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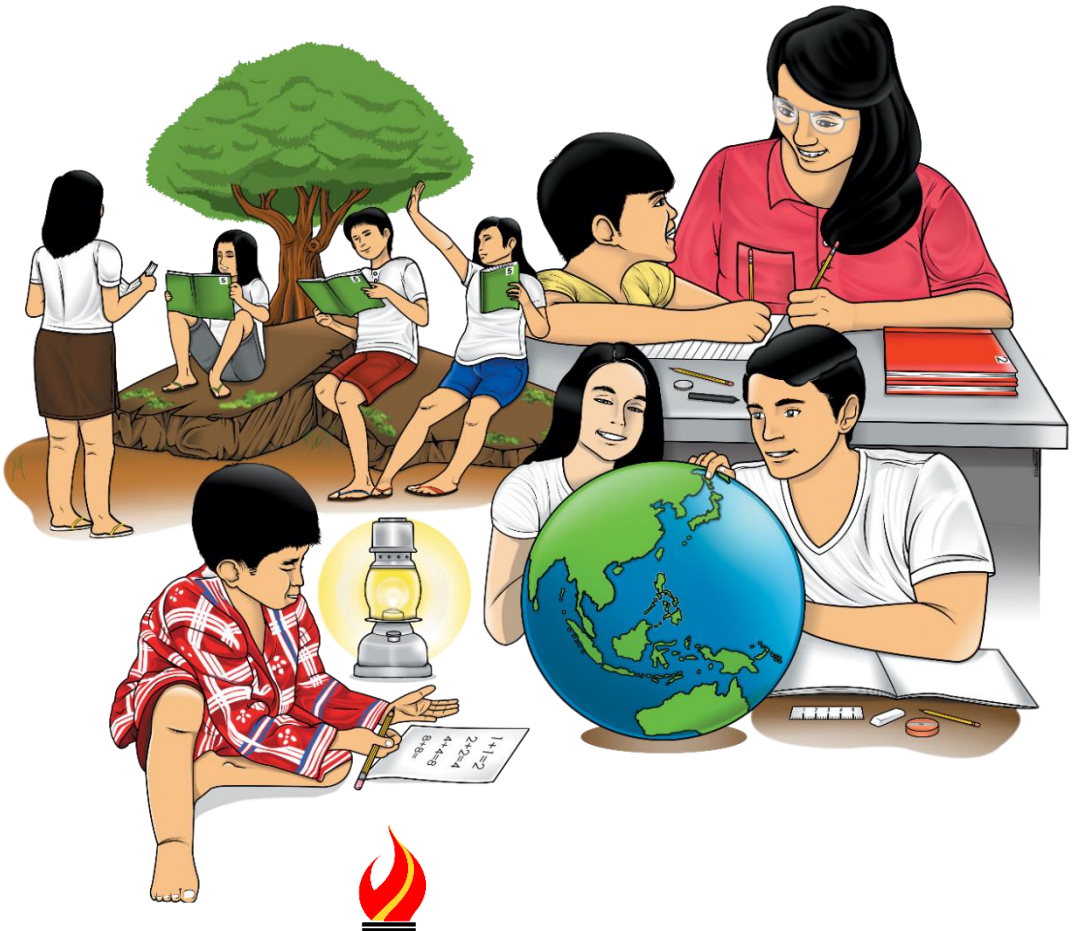
Mathematics

Quarter 2 – Module 12:
Subtracting Integers



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Mathematics

Quarter 2 – Module 12:
Subtracting Integers

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What I Need to Know

This module was designed and written with you in mind. It is here to help you master subtraction of integers. The scope of this module permits it to be used in many different learning situations. The language used recognizes your diverse vocabulary level. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is divided into two lessons, namely:

- Lesson 1 – Subtracting Integers with Like Signs
- Lesson 2 – Subtracting Integers with Unlike Signs
- Lesson 3 – Solving Routine and Non-Routine Problems Involving Subtraction of Integers

After going through this module, you are expected to:

1. describe and interpret subtraction of integers using materials such as algebra tiles, counters, chips, and cards **(M6NS-IIh-155);**
2. perform subtraction of integers **(M6NS-IIi-15);** and,
3. solve routine and non-routine problems involving subtraction of integers using appropriate strategies and tools **(M6NS-IIj-157).**

What I Know

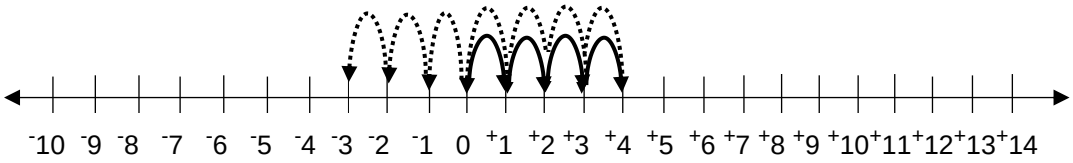
A. Read and analyze the situations below. Write the letter of the correct answer on your answer sheet.

