1.2 – Rational Numbers in Decimal Form
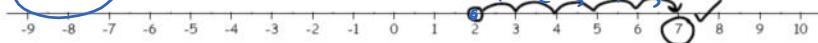
① List as many situations as you can where people like negative numbers.

- discounts (receipt)   • golf   • free er
- temperature (if you like snow) • scuba diving

② List as many situations as you can where people do not like negative numbers.

- bank account
- report card / tests   • scoreboard

"to solve"

The number line is a visual tool that can be used to demonstrate your understanding.

• Evaluate 2 + 5 using the number line. Start at positive two, use arrows and circle your answer.

ADD

Remember
$(-)(-) = (+)$
subtract a negative is the same as adding

58. Evaluate 2 – 5 using the number line.

SUB

59. Evaluate 2 – (-5) using the number line. $2-(-5) = 2+5 = 7$

$(+)(-) = (-)$
adding a negative is the same as subtracting

60. Evaluate 2 + (-5) using the number line. $2+(-5) = 2-5 = -3$

61. Evaluate -2 – 5 using the number line. $(-2) - 5 = -7$

Observations: Look above ↑ notice the patterns

62. 2 + 5 is equivalent to which of the following:	63. 2 – 5 is equivalent to which of the following: $2-5 = -3$	64. -2 – 5 is equivalent to which of the following: $(-2) - 5 = -7$
• 2 – 5	• 2 + 5	• -2 + (-5)
• 2 – (-5) "equal to"	• 2 + (-5) $= 2-5$	• 2 + (-5) $(-2) - 5 = -7$
• -2 – 5	• -2 + 5	• -5 – 2 $= -7$
• 2 + (+5)	• -5 + 2 $= -3$	• -5 + 2
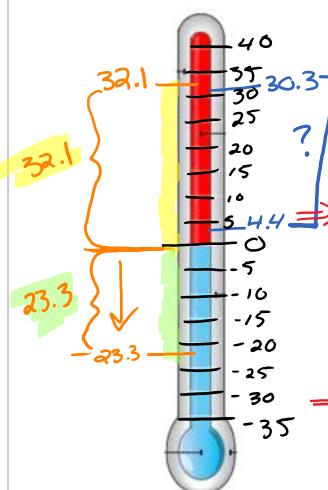
1

Example 1:

When reading and recording external temperatures, we use a thermometer.

Indicate the following temperatures on the thermometer and calculate the difference between them.

A) The coldest recorded temperature in Victoria last January was 4.4°C. Compare that to our hottest day in July, 30.3°C.

⟹ What is the difference between those daily temperatures? (Victoria)

subtract
large − small $30.3 - 4.4 = 25.9$

B) What if we looked at another Canadian city? Say Calgary. On that same day in January the temperature was -23.3°C. And that summer day in July? It was 32.1°C.

⟹ What is the difference between those daily Calgary temperatures?

large number − smaller number

$32.1 \ominus (\ominus 23.3) = 55.4$
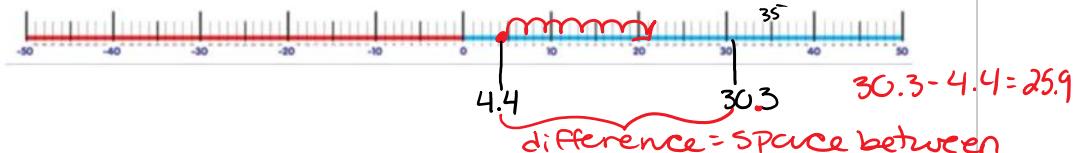
$32.1 + 23.3 = 55.4$

You can think of a thermometer as a __vertical__ number line.
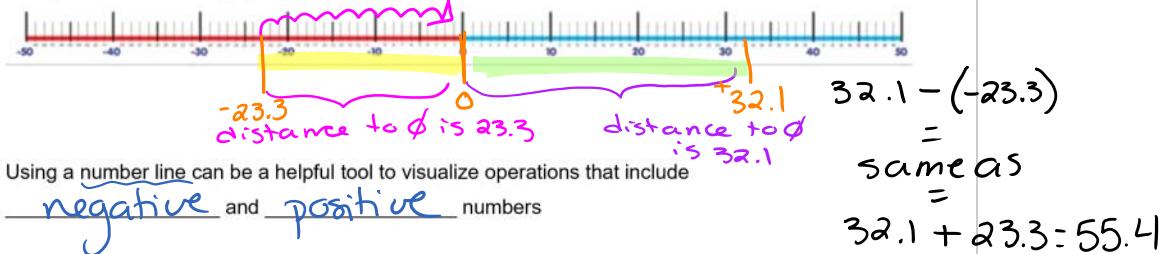
vertical ↕
⟵ horizontal

