Agenda:

1) Fluency Quiz

2) Module 2- Rational Numbers
Lesson 5: How do you subtract rational numbers?

3) Homework: Lesson 5 - pages 50-51 (1-3)

4) Exit Ticket- page 52

Sep 7-12:49 PM

Lesson 5: Understanding Subtraction of Integers and Other Rational Numbers

Oct 30-3:33 PM

Classwork

Example 1: Exploring Subtraction with the Integer Game

Play the Integer Game in your group. Start Round 1 by selecting four cards. Follow the steps for each round of play.

1. Write the value of your hand in the Total column.
2. Then, record what card values you select in the Action 1 column and discard from your hand in the Action 2 column.
3. After each action, calculate your new total, and record it under the appropriate Results column.
4. Based on the results, describe what happens to the value of your hand under the appropriate Descriptions column. For example, "Score increased by 3."

Oct 30-3:33 PM

Round	Total	Action 1 Draw x	Result	Description	Action 2 Discard	Result	Description
1	-4	6	2	went up 6	-2	4	went up 2
2	3	-1	2	down 1	3	-1	down 3
3	-1	-3	-4	down 3	-1	-3	up 1
4							
5							

Oct 30-3:33 PM

Discussion: Making Connections to Integer Subtraction

1. How did selecting positive value cards change the value of your hand?

Add a pos, go up   increased value of your hand

2. How did selecting negative value cards change the value of your hand?

Add a neg, go down   value decreased

3. How did discarding positive value cards change the value of your hand?

Subtract a positive, go down   decreased the value

4. How did discarding negative value cards change the value of your hand?

subtract a negative, go up   increased the value

Oct 30-3:33 PM

5. What operation reflects selecting a card?

addition

6. What operation reflects discarding or removing a card?

subtraction

7. Based on the game, can you make a prediction about what happens to the result when:

a. Subtracting a positive integer.

go down

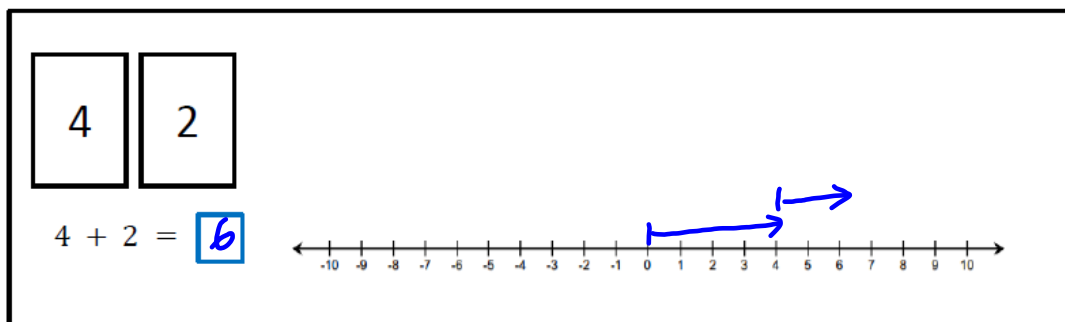b. Subtracting a negative integer.