1. Alton has 20 negative counters on his table. He took away the 9 negative counters. Which number sentence best describes the situation above?

   A. $^{+}20 - {}^{+}9 = N$ B. $^{-}20 - {}^{-}9 = N$

   C. $^{+}20 + {}^{+}9 = N$ D. $^{-}20 + {}^{-}9 = N$

2. What number sentence is illustrated in the number line below?



   A. $^{+}4 - {}^{+}7 = N$ B. $^{-}4 - {}^{-}7 = N$

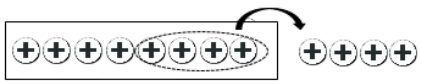
   C. $^{+}4 - {}^{+}3 = N$ D. $^{+}4 - {}^{+}3 = N$

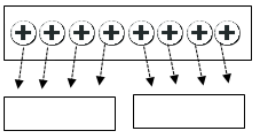
3. What is the answer to the illustration in item number 2?

   A. $^{+}3$ B. $^{-}3$

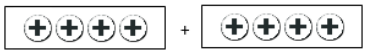
   C. $^{+}4$ D. $^{-}4$

4. How will you visualize $^{+}5 - {}^{+}4$ using counters?

   A. 

   B. 

   C. 

   D. 

5. On the number line, you moved 3 units to the right from zero. From there, you moved again 5 units to the left. In what integer are you now?

   A. $^{+}8$ B. $^{-}2$

   C. $^{-}8$ D. $^{+}2$

B. Below are expressions involving integers with like signs. Find the value of N by performing subtraction. Write your answers on your answer sheet.

6. $^{+}7 - {}^{+}11 = N$

7. $^{+}5 - {}^{+}6 = N$

8. $^{+}7 - {}^{+}3 = N$

9. $^{+}1 - {}^{+}6 = N$

10 $^{+}14 - {}^{+}9 = N$

Lesson 1 Subtracting Integers with Like Signs

You have learned how to add integers in the past lesson. Now, you will learn how to subtract integers with like signs.

What's In

Add the following integers. Write your answers on your answer sheet.

1) $8 + {}^{-}9 =$

2) ${}^{+}10 + {}^{-}15 =$

3) ${}^{+}45 + {}^{+}6 =$

4) ${}^{+}10 + {}^{-}15 =$

5) ${}^{-}50 + {}^{+}15 =$

What's New

Look at the problem situation below.

> Three weeks ago, the water in a river was 5 feet above normal level. This week, it was only 3 feet above normal level. Find the difference.

Solution: To find the difference of the water level, we are going to subtract ${}^{+}3$ from ${}^{+}5$.

What is It

Find: $^{+}5 - {}^{+}3 =$

SUBTRACTING POSITIVE NUMBERS

To fully understand the concepts in basic operations on integers, you can use counters and number lines.

Subtraction of Positive Integers Using Counters

To perform the subtraction operation using counters, follow the suggested steps below:

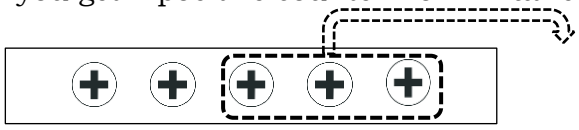
Step 1:

Get the exact number of counters as your minuend.
Get the 5 positive counters. Place them on your table.

Step 2:

Look at the operation and decide what to do.
The operation is subtraction.
Subtraction means **to take away**, **to get**, **to deduct**, or **to minus** from the first quantity.
Take away 1 positive counter from 10 positive counters on the table as indicated in your subtrahend.

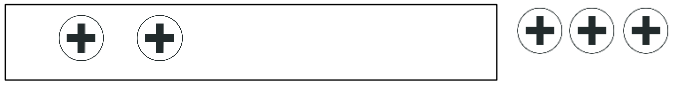
Can you get 1 positive counter from what is shown on the table? (Yes)



Step 3:

Perform the operation and write your answer.

