NS7-86 Gains and Losses

1. Write a plus sign (+) if the net result is a gain. Write a minus sign (−) if the net result is a loss.

   a) a gain of $4 ___+___

   b) a loss of $2 _____

   c) a gain of $3_____

   d) a gain of $1 and a loss of $4 ___−___

   e) a gain of $4 and a loss of $2 _____

   f) a loss of $2 and a gain of $3 _____

   g) a loss of $5 and a gain of $1 _____

2. Write each sequence of gains and losses using numbers and signs (+ and −).

   a) a gain of $3 and a loss of $5 ___+ 3 − 5___

   b) a loss of $3 and a gain of $7 ___− 3 + 7___

   c) a loss of $5 and a gain of $4 _____

   d) a gain of $7 and a loss of $6 _____

   e) a loss of $6, a gain of $9, a loss of $3, then a gain of $2 _____− 6 + 9 − 3 + 2_____

   f) a gain of $2, a gain of $4, a loss of $5, then a gain of $1 _____

   g) a loss of $4, a loss of $7, a gain of $9, then a gain of $4 _____

   h) a gain of $3, a loss of $2, a loss of $1, then a gain of $4 _____

3. Decide whether each sequence of gains and losses is a net gain (+) or a net loss (−).

   a) + 5 − 3 ___+___

   b) + 3 − 5 _____

   c) − 4 + 3 _____

   d) − 6 + 1 _____

   e) + 9 − 8 _____

   f) + 6 − 9 _____

   g) − 3 + 6 _____

   h) − 1 + 34 _____

   i) − 8 + 35 _____

4. How much was gained or lost overall? Use + for a gain, − for a loss, and 0 for no gain or loss.

   a) + 6 − 5 = ___+ 1___

   b) − 4 + 3 = _____

   c) + 5 − 5 = _____

   d) − 6 + 6 = _____

   e) − 3 + 5 = _____

   f) + 7 − 11 = _____

   g) + 4 + 2 = _____

   h) − 3 − 1 = _____

   i) − 6 − 2 = _____

   j) − 6 + 2 = _____

   k) + 6 − 2 = _____

   l) + 6 + 2 = _____

   m) + 3 − 8 = _____

   n) − 5 + 2 = _____

   o) + 9 − 4 = _____

   p) − 5 + 7 = _____

   q) − 3 + 3 = _____

   r) + 8 − 87 = _____

5. Group the gains (+'s) together and the losses (−'s) together. Then write the total gain and the total loss.

   a) + 4 − 3 + 2 = ___+ 4 + 2 − 3___

      = ___+ 6 − 3___

   b) − 3 + 4 − 2 = _____

      = _____

   c) − 6 + 8 − 4 = _____

      = _____

   d) + 9 − 6 + 2 = _____

      = _____

BONUS ▶ − 3 + 4 + 2 − 1 − 5 + 4 + 1 + 2 − 3 = _____

= _____

6. Circle all the gains first. Then group the gains (+'s) and losses (−'s).
Then say how much was gained or lost overall.

a) $+7-6+2 =$ _____

b) $+5-7+4 =$ _____

           $=$ _____

           $=$ _____

           $=$ _____

           $=$ _____

c) $-5-1 \boxed{+3} -2 \boxed{+4} \boxed{+6} -4 =$ $+3+4+6-5-1-2-4$

                          $=$ $+13-12$

                          $=$ $+1$

d) $+6+3-4-5-8+2-1 =$ _____

                         $=$ _____

                         $=$ _____

e) $-4+5+6-3-2+8-5+1-4 =$ _____

                            $=$ _____

                            $=$ _____

> When the same number is gained and lost, the two numbers add 0 to the expression,
> so we can cancel them.

