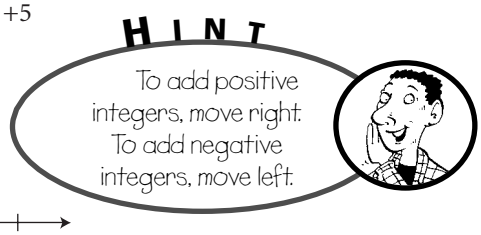


c) (–4) + (+8) = _____



d) (–1) + (+2) = _____





3. Add.

a) (+4) + (+7) = _____

b) (–2) + 0 = _____

c) (+9) + (–5) = _____

d) (–10) + (+3) = _____

4. Match each addition statement with its sum. The first one is done for you.

(–6) + (–5)	+11
(–6) + (+5)	–11
(+6) + (–5)	+1
(+6) + (+5)	–1

5. Add, using a method of your choice.
Use a different method to check your work.

a) (–1) + (+5) = _____

b) (–8) + (+2) = _____

c) (–8) + (–6) = _____

d) (+2) + (–5) = _____

6. Kim earned $24 baby-sitting.
He spent $7 buying lunch at school.

How much does Kim have left? _____

7. Create a problem that can be solved using integer addition.
Show the solution.
Here are some possible ideas.

- temperature change
- elevation change
- bank balance

_____

_____

_____

_____

8. Play this game with 2 to 4 people.
You will need a deck of cards with face cards removed, paper, and pencil.

Red cards are negative. Black cards are positive.

Deal 2 cards to each player.

➤ Players find the sum of their 2 numbers.
➤ If a player has a sum of 0, he or she is "out."
➤ Each remaining player takes 1 card from the deck.
Add this number to the previous sum.
➤ Any player with a total of 0 is "out."
➤ Play continues until 1 player remains.
➤ The last player in the game wins.

2.4 Subtracting Integers with Tiles

Quick Review

➤ To model subtraction using tiles, begin by modelling the first number. Then, take away tiles that model the number to be subtracted. If there are not enough tiles to take away, add zero pairs.

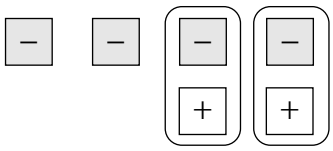
Use tiles to subtract. (–2) – (–4)

Model –2. [–] [–]

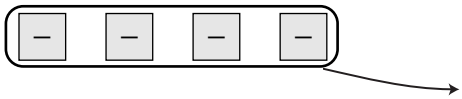
There are not enough tiles to take away –4.

You need more [–] tiles.

Add 2 zero pairs.

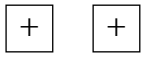


Now take away 4 [–] tiles.



There are 2 [+] tiles left.

These model +2, so we write:

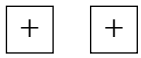


(–2) – (–4) = +2

Practice

1. Use tiles to subtract (+2) – (+5).

Start with 2 [+] tiles.



Can you take away +5 from +2? _____

Add zero pairs until you can take away 5 [+] tiles.

So, (+2) – (+5) = _____

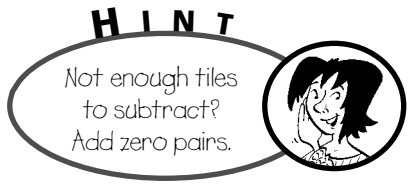
2. Use tiles to subtract (–3) – (+4).

Model –3 with [–] tiles.

Can you take away +4 from –3? _____

Add zero pairs until you can take away 4 [+] tiles.

So, (–3) – (+4) = _____



3. Draw tiles to represent each difference.
Then complete the subtraction equation.

a) (+4) – (+3) = _____

[+] [+] [+] [+]

b) (–2) – (–5) = _____

[–] [–]

c) (+1) – (+6) = _____

d) (+5) – (+3) = _____

4. Subtract.

a) (–7) – (–5) = _____

b) (+3) – (+8) = _____

c) (+6) – (–4) = _____

d) (+3) – (–2) = _____

5. Subtract. Then complete the subtraction equation.

C. (+3) – (+5) = _____

E. (–2) – (–1) = _____

L. (+3) – (–1) = _____

I. (+3) – (+3) = _____

H. (–2) – (+1) = _____

T. (+3) – (–3) = _____

O. (+3) – (+1) = _____

N. (–2) – (+3) = _____

R. (+3) – (–5) = _____

Why is it always warm in Brazil and Peru? Fill in the corresponding letters to find out.