In this number sentence, you need to take away 3 positive counters from the set of 5 positive counters.



Answer: How many counters do you have left on the table? (2 counters)

Do these counters have the same sign? (Yes)

What is the sign? (Positive)

Therefore, if you subtract $^{+}3$ from $^{+}5$ you will get the difference of $^{+}2$.

$$^{+}5 - {}^{+}3 = {}^{+}2$$

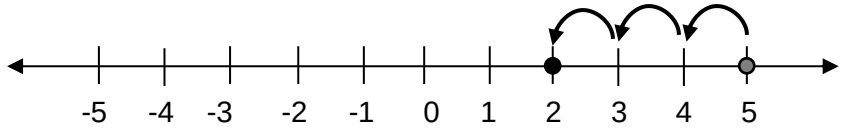
So, the difference of the water level this week compared to last three weeks is 2 feet.

Subtraction of Positive Integers Using Number Line

$^{+}5 - {}^{+}3 =$

Study the number line below.

To use a number line in subtracting positive integers, locate first the integer $^{+}5$ and then move **3 units to the left** of the number line.



We arrive at 2. So, this gives us the answer of $^{+}5 - {}^{+}3 = {}^{+}2$

Now, simplify by subtracting the numbers ($^{+}5 - {}^{+}3 =$)

To subtract two negative numbers, transform the subtraction into an addition problem.

Step 1: Change the sign of the number to be subtracted or the subtrahend.

$$^{+}5 - {}^{+}3 = {}^{+}5 + {}^{-}3$$

Step 2: Change the subtraction operation to addition. Follow the rule in adding integers with unlike signs. Then, copy the sign of the number with the larger value in the answer.

$$^{+}5 - {}^{+}3 = {}^{+}5 + {}^{-}3 = {}^{+}2$$

Here are the other examples:

1. $^{+}27 - {}^{+}21 = {}^{+}27 + {}^{-}21 = {}^{+}6$
2. $^{+}40 - {}^{+}10 = {}^{+}40 + {}^{-}10 = {}^{+}3$

SUBTRACTING NEGATIVE INTEGERS

Subtraction of Negative Integers Using Counters

Find: $^{-}5 - {}^{-}3 = N$

To perform the subtraction operation using counters, follow the suggested steps below:

Step 1:

Get the exact number of counters as your minuend.

Get 5 the negative counters. Place them on your table.

Step 2:

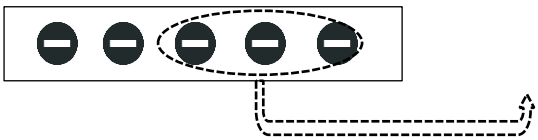
Look at the operation and decide what to do.

The operation is subtraction.

Subtraction means **to take away**, **to get**, **to deduct**, or **to minus** from the first quantity.

Take away 3 negative counters from 5 negative counters on the table as indicated in your subtrahend.

Can you get 3 negative counters from what is shown on the table? (Yes)



Step 3:

Perform the operation and write your answer.

In this number sentence, you need to take away the 3 negative counters from the set of 15 negative counters on the table.

How many counters are left on the table? (2 counters)

Do these counters have the same sign? (Yes)

What is the sign? (Negative)

Therefore, if you subtract $^{-}3$ from $^{-}5$ you will get the difference of $^{-}2$.

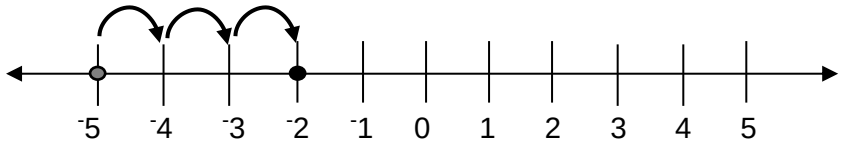
$^{-}5 - {}^{-}3 = {}^{-}2$

Subtraction of Negative Integers Using Number Line

Find: $^{-}5 - {}^{-}3 =$

Study the number line below.

To use a number line in subtracting two negative integers, transform the subtraction into addition equation. Change the operation into addition and change the sign of the subtrahend into positive. Locate first the integer $^{-}5$ and then move it **3 units to the right** of the number line.



We arrive at $^{-}2$. So, $^{-}5 - {}^{-}3 = {}^{-}2$

Now, simplify by subtracting the numbers ($^{-}5 - {}^{-}3 =$)

To subtract two negative numbers, transform the subtraction into an addition problem.