7. Cancel the numbers that make 0. Then write the total gain or loss.

a) $\cancel{-3}+7+\cancel{3} =$ ___$+7$___

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

c) $+3+4-3 =$ _____

d) $-6-4+6 =$ _____

e) $-8+7+8 =$ _____

f) $-4+4+2 =$ _____

g) $+3+5-5 =$ _____

h) $-8-6+6 =$ _____

i) $-7-8+7 =$ _____

j) $+8-3+4+3-4 =$ _____

k) $-3+4+2+3-2 =$ _____

l) $-8+8-6+7-7 =$ _____

m) $-4-3+2+3-2 =$ _____

n) $-5-4+4-3+5 =$ _____

o) $+6-5-6-2+5 =$ _____

p) $\cancel{-3}+\cancel{2}+4-5\cancel{-2}+\cancel{6}+\cancel{3}\cancel{-6} =$ $+4-5$

                these cancel $=$ ___-1___

q) $-5+2+6-2+3+4+5-3 =$ _____

                            $=$ _____

r) $+8-10-4+7-2+10-7-4 =$ _____

                            $=$ _____

s) $-4-3+2-7+4+2+3 =$ _____

                        $=$ _____

8. Find the mistake in the cancelling. Circle the two numbers that should not
have been cancelled.

$\cancel{-3}+\cancel{4}+\cancel{2}+6\cancel{-2}+\cancel{3}+\cancel{4}\cancel{-7}+\cancel{7} = +6$

Number Sense 7-86

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.

◄——— smaller   larger ———►

$$-8 \quad -7 \quad -6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8$$
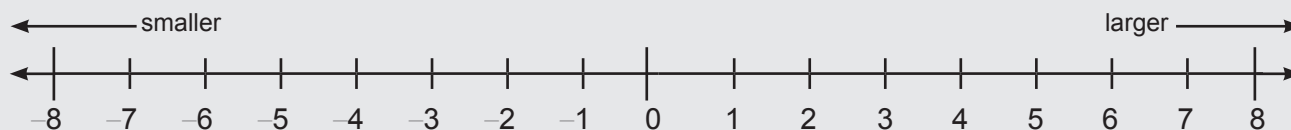
1. Write three integers that are less than zero.   _____   _____   _____

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

$$-8 \qquad\qquad\qquad\qquad 0 \qquad\qquad\qquad\qquad 8$$

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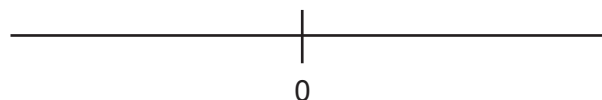
c) Write the correct symbol (< or >) in each box.

If $0 < a < b$, then 0 ☐ −a ☐ −b.

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Number Sense 7-87

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

$\qquad\qquad\qquad = (-3) + 4 + (-5).$

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) = $ _____

   $\qquad\qquad\quad = $ ___$+3$___ $\qquad\qquad\quad = $ _____ $\qquad\qquad\quad = $ _____

   d) $(+3) + (+4) = $ _____   e) $(-3) + (-8) = $ _____   f) $(-7) + (+9) = $ _____

   $\qquad\qquad\quad = $ _____ $\qquad\qquad\quad = $ _____ $\qquad\qquad\quad = $ _____

   g) $(+5) + (-2) + (+3) = $ ____$+5 - 2 + 3$____   h) $(-6) + (+3) + (+5) = $ _____

   $\qquad\qquad\quad = + $ _8_ $ - $ _2_ $ = $ _$+6$_ $\qquad\qquad\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) ($\cancel{+5}$) + ($\cancel{-5}$) + (+3) = ___+3___

b) (−5) + 7 + (−7) = _____

c) (+5) + (−4) + (+4) = _____

d) (−4) + (+6) + (−6) = _____

e) (+4) + (−1) + (+1) = _____

f) (+8) + (−8) + (+2) = _____

g) (−6) + 6 + (−3) = _____

h) (+9) + (−9) + (+4) = _____

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

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

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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) = ___+ 2___

    $+ 1 + 1 + \cancel{1} + \cancel{1} - \cancel{1} - \cancel{1}$

b) (−2) + (−1) = _____

c) (+6) + (−7) = _____

d) (+5) + (−3) = _____

e) (+4) + (+5) = _____

f) (−1) + (−2) = _____

g) (−3) + (−2) = _____

h) (−2) + (+2) = _____

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

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

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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**