They are ____ ____ ____ ____ ____ ____ ____ ____ !
–5 +2 +6 –2 –3 0 +4 –1

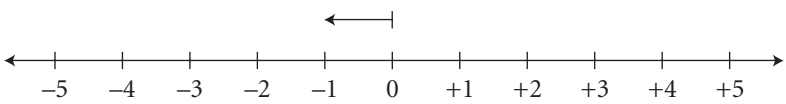
2.5 Subtracting Integers on a Number Line

Quick Review

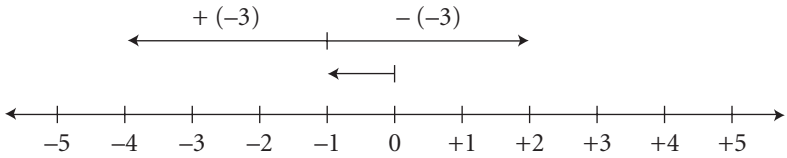
➤ You can subtract integers using a number line.

When you subtract, you move in the opposite direction of addition.
Subtraction is the opposite of addition.

To subtract: (–1) – (–3)
Start at –1.
This is 1 unit to the left of 0.



Then, move in the opposite direction of adding (–3).

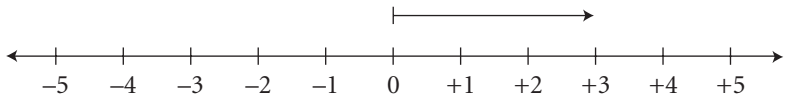


So, (–1) – (–3) = +2

➤ The result is the same as adding the opposite integer.
(–1) – (–3) is the same as (–1) + (+3). Both equal +2.

Practice

1. Use the number line to subtract (+3) – (+5).



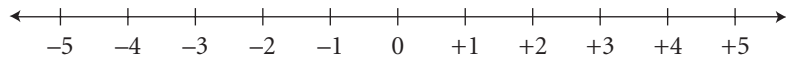
Start at 0. Move 3 units to the _____.

Then move _____ units left.

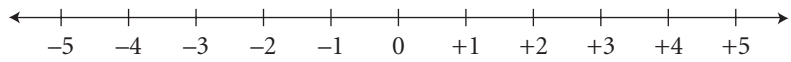
So, (+3) – (+5) = _____

2. Use a number line to subtract.

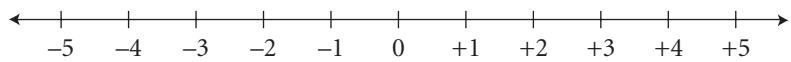
a) (+3) – (+4) = _____



b) (–2) – (+3) = _____

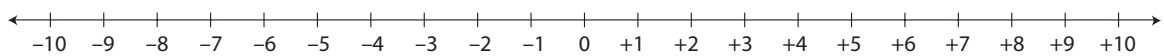


c) (–1) – (–6) = _____



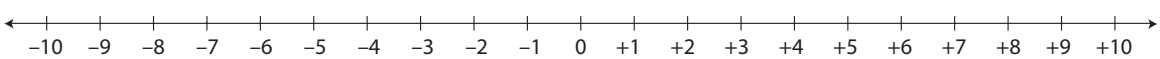
3. Rewrite each subtraction as an addition statement. Then use a number line to solve.

a) (+4) – (+7) = (+4) + _____



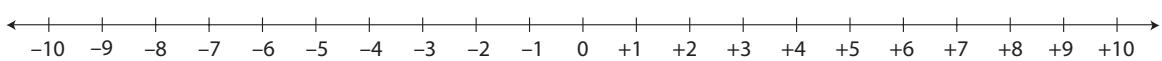
(+4) – (+7) = _____

b) (–3) – (–5) = (–3) + _____



(–3) – (–5) = _____

c) (–1) – (+4) = _____ + _____



(–1) – (+4) = _____

4. Rewrite each subtraction as the addition of the opposite integer. Then solve.

a) (+2) – (–6) = (+2) + (+6)

= _____

b) (–2) – (–4) = (–2) + _____

= _____

c) (+1) – (+5) = _____ + _____

= _____

d) (–12) – (+9) = _____ + _____

= _____

5. Subtract.

a) (+4) – (+7) = _____

b) (+6) – (–5) = _____

c) 0 – (–4) = _____

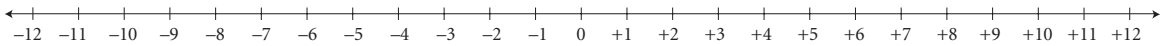
d) (–10) – (–2) = _____

e) (+2) – (+12) = _____

f) (–1) – (–10) = _____

Tip

Use a second method to check your answer.