Step 1: Change the sign of the number to be subtracted or the subtrahend.

$$^{-}5 - \mathbf{^{-}3} = {}^{-}5 - \mathbf{^{+}3}$$

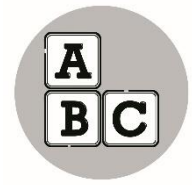
Step 2: Change the subtraction operation to addition. Proceed to addition of integers with unlike signs. Then, copy the sign of the number with the larger value in the difference.

$$^{-}5 \mathbf{-} {}^{-}3 = {}^{-}5 \mathbf{+} {}^{+}3 = {}^{-}2$$

Here are the other examples.

1) $({}^{-}20) - ({}^{-}4) = ({}^{-}20) + ({}^{+}4) = ({}^{-}16)$

2) $({}^{-}4) - ({}^{-}3) = ({}^{-}4) + ({}^{+}3) = ({}^{-}1)$



What's More

A. Using your positive and negative counters, give the difference of the following integers. Write your answers on your answer sheet.

1) $^{+}9 - {}^{+}7 = N$

2) $^{-}12 - {}^{-}8 = N$

3) $^{-}20 - {}^{-}25 = N$

B. Study the table below. Change the opposite sign of the subtrahend. Write the final equation by changing the operation to addition. Then, solve for the answers and write them on your answer sheet.

Equation	Final Equation	Answer
Example $^{-}18 - {}^{-}5 = N$	$^{-}18 + {}^{+}5 = N$	$^{-}13$
1. $^{+}5 - {}^{+}19 = N$		
2. $^{+}3 - {}^{+}12 = N$		
3. $^{-}9 - {}^{-}6 = N$		
4. $^{-}6 - {}^{-}28 = N$		
5. $^{-}5 - {}^{-}4 = N$		

What I Have Learned

In subtracting positive integers:

- First, change the sign of the number to be subtracted or the subtrahend.
- Second, change the subtraction operation to addition. Follow the rule in adding integers with unlike signs. Then, copy the sign of the number with larger value in the answer.

In subtracting negative integers:

- First, change the sign of the number to be subtracted or the subtrahend.
- Second, change the subtraction operation to addition. Then, proceed to addition of integers with unlike signs. Lastly, copy the sign of the number with the larger absolute value in the answer.

What I Can Do

A. Find the difference using your counters. Write your answers on your answer sheet.

____1) $^{-}14 - {}^{-}19 =$

____2) $^{-}20 - {}^{-}30 =$

____3) $^{+}16 - {}^{+}4 =$

B. Use number lines to find the difference of the integers below. Do it on your answer sheet.

____4) $^{-}10 - {}^{-}3 =$

____5) $^{+}15 - {}^{+}20 =$

C. Solve the problem below. Show your solution and label your final answer. Do it on your answer sheet.

6) If it is 15° C outside and the temperature will drop by 16° in the next 8 hours, what is the temperature after 8 hours?

Assessment

A. Read and analyze the situations below. Write the letter of the correct answer on your answer sheet.

1) You took away 5 negative counters from a group of 6 negative counters. How many negative counters were left?

A. -1 B. 0 C. 11 D. -11

2) Xav placed 10 positive counters on the table. Ella, her friend, took away 4 positive counters. How many positive counters were left on the table?

A. 8 B. 6

C. 14 D. 40

3) Using your counters, what is $^{-}15 - {}^{-}4$?

A. $^{-}16$ B. $^{-}19$

C. $^{+}19$ D. $^{-}11$

4) On the number line, you moved 8 units to the right from zero. From there, you moved again 10 units to the left. In what integer are you now?

A. $^{+}8$ B. $^{-}2$

C. $^{+}2$ D. $^{+}18$

5) Nine negative counters were taken from a group of 15 negative counters. How will you write the number sentence for this?

A. $^{-}15 - {}^{+}9 = N$ B. $^{-}15 - {}^{-}9 = N$

C. $^{+}9 - {}^{-}15 = N$ D. $^{-}9 - {}^{+}15 = N$

B. Solve for the value of N by subtracting the following integers. Write your answers on your answer sheet.

6) $^{-}35 - {}^{-}20 = N$

7) $^{+}9 - {}^{+}16 = N$

8) $^{+}85 - {}^{+}12 = N$

9) $^{-}6 - {}^{-}2 = N$

10) $^{+}13 - {}^{+}12 = N$

Additional Activities

A. Subtract the given integers. Write your answers on your answer sheet.

1) $^{-}7 - {}^{-}13 =$ _____.
2) What is the difference when $^{-}12$ is subtracted from $^{-}24$?
3) $^{+}15$ when subtracted from $^{+}9$ is equal to _____.
4) $^{+}40 - {}^{+}15 =$ _____.
5) $^{+}20 - {}^{+}8 =$ _____.