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.

$$-3 \quad -2 \quad -1 \quad 0 \quad +1 \quad +2 \quad +3 \quad +4$$
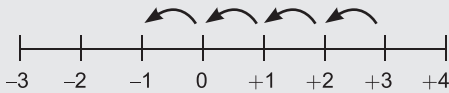
(+3) + (–4) = (–1) or 3 – 4 = –1

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.

$$-3 \quad -2 \quad -1 \quad 0 \quad +1 \quad +2 \quad +3 \quad +4$$
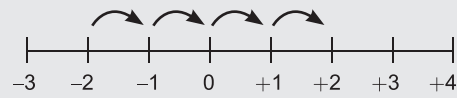
(–2) + (+4) = (+2) or –2 + 4 = 2

1. Use a number line to add the integers.

a) (+3) + (–5) = _____

b) (–4) + (–1) = _____

$$-3 \quad -2 \quad -1 \quad 0 \quad +1 \quad +2 \quad +3 \quad +4$$

$$-6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad +1$$

c) (+1) + (+3) = _____

d) (–3) + (+2) = _____

$$-3 \quad -2 \quad -1 \quad 0 \quad +1 \quad +2 \quad +3 \quad +4$$

$$-6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad +1$$

e) (+2) + (–2) = _____

f)   (–3) + (+3) = _____

$$-3 \quad -2 \quad -1 \quad 0 \quad +1 \quad +2 \quad +3 \quad +4$$

$$-6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad +1$$
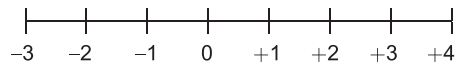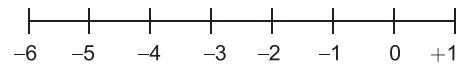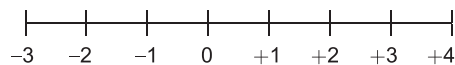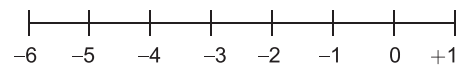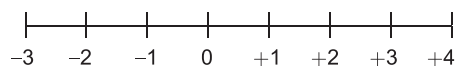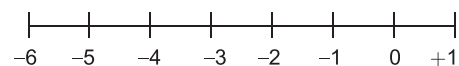
2. Write each addition from Question 1 as a sequence of gains and losses to check your answers.

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, _____, _____, _____

b) –10, –8, –6, –4, _____, _____, _____

Subtracting Integers on a Number Line

Subtraction undoes addition, so to subtract an integer, do the opposite of what you would do to add the integer.

Example: (−5) − (−2)   To add (−2), move __2__ units to the _____*left*_____.

To subtract (−2), move __2__ units to the _____*right*_____.
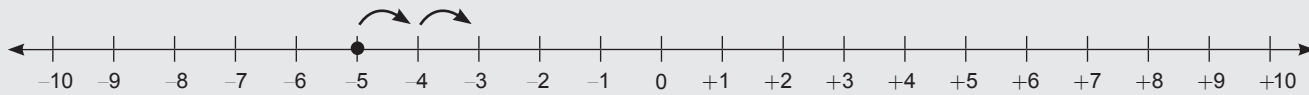
So (−5) − (−2) = __*−3*__

1. Use a number line to subtract.

a) (+6) − (−3)

To add (−3), move _____ units _____.
To subtract (−3), move _____ units _____.
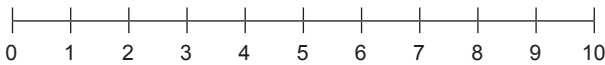
So (+6) − (−3) = _____

b) (+5) − (+2)

To add (+2), move _____ units _____.
To subtract (+2), move _____ units _____.
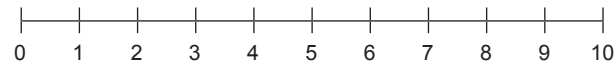
So (+5) − (+2) = _____

c) (−5) − (+4)