go up

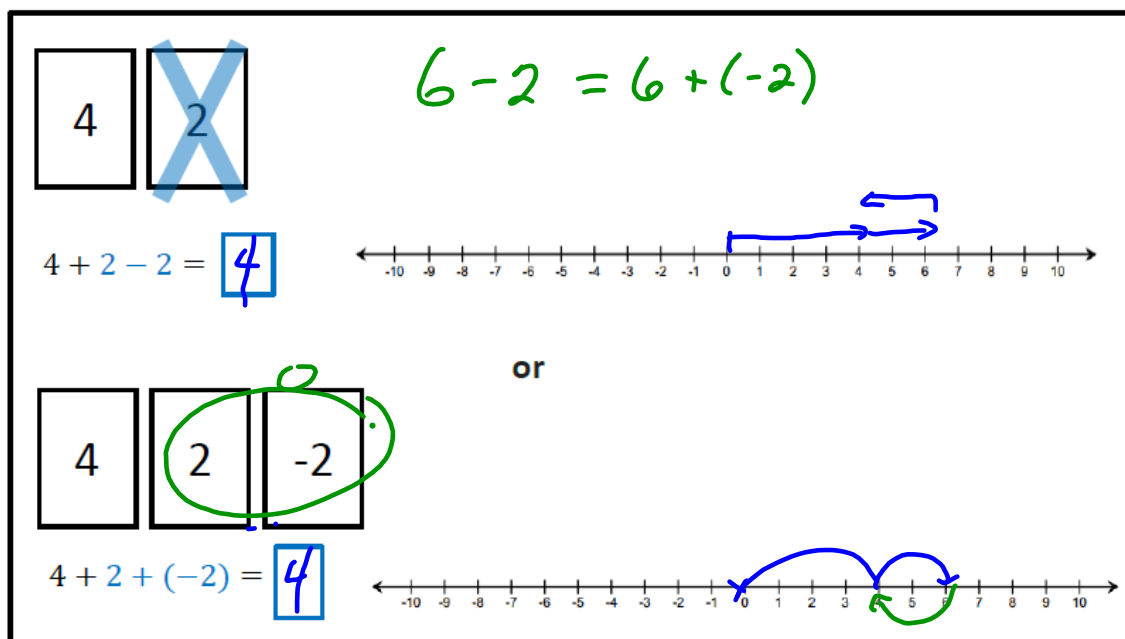Oct 30-3:33 PM

Example 2: Subtracting a Positive Number

Follow along with the teacher, completing the diagrams below.

a. The teacher leads whole class by modeling an Integer Game example to find the sum of $4 + 2$.

4	2

$4 + 2 = \boxed{6}$

Oct 30-3:33 PM

---

b. Show that discarding (subtracting) a positive card, which is the same as subtracting a positive number, decreases the value of the hand.

4	⊠

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

$4 + 2 - 2 = \boxed{4}$

or

4	2	-2

$4 + 2 + (-2) = \boxed{4}$

Oct 30-3:34 PM

4

Removing (**Subtracting**) a positive card changes the score in the same way as **adding** a card whose value is the **additive** **inverse** (or opposite). In this case, adding the corresponding **negative**.
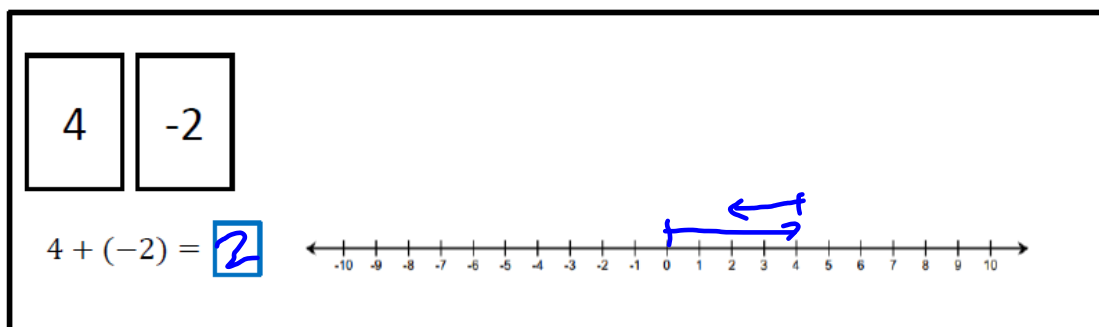
$$-2 = + (-2)$$