B. Solve the problems below. Show your solutions on your answer sheet.

6) Jane lost 5 kilograms after a month of doing her exercise and healthy diet. If Jane was 75 kilograms last month, how heavy is she now?
7) One hundred eighty boxes of canned goods from a total donation of 210 boxes were delivered to the victims of the typhoon. How many boxes of canned goods were left?

Answer Key

What's In	What I Can Do	Additional Activities
1) +17 2) -5 3) +51 4) +9 5) -35	A. 1) +5 2) +10 3) +12 B. 4) -7 5) -5 C. 6) -1°C	A. 1) 6 2) -12 3) -6 4) 25 5) 12 B. 6) 70 7) 130
What I Know A. B. 1) B 6) -4 2) A 7) -1 3) B 8) +3 4) A 9) -5 5) C 10) +5	**What's More** A. 1) +2 2) -4 3) +5 B. Final Equation / Answer 1. (+5) + (-19) = N / (-14) 2. (+3) + (-12) = N / (-9) 3. (-9) + (+6) = N / (-3) 4. (-6) + (+28) = N / (+22) 5. (-5) + (+4) = N / (-1)	**Assessment** A. B. 1) A 6) -15 2) B 7) -7 3) D 8) +73 4) B 9) -4 5) B 10) +1

What I Know

A. Read and analyze the sentences below. Write the letter of the correct answer on your answer sheet.

1. In +9 – ⁻2 = N, how can you take away two negative counters from a set of 9 positive counters?

   A. Add two zeroes
   B. Subtract two positives
   C. Add two negatives
   D. Subtract two zeroes

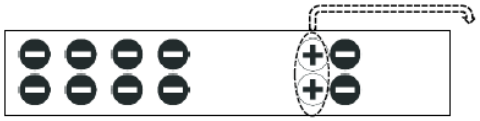
2. What is the answer to the equation in item number 1?

   A. ⁺11
   B. ⁻11
   C. ⁺7
   D. ⁻7

3. To subtract integers with unlike signs, change the sign of the _____ and change the subtraction sign to _____. What are the correct words to make the sentence true?

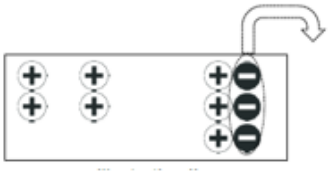
   A. subtrahend, multiplication
   B. minuend, addition
   C. subtrahend, addition
   C. difference, division

4. What number sentence is shown in the illustration below?



   A. ⁻8 – ⁺2
   B. ⁺2 – ⁻8
   C. ⁻8 + ⁺2
   D. ⁺2 + ⁻8

5. What is the answer to the illustration below?



   A. ⁺7
   B. ⁻7
   C. ⁻3
   D. ⁺3

B. Below are equations involving integers with unlike signs. Find the value of N by performing subtraction. Write your answers on your answer sheet.

1) ⁻20 – ⁺25 = N

2) ⁺12 – ⁻9 = N

3) ⁻30 – ⁺45 = N

4) ⁺68 – ⁻32 = N

5) ⁺150 – ⁻20 = N

Lesson 2

Subtracting Integers with Unlike Signs

Subtraction is the opposite of addition. In the past, you have learned that 10 – 5 will give us the difference of 5. Subtracting integers with unlike signs is not the same as subtracting whole numbers. There are certain steps and rules to follow in order to get the correct answer.

In this lesson, you will learn the rules and steps in subtracting integers with unlike signs.

What's In

Given below are pairs of integers with like and unlike signs. Find the sum of each item. Write your answers on your answer sheet.

1) $^{-}8 + {}^{-}8 =$ _____

2) $^{+}45 + {}^{-}20 =$ _____

3) $^{+}10 + {}^{+}15 =$ _____

4) $^{-}60 + {}^{+}50 =$ _____

5) $^{-}30 + {}^{-}35 =$ _____

What's New

Read and study the problem below.