To add (+4), move _____ units _____.
To subtract (+4), move _____ units _____.
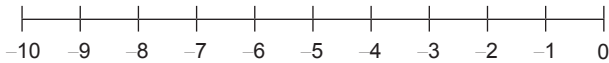
So (−5) − (+4) = _____

d) (−5) − (−3)

To add (−3), move _____ units _____.
To subtract (−3), move _____ units _____.
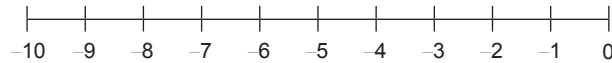
So (−5) − (−3) = _____

e) (+3) − (+5)

To add (+5), move _____ units _____.
To subtract (+5), move _____ units _____.
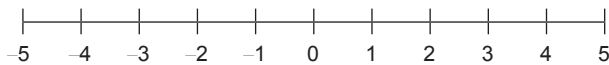
So (+3) − (+5) = _____

f) (+2) − (−1)

To add (−1), move _____ units _____.
To subtract (−1), move _____ units _____.
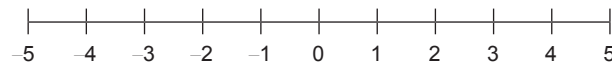
So (+2) − (−1) = _____

g) (−1) − (−3)

To add (−3), move _____ units _____.
To subtract (−3), move _____ units _____.

So (−1) − (−3) = _____

h) (−2) − (+3)

To add (+3), move _____ units _____.
To subtract (+3), move _____ units _____.

So (−2) − (+3) = _____

2. a) Would you move **left** or **right** on a number line?

   To add $+5$, move _____ 5 units.

   To add -5, move _____ 5 units.

   To subtract $+5$, move _____ 5 units.

   To subtract -5, move _____ 5 units.

b) Look at your answers in part a).

   Subtracting $+5$ gives the same result as adding _____ so ▢ $- (+5) =$ ▢ $+$ _____.

   Subtracting -5 gives the same result as adding _____ so ▢ $- (-5) =$ ▢ $+$ _____.

3. Write each difference as a sum and then calculate the answer.

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

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

   c) $(+4) - (-7) = (+4) + \underline{\quad\quad}$
       $= \underline{\quad\quad}$

   d) $(-3) - (+6) = (-3) + \underline{\quad\quad}$
       $= \underline{\quad\quad}$

   e) $(-1) - (+6) = (-1) + \underline{\quad\quad}$
       $= \underline{\quad\quad}$

   f) $(+3) - (-8) = (+3) + \underline{\quad\quad}$
       $= \underline{\quad\quad}$

4. Write the correct integer in the blank.

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

   b) $x - (+7) = x + \underline{\quad\quad}$

   c) $x - (-25) = x + \underline{\quad\quad}$

5. Subtract by continuing the pattern.

   a)
   $9 - 4 = \underline{\quad\quad}$
   $9 - 3 = \underline{\quad\quad}$
   $9 - 2 = \underline{\quad\quad}$
   $9 - 1 = \underline{\quad\quad}$
   $9 - 0 = \underline{\quad\quad}$
   $9 - (-1) = \underline{\quad\quad}$
   $9 - (-2) = \underline{\quad\quad}$
   $9 - (-3) = \underline{\quad\quad}$
   $9 - (-4) = \underline{\quad\quad}$
   $9 - (-36) = \underline{\quad\quad}$

   b)
   $5 - 4 = \underline{\quad\quad}$
   $5 - 3 = \underline{\quad\quad}$
   $5 - 2 = \underline{\quad\quad}$
   $5 - 1 = \underline{\quad\quad}$
   $5 - 0 = \underline{\quad\quad}$
   $5 - (-1) = \underline{\quad\quad}$
   $5 - (-2) = \underline{\quad\quad}$
   $5 - (-3) = \underline{\quad\quad}$
   $5 - (-4) = \underline{\quad\quad}$
   $5 - (-36) = \underline{\quad\quad}$

   c)
   $12 - 4 = \underline{\quad\quad}$
   $12 - 3 = \underline{\quad\quad}$
   $12 - 2 = \underline{\quad\quad}$
   $12 - 1 = \underline{\quad\quad}$
   $12 - 0 = \underline{\quad\quad}$
   $12 - (-1) = \underline{\quad\quad}$
   $12 - (-2) = \underline{\quad\quad}$
   $12 - (-3) = \underline{\quad\quad}$
   $12 - (-4) = \underline{\quad\quad}$
   $12 - (-36) = \underline{\quad\quad}$