subtracting a
positive = adding a
negative

Example 3: Subtracting a Negative Number

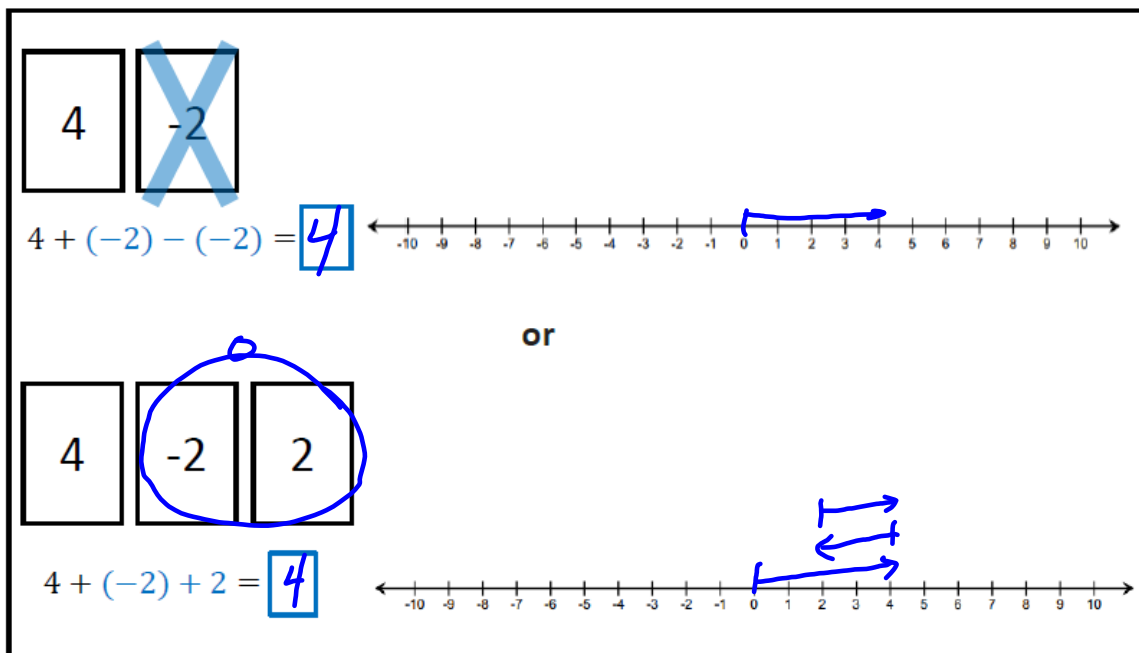Follow along with the teacher, completing the diagrams below.

| 4 | -2 |

$$4 + (-2) = \boxed{2}$$

a.   How does removing a negative card change the score, or value, of the hand?

goes up

4	~~-2~~

$4 + (-2) - (-2) = \boxed{4}$

4	-2	2

$4 + (-2) + 2 = \boxed{4}$

Oct 30-3:34 PM

Removing (**Subtracting**) a negative card changes the score in the same way as **adding** a card whose value is the ___**additive**___ ___**inverse**___ (or opposite). In this case, adding the corresponding ___**positive**___ .

$$-(-2) = + (+2)$$

Subtracting = adding a
a negative   positive

Oct 30-3:34 PM

6

The *Rule of Subtraction:* Subtracting a number is the same as adding its additive inverse (or opposite).

Oct 30-3:34 PM

Exercises: Subtracting Positive and Negative Integers

1. Using the rule of subtraction, rewrite the following subtraction sentences as addition sentences and solve. Use the number line below if needed.

   a. $8 - 2$ $= 8 + (-2) = 6$

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

   c. $-3 - 7$ $-3 + (-7) = -10$

   d. $-9 - (-2)$ $-9 + (+2) = -7$

Oct 30-3:34 PM

2. Find the differences.

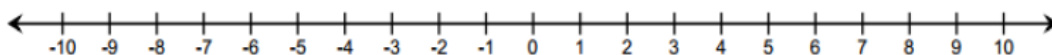   a. $-2 - (-5)$ $-2 + (+5) = 3$

    b. $11 - (-8)$ $11 + (+8) = 19$

    c. $-10 - (-4)$ $-10 + (+4) = -6$

Oct 30-3:34 PM

3. Write two equivalent expressions that would represent, "An airplane flies at an altitude of 25,000 feet. A submarine dives to depth of 600 feet below sea level."

```
←——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——+——→
  -10  -9  -8  -7  -6  -5  -4  -3  -2  -1   0   1   2   3   4   5   6   7   8   9  10
```