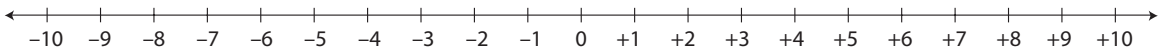


6. **a)** Ava's golf score changed from 2 above par to 3 below par.
How did her score change?

(–3) – (+2) = _____ It decreased by _____.

b) Murphy's golf score changed from 1 below par to 5 above par.
How did his score change?

It _____ by _____.



7. Play this game with a partner.
You will need a deck of cards with the face cards removed.
Use red cards to represent positive integers and black cards to represent negative integers.

- ➤ Shuffle the cards. Each player draws one card.
  The player with the greater number takes the first turn.
- ➤ Shuffle the cards again and place them in a pile, face down.
- ➤ The player turns over the top 4 cards. She chooses 2 cards to play.
  She uses the integers represented by these cards to make a subtraction statement.
  The player records the difference.
- ➤ The partner checks the difference. This is the player's score for the round.
  If the result is incorrect, it is erased.
  The 4 cards are placed at the bottom of the pile.
- ➤ The play passes to the partner.
  Each player records her or his own differences.
- ➤ After 4 rounds, the player with the lesser total score wins.

In Your Words

Here are some of the important mathematical words of this unit.
Build your own glossary by recording definitions and examples here. The first one is done for you.

negative number any number less than zero

A negative number appears to the left of zero on a number line.

For example, -2, -18, and -4000 are negative numbers.

integer _____

positive integer _____

negative integer _____

opposite integers _____

zero pair _____

List other mathematical words you need to know.

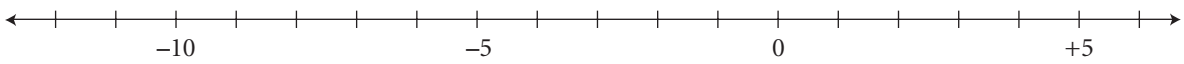
_____

Unit Review

LESSON

APK **1.** Show each integer on the number line.

a) +1 **b)** –4 **c)** –11 **d)** +3



2. **a)** Place either < or > between the integers.

i) +1 _____ –2 **ii)** –8 _____ 0 **iii)** –11 _____ –18

b) Order all the integers in part a from least to greatest.

_____, _____, _____, _____, _____, _____

2.1 **3.** Write the integer modelled by each set of tiles.

a)

+	+	+	+
+	–	+	+

_____

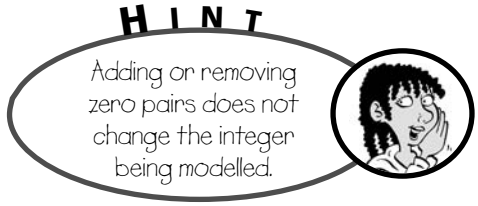
b)

+	–	+	–
–	–	–	

_____

4. One way to model –2 is shown.
Draw tiles to model –2 three more ways.

–	+
–	–



2.2 **5.** Use tiles to add.

a) (+6) + (–5) = _____

+	+	+	+	+	+

b) (–3) + (+2) = _____

2.3 **6.** What type of integer do you get when you add two negative integers?
Explain how you know.

_____

_____

_____

LESSON

2.4 **7.** Use tiles to add or subtract.

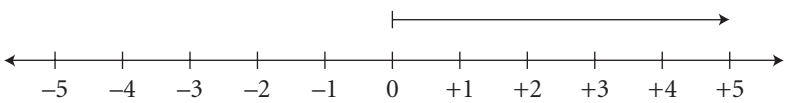
a) (+3) – (–2) = _____

b) (+5) + (–4) = _____

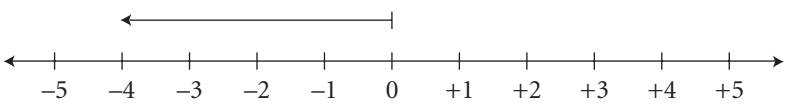
+	+	+

2.5 **8.** Use a number line to add or subtract.

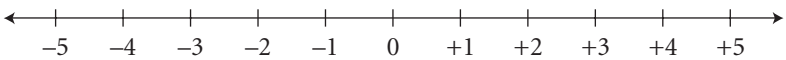
a) (+5) + (–8) = _____



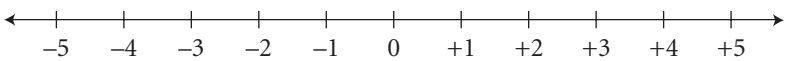
b) (–4) – (–7) = _____



c) (–4) + (+6) = _____



d) (–3) – (–7) = _____



9. Calculate each difference.

a) The temperature went from –7°C to +8°C.

_____

b) The temperature went from +20°C to +3°C.

_____