A) Mark the two Victoria temperatures on the number line & calculate the difference:

35
4.4   30.3 $30.3 - 4.4 = 25.9$
difference = space between

B) Mark the two Calgary temperatures on the number line & calculate the difference:

-23.3   0   +32.1
distance to 0 is 23.3   distance to 0 is 32.1

$32.1 - (-23.3)$
=
same as
=
$32.1 + 23.3 = 55.4$

Using a number line can be a helpful tool to visualize operations that include __negative__ and __positive__ numbers

2

RULES for Adding & Subtracting Positive and Negative Numbers

Rule 1: ▬ ▬ ▭ ✚
Subtracting a Number from a Negative Number is same as Adding.
Example:

Rule 2: ✚ ✚ ▭ ✚
Adding a positive number to a positive number is regular addition.
Example:

Rule 3: ▬ ✚ ▭ ▬
Subtracting a positive number is   same as regular
Subtraction. The answer will take the sign of the bigger number.
Example:

Rule 4: ✚ ▬ ▭ ▬
Adding a negative number to a number is same as regular Subtraction.
The answer will take the sign of the bigger number.
Example:

Subtraction moves left on the number line.	**Addition** moves right on the number line.
Example. $2-5=-3$ and $-2-5=-7$ Subtracting 5 moves 5 units left on the number line.	Example $2+5=7$ and $-2+5=3$ Adding 5 moves 5 units right on the number line.
Subtracting a negative number has the same impact as adding.	
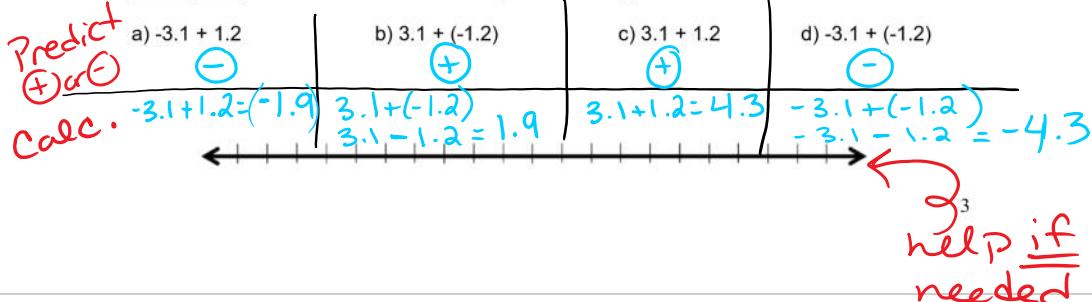
Example $2-(-5)=7$ and $-2-(-5)=3$ and $-2+5=3$

- Adding moves right. Subtracting moves left. Subtracting a negative moves right.

Example 2: Will the answers below be a positive or negative value? Predict. Then add.

Predict
⊕ or ⊖
Calc.

a) -3.1 + 1.2   ⊖
$-3.1+1.2=(-1.9)$

b) 3.1 + (-1.2)   ⊕
$3.1+(-1.2)$
$3.1-1.2=1.9$

c) 3.1 + 1.2   ⊕
$3.1+1.2=4.3$

d) -3.1 + (-1.2)   ⊖
$-3.1+(-1.2)$
$-3.1-1.2=-4.3$

help **if** needed

* Remembering that **subtraction means difference**, consider 5 – (-3); think, what is the difference between 5 and -3?

