Name _____ Date _____

Understanding Subtraction of Integers and Other Rational Numbers

1. If a player had the following cards, what is the value of his hand?

| 1 | −7 | 4 |

   a. Identify two different ways the player could get to a score of 5 by adding or removing only one card. Explain.

   b. Write two equations for part (a), one for each of the methods you came up with for arriving at a score of 5.

2. Using the rule of subtraction, rewrite the following subtraction expressions as addition expressions and find the sums.

   a. $5 - 9$

   b. $-14 - (-2)$

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 Expression	Addition Expression	Answer
10	$10 - 4$	$10 + (-4) = 6$	6
2			
-4			
-6			
1			
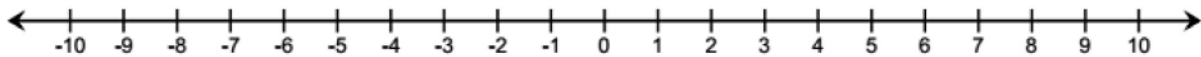
2. You and your partner were playing the Integer Game in class. Here are the cards in both hands.

Your hand

| -8 | 6 | 1 | -2 |

Your partner's hand

| 9 | -5 | 2 | -7 |
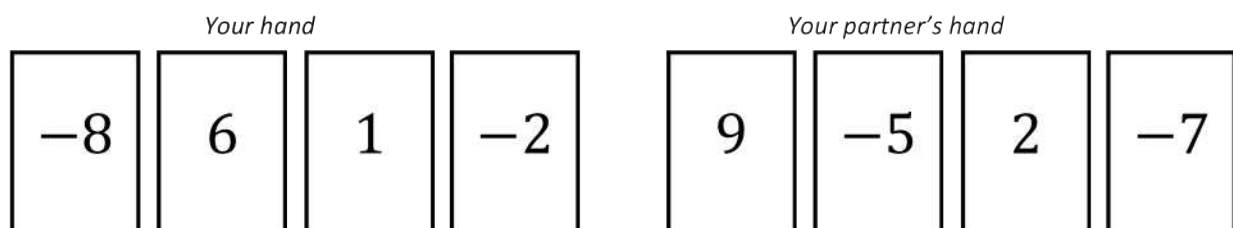
   a. Find the value of each hand. Who would win based on the current scores? (The score closest to 0 wins.)

   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.

3. Write the following expressions as a single integer.

   a. $-2 + 16$

   b. $-2 - (-16)$

   c. $18 - 26$

   d. $-14 - 23$

   e. $30 - (-45)$

4. Explain what is meant by the following and illustrate with an example:

$$\text{"For any real numbers, } p \text{ and } q, p - q = p + (-q)."$$

5. Choose an integer between -1 and -5 on the number line, and label it point P. Locate and label the following points on the number line. Show your work.
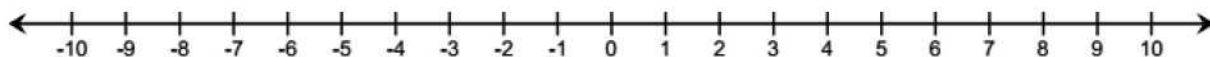
   a. Point A: $P - 5$

   b. Point B: $(P - 4) + 4$

   c. Point C: $-P - (-7)$

Challenge Problem:

6. Write two equivalent expressions that represent the situation. What is the difference in their elevations?

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

1. If a player had the following cards, what is the value of his hand?

   The current value of the hand is -2. $1 + (-7) + 4 = -2$.

   | 1 | | -7 | | 4 |

   a. Identify two different ways the player could get to a score of 5 by adding or removing only one card. Explain.

      He could remove the -7 or add 7. If we remove the -7, the value of the hand will be 5, which is 7 larger than -2. I could also get a sum of 5 by adding 7 to the hand. Therefore, removing the -7 gives me the same result as adding 7.

   b. Write two equations for part (a), one for each of the methods you came up with for arriving at a score of 5.