What is the change in temperature you will experience in a grocery store when you walk from a chilled drinks section at 5°C to a frozen meat section which is set to ⁻5°C?

How will you solve the answer?

What is It

Find: $^{+}5 - {}^{-}5 =$

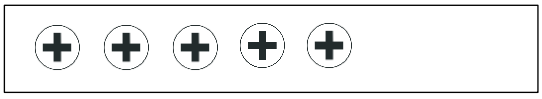
Subtraction of Integers with Unlike Signs Using Counters

To perform the subtraction operation using counters, follow the suggested steps below:

Step 1:

Get the exact number of counters as your minuend.

Get the 5 positive counters. Place them on your table.



Step 2:

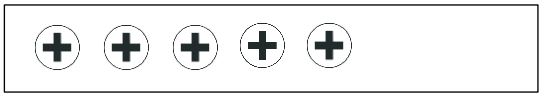
Look at the operation and decide what to do.

The operation is subtraction.

Subtraction means **to take away**, **to get**, **to deduct**, or **to minus** from the first quantity.

Take away 5 negative counters from 5 positive counters on the table as indicated in your subtrahend.

Can you get 5 negative counters from what is shown on the table? (No)
There is no negative counter on the table.



Step 3:

Perform the operation and write your answer.

In this situation, you cannot take away 5 negative counters from the set of 5 positive counters on the table.

You can only take away negative counters from a set if there are. In order to do it we need to have 5 negative counters in the set to show subtraction.

However, if we add 5 negative counters to the set of counters in the minuend its value is not $^{+}5$ anymore. What then should you do?

Take a look at this… ($^{+}5$) + ___ = ($^{+}5$)

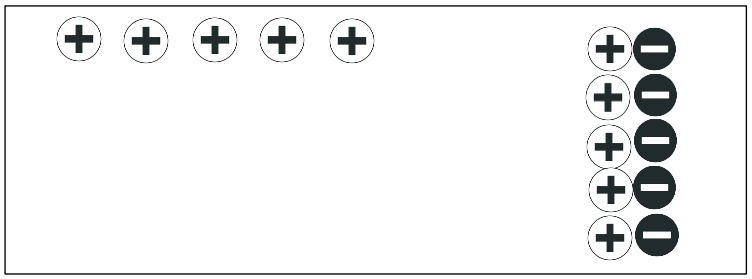
What should you add to $^{+}5$ to maintain its value as $^{+}5$? (0)

Going back to our previous discussion in adding counters, if you add 1 positive and 1 negative it gives you a sum of zero. Be reminded of the following illustration.

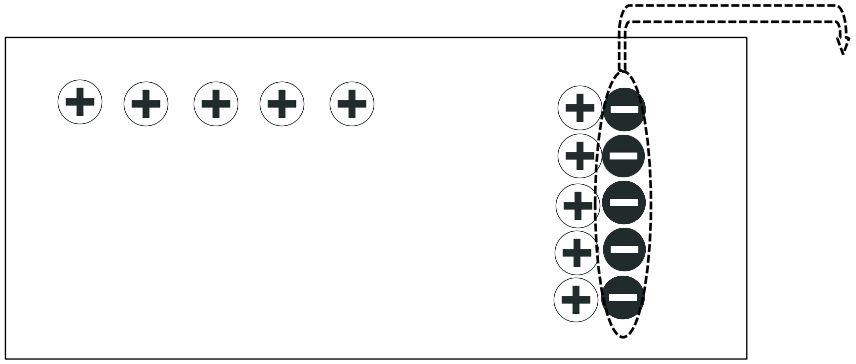
 = 0

In order to take away 5 negative counters in the set of positive counters, we need to have negative counters. So, you add 5 negative counters paired with 5 positive counters which are equal to zeroes.

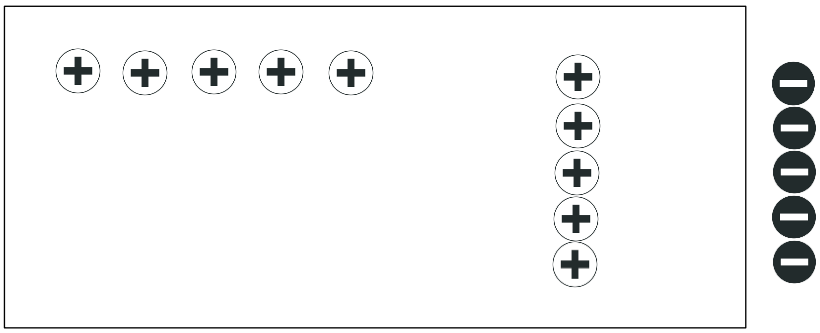
Therefore, in the number sentence ($^{+}5$) – ($^{-}5$), we need to add 5 zeroes. These 5 zeroes are pairs of 5 positive and 5 negative counters. See the following illustration.