Subtract:
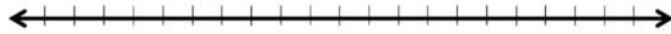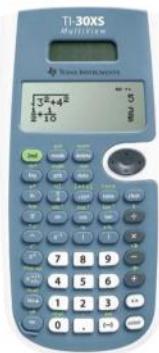
e) (-3) - 7   f) 3 - 7   g) 7 – 3   h) -7 – (-3)   i) -3 – (-7)

Calculator input – *difference between negative and subtraction sign in calculator* *

Example 3: Subtract

a) -2.3 – (-3.9)   b) 3.1 - (-1.2)

4

Example 4: At the beginning of June, the Mr. Plow's Snow Removal was $235.46 in debt. By the end of August, the company had increased its debt by $156.71.

a) Use a rational number to represent each amount.

b) Calculate how much the company owed at the end of August.

Example 5: Mike jumps off the 15.8 m high cliff at Thetis Lake and plunges 4.1 metres below the surface of the water before returning to the surface.

a) Use rational numbers to write a statement represent the difference in heights from the top of the cliff to the bottom of his dive.

b)   Determine the distance traveled by Mike.

c)   The water is 10.6 m deep. What is the distance from the bottom of the lake floor to the bottom of the Mike's dive?

What does evaluate mean? _____

Evaluate.

85. $3-5+(-4)=$	86. $8-3-(-7)=$	87. $-4+(-1)-4=$
88. $11-2-(-9)=$	89. $13-4+(-8)=$	90. $-9+(-2)-8=$

5

Use an integer to represent each of the following situations.

80. Vincent's bank account currently has a balance of negative four dollars. If he withdraws another nineteen dollars, what will his bank balance be?

81. Billy plays two rounds of golf. His score in the first round is minus five and his score on the second round is plus 3. What will his final score be after two rounds?

82. Getbeeger wants to gain some weight. He starts eating well and working out and gains nine pounds over an 8 month time period. Unfortunately at the start of the ninth month he got the flu and lost 7 pounds. Use an integer to describe his total weight gain.

83. Sandeesa bought six one-dollar raffle tickets and won five dollars. Use an integer to represent her total winnings.

84. In a town called "Wehtucold", the average temperature during the day is negative 41 degrees Celsius. At night, the temperature drops another 12 degrees. What is the temperature at night?

Fill in the multiplication table.
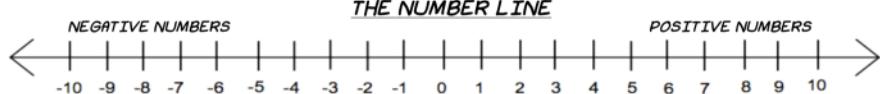
|	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

97. The numbers in the bolded boxes are called perfect square numbers. Why might this be?

HW: due tomorrow.

6

INTEGER CHEAT SHEET

Integers- A set of positive and negative whole numbers. They can be represented on a number line.

THE NUMBER LINE

NEGATIVE NUMBERS   POSITIVE NUMBERS

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

Absolute Value- The distance a number is from zero on the number line. An absolute value is never negative. Examples: $|-5| = 5$ and $|5| = 5$

ADDING INTEGERS

SAME SIGN- Add and Keep the Sign!

Add the absolute value of the numbers and keep the same sign.

(positive) + (positive) = Positive

$(+4) + (+5) = +9$

(negative) + (negative) = Negative

$(-4) + (-5) = -9$

DIFFERENT SIGNS- Subtract and Keep the Sign of the Bigger Number!

Subtract the absolute value of the numbers and keep the sign of the bigger number.

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

SUBTRACTING INTEGERS

Do not subtract integers. You must change the signs:
"Add the Opposite"

KEEP- Keep the sign of the first number

CHANGE- Change the subtraction sign to addition

CHANGE- Change the sign of the second number to the opposite sign. If it is positive- change to negative. If it is negative- change to positive.
$(+4) - (-4)$

Keep   change   change
$(+4)$ + $(+4)$

NOW USE THE RULES FOR ADDING:
SAME SIGN- Add absolute values and keep sign:
$(+4) + (+4) = 8$

MULTPLYING INTEGERS

SAME SIGNS- POSITIVE
Multiply the numbers. Answer will be positive.

$(-5) \times (-5) = +25$

DIFFERENT SIGNS- NEGATIVE
Multiply the numbers. Answer will be negative

$(+5) \times (-5) = -25$

DIVIDING INTEGERS

SAME SIGNS- POSITIVE
Divide the numbers. Answer will be positive.

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

DIFFERENT SIGNS- NEGATIVE
Divide the numbers. Answer will be negative

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