Oct 30-3:35 PM

Lesson Summary

- The Rule for Subtraction: Subtracting a number is the same as adding its opposite.
- Removing (subtracting) a positive card changes the score in the same way as adding a corresponding negative card.
- Removing (subtracting) a negative card makes the same change as adding the corresponding positive card.
- For all rational numbers, subtracting a number and adding it back gets you back to where you started: $(m - n) + n = m$.
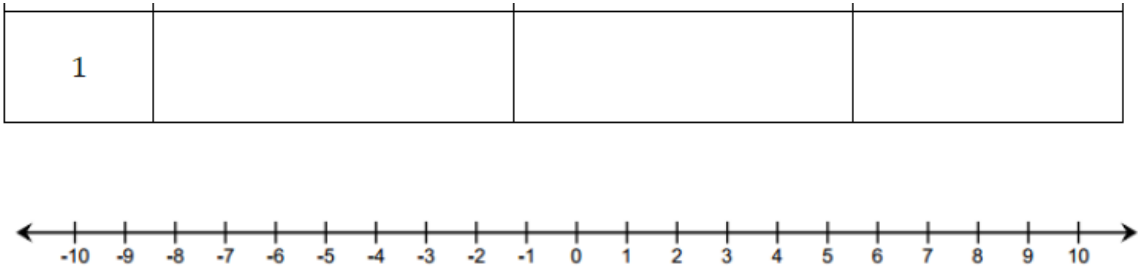
Oct 30-3:35 PM

Problem Set

1. On a number line, find the difference of each number and 4? Complete the table to support your answers. The first example is provided.

Number	Subtraction Number Sentence	Addition Number Sentence	Distance (units)
10	10 – 4	10 + (−4) = 6	6
2			
−4			
−6			
1			

Oct 30-3:35 PM

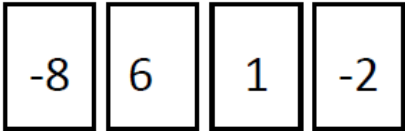| 1			

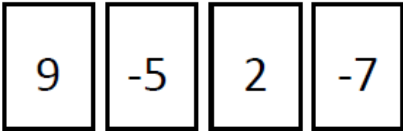Oct 30-3:35 PM

---

2. You and your partner were playing the Integer Game in class. Here are the cards in both hands.

   Your hand   **Your partner's hand**

   | -8 | 6 | 1 | -2 | | 9 | -5 | 2 | -7 |

   a. Find the value of each hand. Who would win based on the current scores? (The score closest to 0 wins.)

   b. Find the value of each hand if you discarded the −2 and selected a 5, and your partner discarded the −5 and selected a 5. Show your work to support your answer.

   c. Use your score values from part (b) to determine who would win the game now.

Oct 30-3:35 PM

3. Solve the following problems.

  a. $-2 + 16$

  b. $-2 - (-16)$

  c. $18 - 26$
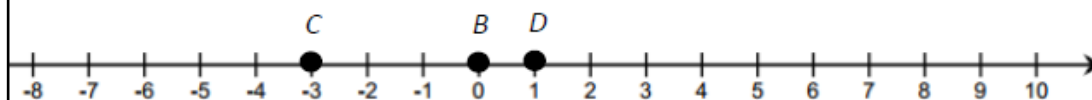
  d. $-14 - 23$

  e. $30 - (-45)$

Oct 30-3:35 PM

heant by the following and illustrate with an example: plug in values for p and q

    "For any real numbers, p and q, $p - q = p + (-q)$." $p = 4$ $q = -5$

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

er between -1 and -5 on the number line, and label it point P. Locate and label the following
mber line. Show your work.

```
         C          B   D
  +--+--+--+--+--●--+--+--●--●--+--+--+--+--+--+--+--+--+-->
  -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9  10
```