Can you now take away 5 negative counters from the set? (Yes)



How many are left on the table?



Do these counters have the same sign? (Yes)

What is the sign? (Positive)

Therefore, if you subtract $^{-}5$ from $^{+}5$ you will get the difference of $^{+}10$.

$^{+}5 - {}^{-}5 = {}^{+}10$

So, the change in temperature is 10°C.

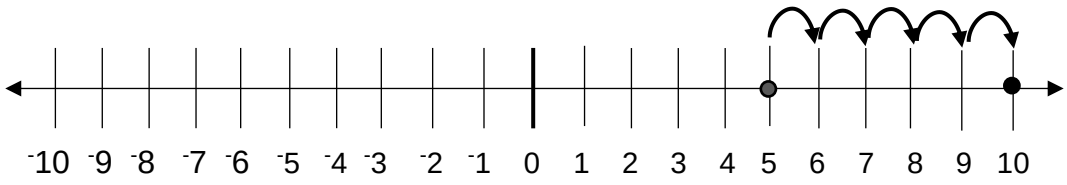
Subtraction of Unlike Integers Using Number Line

Find: $^{+}5 - {}^{-}5 =$

Study the number line below.

To use a number line in subtracting negative integer from positive integer, change the operation into addition. Then change the sign of the subtrahend. That means, you rewrite $^{+}5 - {}^{-}5 = {}^{+}5 + {}^{+}5$.

Now, locate the integer $^{-}5$ and then move it **5 units to the right** of the number line.



We arrive at 10. So, $^{+}5 - {}^{-}5 = 10$

To solve for the value of N, let's consider the rules in subtracting integers with unlike signs.
Follow these steps.

Equation 1. $^{+}5 - {}^{-}5 = N$

1. Change the sign of the subtrahend then, add.

$$\begin{array}{rl} & {}^{+}5 \quad \textit{Minuend} \\ - & {}^{-}5 \quad \textit{Subtrahend} \end{array} \longrightarrow \begin{array}{rl} & {}^{+}5 \\ + & {}^{+}5 \end{array} \longleftarrow \textit{change the sign of the subtrahend}$$

2. Follow the rule in adding positive integers.

*The sum of two positive integers is positive.

Hence,
$$\begin{array}{r} {}^{+}5 \\ +\ {}^{+}5 \\ \hline {}^{+}10 \end{array}$$

Equation 2. $^{-}25 - {}^{+}20 = N$

1. First, change the sign of the subtrahend then, add.

$^{-}25 - {}^{+}20 \longrightarrow {}^{-}25 + {}^{-}20$ *change the sign of the subtrahend*

2. Follow the rule in adding negative integers.

*The sum of two negative integers is negative.

$({}^{-}25) + ({}^{-}20) = ({}^{-}45)$

Therefore, the answers to the equations are: 1) $^{+}23$ 2) $^{-}45$

Study more examples below.

1. What is the difference of $^{-}19 - {}^{+}8$?

First, change the sign of the subtrahend then, add.

$$\begin{array}{r} {}^{-}19 \rightarrow \textit{Minuend} \\ -\ {}^{+}8 \rightarrow \textit{Subtrahend} \\ \hline \end{array} \longrightarrow \begin{array}{r} {}^{-}19 \\ +\ {}^{-}8 \\ \hline \end{array}$$ *change the sign of the subtrahend*

Then, follow the rule in adding negative integers.

*The sum of two negative integers is negative.

Hence,
$$\begin{array}{r} {}^{-}19 \\ +\ {}^{-}8 \\ \hline {}^{-}27 \end{array}$$

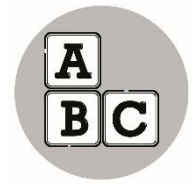
2. $^{+}10 - {}^{-}6 = N$. Solve for the value of N.

First, change the sign of the subtrahend then, add.

$^{+}10 + {}^{-}6 \longrightarrow {}^{+}10 + {}^{+}6$ *change the sign of the subtrahend*

Since the two addends are positive, add the numbers and copy the common sign.