6. Look at the patterns in Question 5. As the number being subtracted decreases by 1, what happens to the difference? How does $17 - (-15)$ compare to $17 - 0$?

NS7-91 Subtraction Using a Thermometer

What does $2 - 5$ mean on a thermometer?

Look at $5 - 2$. If the temperature is 5° and drops 2°, the temperature becomes **$5 - 2 = 3$°**.

Now switch the 2 and the 5. If the temperature is 2° and drops 5°, the temperature becomes **$2 - 5 = -3$°**.
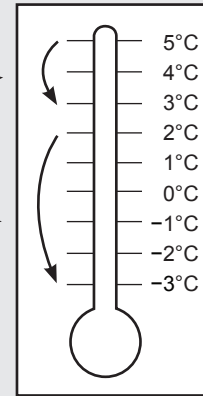
1. Use the thermometer model to calculate each expression.

   a) If the temperature is 4° and the temperature drops 3°, the temperature becomes $4° - 3° = $ _____°.

   If the temperature is 3° and the temperature drops 4°, the temperature becomes $3° - 4° = $ _____°.

   b) If the temperature is 5° and the temperature drops 1°, the temperature becomes $5° - 1° = $ _____°.

   If the temperature is 1° and the temperature drops 5°, the temperature becomes $1° - 5° = $ _____°.

   c) $6 - 4 = $ _____ and $4 - 6 = $ _____

   d) $5 - 4 = $ _____ and $4 - 5 = $ _____

   e) $4 - 1 = $ _____ and $1 - 4 = $ _____

   f) $6 - 3 = $ _____ and $3 - 6 = $ _____

   g) $6 - 2 = $ _____ and $2 - 6 = $ _____
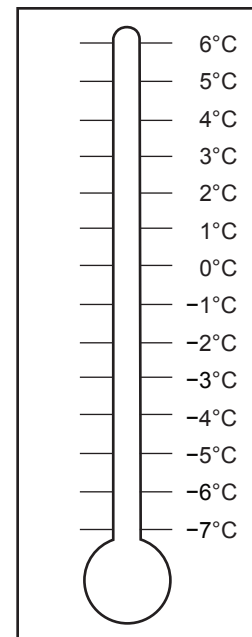
2. a) Look at your answers in Question 1. In general, how does $a - b$ compare to $b - a$?

   _____

   b) Use your answer to part a) to predict $98 - 101$: _____

   c) Check your prediction on a calculator. Were you correct? _____

3. Use the thermometer model to subtract.

   a) $(-2) - 3 = $ _____ and $(-3) - 2 = $ _____   b) $(-1) - 5 = $ _____ and $(-5) - 1 = $ _____

   c) $(-4) - 2 = $ _____ and $(-2) - 4 = $ _____   d) $(-4) - 3 = $ _____ and $(-3) - 4 = $ _____

4. Look at your answers in Question 3.

   How does $(-a) - b$ compare to $(-b) - a$? _____

   How do both of these compare to $a + b$? _____

5. Use the thermometer model to find the negative integer minus the positive integer. Then change the sign (as you did in Question 2) to find the positive integer minus the negative integer.
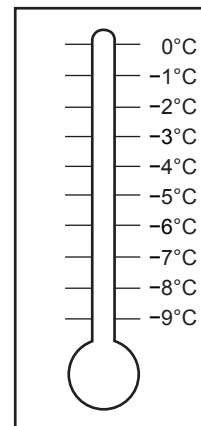
a) $(-2) - 3 =$ ___-5___