      $-2 - (-7)$ and $-2 + 7 = 5$

2. Using the rule of subtraction, rewrite the following subtraction expressions as addition expressions and find the sums.

   a. $5 - 9$

      $5 + (-9) = -4$

   b. $-14 - (-2)$

      $-14 + 2 = -12$

The Problem Set provides students with skill practice and application of the rules for integer subtraction. Students will solve problems with and without a number line.
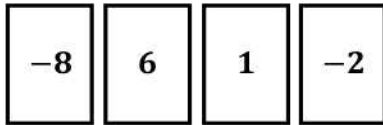
1. On a number line, find the difference of each number and 4? Complete the table to support your answers. The first example is provided.

Number	Subtraction Expression	Addition Expression	Answer
10	$10 - 4$	$10 + (-4)$	6
2	$2 - 4$	$2 + (-4)$	-2
-4	$-4 - 4$	$-4 + (-4)$	-8
-6	$-6 - 4$	$-6 + (-4)$	-10
1	$1 - 4$	$1 + (-4)$	-3
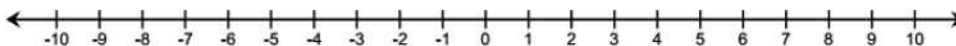
2. You and your partner were playing the Integer Game in class. Here are the cards in both hands.

Your hand

-8	6	1	-2

Your partner's hand
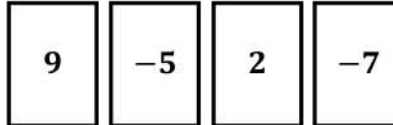
9	-5	2	-7

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

        My hand: $-8 + 6 + 1 + (-2) = -3$

        Partner's hand: $9 + (-5) + 2 + (-7) = -1$

        My partner would win because -1 is closer to 0. It is 1 unit to the left of 0.

    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.

        My hand: Discard the -2, $-3 - (-2) = -1$; Select a 5: $-1 + 5 = 4$.

        Partner's hand: Discard the -5, $-1 - (-5) = 4$; Select a 5: $4 + 5 = 9$.

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

        I would win now because 4 is closer to zero.

3. Write the following expressions as a single integer.

    a. $-2 + 16$

       14

    b. $-2 - (-16)$

       14

    c. $18 - 26$

       -8

    d. $-14 - 23$

       -37

    e. $30 - (-45)$

       75

4. Explain what is meant by the following and illustrate with an example:

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

Subtracting a number is the same as adding its additive inverse. Examples will vary. A sample response is shown below.

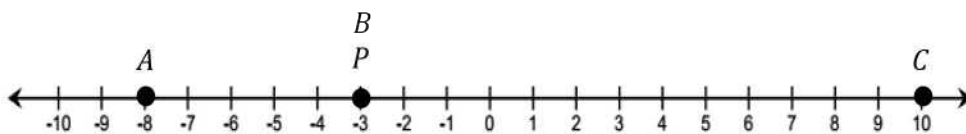*$p = 4$, $q = 6$, $4 - 6$ is the same as $4 + (-6)$ because -6 is the opposite of 6.*

$4 - 6 = -2$

$4 + (-6) = -2$

So, $4 - 6 = 4 + (-6)$ because they both equal -2.

5. Choose an integer between -1 and -5 on the number line, and label it point P. Locate and label the following points on the number line. Show your work.

Answers will vary. A sample response is shown below given the student chose -3 for P.

a. Point A: $P - 5$

Point A: $-3 - 5 = -8$

b. Point B: $(P - 4) + 4$

Point B: $(-3 - 4) + 4 = -3$ (same as P)

c. Point C: $-P - (-7)$

Point C: $-(-3) - (-7) = 3 + 7 = 10$

Challenge Problem:

6. Write two equivalent expressions that represent the situation. What is the difference in their elevations?

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

Two equivalent expressions are $26,000 - (-700)$ and $26,000 + 700$. The difference in their elevations is $26,700$ feet.