$- 5$

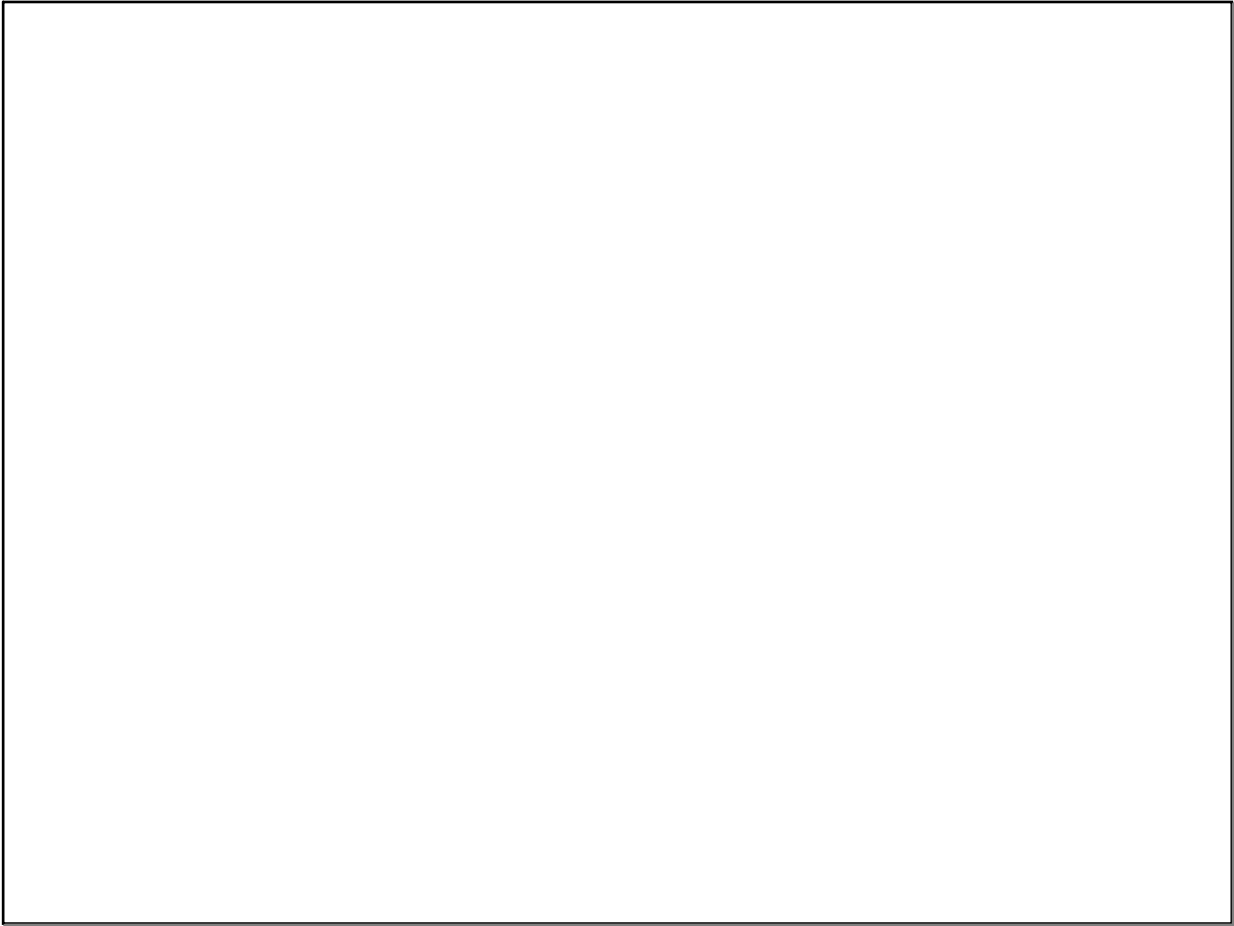$P - 4) + 4$

$P - (-7)$

Oct 30-3:36 PM

11

6. CHALLENGE PROBLEM: Write two equivalent expressions that represent the situation. What is the difference of their elevations?

"An airplane flies at an altitude of 26,000 feet. A submarine dives to depth of 700 feet below sea level."

Oct 30-3:36 PM

Lesson 6: The Distance Between Two Rational Numbers

Oct 30-3:36 PM

Oct 28-3:41 PM