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

b) $(-1) - 4 =$ _____

so $4 - (-1) =$ _____

c) $(-5) - 3 =$ _____

so $3 - (-5) =$ _____

d) $(-5) - 4 =$ _____

so $4 - (-5) =$ _____

e) $(-4) - 5 =$ _____

so $5 - (-4) =$ _____

f) $(-6) - 3 =$ _____

so $3 - (-6) =$ _____

Thermometer markings: 0°C, −1°C, −2°C, −3°C, −4°C, −5°C, −6°C, −7°C, −8°C, −9°C

6. Copy each answer from Question 5. How can you get the same answer by adding instead of subtracting? Write the correct positive integer in the blank.

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

so $3 - (-2) = 3 +$ ___(+2)___

b) $4 - (-1) =$ _____

so $4 - (-1) = 4 +$ _____

c) $3 - (-5) =$ _____

so $3 - (-5) = 3 +$ _____

d) $4 - (-5) =$ _____

so $4 - (-5) = 4 +$ _____

e) $5 - (-4) =$ _____

so $5 - (-4) = 5 +$ _____

f) $3 - (-6) =$ _____

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

7. In general, $a - (-b)$ gives the same result as $a +$ _____.

8. Change the subtraction of a negative integer to the addition of a positive integer.

a) $4 - (-2) = 4 +$ ___2___

$=$ ___6___

b) $7 - (-7) = 7 +$ _____

$=$ _____

c) $8 - (-3) = 8 +$ _____

$=$ _____

d) $(-5) - (-1) = (-5) +$ _____

$=$ _____

e) $(-3) - (-4) = -3 +$ _____
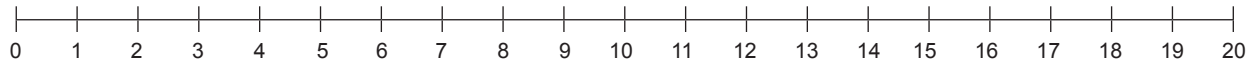
$=$ _____

f) $(-2) - (-5) = -2 +$ _____

$=$ _____

To subtract a positive integer, imagine moving down the thermometer.

To subtract a negative integer, add its opposite or move up the thermometer.

---

9. a) $(-4) - 6 =$ _____

b) $(-4) - (-6) =$ _____

c) $(-2) - (-4) =$ _____

d) $6 - 7 =$ _____

e) $(-9) - 4 =$ _____

f) $6 - (-7) =$ _____

g) $2 - 7 =$ _____

h) $2 - (-7) =$ _____

i) $-2 - (-7) =$ _____

j) $(-2) - 7 =$ _____

k) $(-7) - 2 =$ _____

l) $7 - (-2) =$ _____

1. How many units apart are the two whole numbers?

```
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤
0  1  2  3  4  5  6  7  8  9  10 11 12 13 14 15 16 17 18 19 20
```
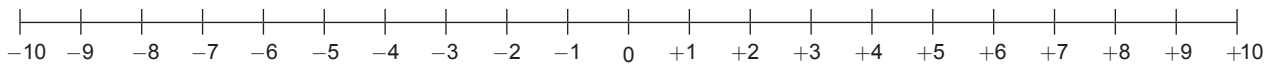
a) 2 and 5 are _____ units apart.

b) 9 and 14 are _____ units apart.

c) 15 and 17 are _____ units apart.

d) 7 and 13 are _____ units apart.

2. Write each statement in Question 1 as a subtraction sentence. Subtract the smaller number from the larger number.

a) ___ *5 − 2 = 3* ___

b) _____

c) _____

d) _____

3. How many units apart are the two integers?

```
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤
−10 −9 −8 −7 −6 −5 −4 −3 −2 −1  0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10
```

a) −5 and 2 are _____ units apart.

b) −3 and 3 are _____ units apart.

c) −8 and −4 are _____ units apart.

d) −6 and 2 are _____ units apart.

4. Write each statement in Question 3 as a subtraction sentence. Subtract the smaller number from the larger number.

a) ___ *2 − (−5) =* ___

b) _____

c) _____

d) _____

> $a - b$ and $b - a$ are opposite integers because $a - b + b - a = 0$. So to get $a - b$ from $b - a$, just change the sign (from $+$ to $-$ or from $-$ to $+$).

5. Subtract the smaller integer from the larger integer by using the distance apart. Then subtract the larger integer from the smaller integer by changing the sign.

a) $4 - (-3) =$ _____

so $(-3) - 4 =$ _____

b) $(-2) - (-9) =$ _____

so $(-9) - (-2) =$ _____

c) $7 - 3 =$ _____

so $3 - 7 =$ _____

d) $6 - (-2) =$ _____

so $(-2) - 6 =$ _____

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

so $(-10) - (-7) =$ _____

f) $204 - 198 =$ _____

so $198 - 204 =$ _____

6. Write **positive** or **negative**.

a) Circle the answers from Question 5 where a smaller integer is subtracted from a larger integer. When you subtract a smaller integer from a larger integer, the answer is _____.

b) Underline the answers from Question 5 where a larger integer is subtracted from a smaller integer. When you subtract a larger integer from a smaller integer, the answer is _____.

7. Decide which integer is larger and then whether the answer is positive or negative. Then subtract by writing the correct sign in the circle and the distance apart in the blank.

a) $(-5) - (-3) =$ ⊖ *2*

b) $9 - (-3) =$ ◯ ___

c) $5 - 8 =$ ◯ ___

d) $(-6) - (-11) =$ ◯ ___

e) $(-4) - 5 =$ ◯ ___

f) $12 - 8 =$ ◯ ___

Subtraction Using Gains and Losses

Remember: **Sums of integers** can be written as sequences of gains and losses.

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

Differences of integers may also be written as sequences of gains and losses.

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

$+ (+ \longrightarrow +$
$+ (- \longrightarrow -$
$- (+ \longrightarrow -$
$- (- \longrightarrow +$

Taking away a loss
gives a gain

Taking away a gain
gives a loss

---

1. Rewrite each expression as a sequence of gains and losses.

a) $+3 + (-5)$ b) $-4 - (+2)$ c) $-5 - (-6)$ d) $8 - (+5)$

$= +3 - 5$ $=$ $=$ $=$

e) $+3 - (-5) + (-4) + (+2) - (+6)$ f) $(-6) + (-7) - (+3) - (-5) + (+4) - (+8) - (-7)$

$=$ $=$

2. a) Rewrite each algebraic expression as a sequence of gains and losses.

$a + (+b) =$ $a + (-b) =$ $a - (-b) =$ $a - (+b) =$

b) Which two expressions are equal to $a + b$? _____ and _____

c) Which two expressions are equal to $a - b$? _____ and _____

3. Simplify each expression and then add to find the result.

a) $-5 + (-3)$ b) $+3 + (+2)$ c) $+2 - (+3)$ d) $-4 - (-6)$

$= -5 - 3$ $=$ $=$ $=$

$= -8$ $=$ $=$ $=$

e) $-11 - (-6)$ f) $+14 + (-8)$ g) $-3 + (+7)$ h) $-25 - (-5)$

i) $-2 + (-3) + (+4)$ j) $+3 + (-5) + 4$ k) $-9 - (+8) - (-12)$ l) $-4 + 5 - (-6) + (-3)$

4. Do you need a gain or a loss to get to $+3$? How much of a gain or loss do you need?

a) $-2 \underline{\ +5\ } = +3$ b) $+8 \underline{\ \ \ } = +3$ c) $+1 \underline{\ \ \ } = +3$ d) $-12 \underline{\ \ \ } = +3$

5. Fill in the missing integer that will make the statement true.

a) $(-3) + \underline{\ 2\ } = -1$ b) $+7 - \underline{\ \ \ } = +10$ c) $(-1) - \underline{\ \ \ } = +3$ d) $(-6) + \underline{\ \ \ } = -10$

e) $\underline{\ \ \ } - (-4) = +3$ f) $\underline{\ \ \ } + (-2) = -6$ g) $\underline{\ \ \ } - (+5) = -3$ h) $\underline{\ \ \ } + (+4) = -7$

6. In Question 5, how can you use your answer to part c) to check your answer to part e)? Explain.

1. a) A valley is 300 m below sea level and the top of a mountain is 2 000 m above sea level. Brooke says the difference in height is 2 300 m. Veda says the difference in height is 1 700 m. Who is right? Explain.

   b) Mount Lamlam on the island of Guam is the tallest mountain in the world from below sea level. Its top is 406 m above sea level. Its feet extend to 10 911 m below sea level. How tall is Mount Lamlam?

2. Arrange the temperatures in order from coldest to hottest.

   −19°C   24°C   −18°C   0°C   15°C   3°C   21°C

3. If the temperature is −15°C, what will the temperature be if it…

   a) increases 20°C?   b) increases 15°C?   c) increases 5°C?   d) decreases 10°C?

4. Which temperature is further from −3°C?

   a) −5°C or 5°C   b) 7°C or 10°C   c) 8°C or −15°C   d) 5°C or −10°C

5. Draw a number line from −10 to +10 and mark a number that is…

   A 2 less than 0   **B** 3 less than 4

   C 3 greater than −1   **D** 5 greater than −2

   E halfway between +2 and +6   **F** an equal distance from −8 and −2

   G the same distance from 0 as −9   **H** twice as far from zero as −4

6. Solve the puzzle by placing the same integer in each shape.

   a) ☐ + ☐ + ☐ = −6   b) ○ + ○ + ○ = −30

7. In this square, the integers in each row, column, and two diagonals (these include the centre box) add up to +3.

   Fill in the missing integers.

+5		−3
−2		

8. The chart shows the average temperatures in winter and summer for three Canadian cities.

   Find the range of average temperatures for each city.

City	Average Winter Temp (°C)	Average Summer Temp (°C)	Range
Toronto	−5	20	
Montreal	−10	21	
Vancouver	−3	23	

9. The chart shows the average temperature on 5 planets.

a) Write the temperatures in order from least to greatest.

b) What is the difference between the highest and the lowest average temperature?

c) Which planet has an average temperature 200°C lower than that of Earth?

Earth	$+20°C$
Venus	$+470°C$
Saturn	$-180°C$
Mercury	$+120°C$
Jupiter	$-50°C$

10. When a plane takes off, the temperature on the ground is 10°C. The temperature outside the plane decreases by 5°C for every 1 000 m it climbs above the ground.

a) What is the temperature outside the plane when it is 3 000 m above the ground?

b) What will the temperature outside the plane be when it is 3 400 m above the ground?

11. A glass of water has a temperature of $+18°C$. When Guled adds an ice cube, the temperature decreases by 1°C. Guled writes $(+18) + (-7)$ to find the temperature after adding 7 ice cubes.

a) How would Guled find the temperature after adding 12 ice cubes?

$(+18) +$ _____ $=$ _____

b) Guled's water has 5 ice cubes and a temperature of $+13°C$. How would Guled find the temperature after **removing** 3 ice cubes? Calculate the new temperature.

12. If you were to spin the spinner twice and add the two results…

a) what is the highest total you could score? _____

b) what is the lowest total you could score? _____

c) what is the largest possible difference between the two scores?

_____
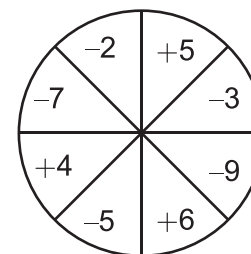
d) how could you score zero? _____

Spinner values: -2, $+5$, -7, -3, $+4$, -9, -5, $+6$

13. How much did the temperature change in the course of each day?

Monday _____

Tuesday _____

Wednesday _____

Thursday _____

	Daily Low Temp (°C)	Daily High Temp (°C)
Monday	-8	$+2$
Tuesday	-10	-8
Wednesday	-4	0
Thursday	-17	-5