Hence, $^{+}10 + {}^{+}6 = {}^{+}16$



What's More

A. Use a number line or counters to solve for the difference of the given integers. Do it on your answer sheet.

1. $^{+}30 - {}^{-}12 = N$
2. $^{-}23 - {}^{+}40 = N$
3. $^{+}15 - {}^{-}8 = N$

B. Copy and complete the table on your answer sheet. Change the sign of the subtrahend and find the value of N. An example is done for you.

Equation	Equation after changing the operation and getting the opposite sign of the subtrahend	Value of N
Example $^{-}18 - {}^{+}5 = N$	$^{-}18 + {}^{-}5 = N$	$^{-}23$
$^{+}85 - {}^{-}20 = N$		
$^{-}15 - {}^{+}40 = N$		
$^{+}50 - {}^{-}90 = N$		
$^{-}16 - {}^{+}24 = N$		
$^{-}3 - {}^{+}72 = N$		

What I Have Learned

In subtracting integers with unlike signs, follow these steps.

1. Change the sign of the subtrahend and follow the rules in adding integers.
   a. The sum of two positive integers is positive.
   b. The sum of two negative integers is negative.

What I Can Do

A. Subtract the given integers using your counters or number line. Do it on your answer sheet.

1. $^{+}3 - {}^{-}7 =$ _____.
2. The difference between $^{-}19$ and $^{+}1$ is _____.
3. $^{+}15$ when subtracted from $^{-}9$ is equal to _____.
4. $^{+}40 - {}^{-}15 =$ _____.
5. $^{-}50$ minus $^{+}10$ is equal to _____.

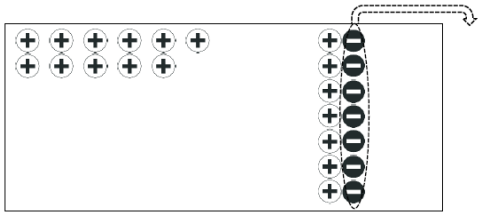
B. Solve the following problems. Show your solutions and label your final answers on your answer sheet.

6. It will be $^{-}10$°C in Korea in December. The weatherman predicts it will be 8° cooler by January. What will be the expected temperature in January?

Assessment

A. Read and analyze the situations below. Write the letter of the correct answer on your answer sheet.

1-3 Use the illustration below to answer items 1-3.



1) What operation is suggested by the illustration above?

A. Multiplication B. Division
C. Subtraction D. Addition

2) What number sentence is shown in the illustration?

A. $^{-}7 + {}^{-}11 = N$ B. $^{+}11 - {}^{-}7 = N$
C. $^{-}11 + {}^{-}7 = N$ D. $^{+}7 - {}^{-}11 = N$

3) What is the answer to the illustration above?

A. $^{-}18$ B. $^{+}18$
C. $^{-}11$ D. $^{+}11$

4) What is the answer if you subtract $^{+}5$ from $^{+}4$?

A. $^{+}9$ B. $^{-}1$
C. $^{+}1$ D. $^{-}9$

5) $^{+}8 - {}^{-}1$ also means _____.

A. $^{+}8 + {}^{+}1$ B. $^{+}8 \times {}^{+}1$
C. $^{+}8 + {}^{-}1$ D. $^{+}8 \div {}^{-}1$

B. Solve for the value of N by subtracting the following integers. Write your answers on your answer sheet.

6) $^{-}76 - {}^{+}80 = N$

7) $^{+}20 - {}^{-}30 = N$

8) $^{-}53 - {}^{+}12 = N$

9) $^{+}18 - {}^{-}7 = N$

10) $^{-}34 - {}^{+}34 = N$

Additional Activities

A. Put a check mark if the number sentence is correct. If the answer is wrong, write the correct answer. Write all your answers on your answer sheet.

Example: 1) $^{+}8 - {}^{-}10 = {}^{+}18$ ___/___

2) $^{-}5 - {}^{+}9 = {}^{+}4$ ___$^{-}14$___

Begin here:

1) $^{-}5 - {}^{+}5 = 0$ ____

2) $^{-}20 - {}^{+}30 = {}^{-}50$ ____

3) $^{-}16 - {}^{+}4 = {}^{-}20$ ____

4) $^{-}23 - {}^{+}3 = {}^{+}26$ ____

5) $^{+}35 - {}^{-}50 = {}^{-}15$ ____

B. Solve the following problems. Show your solutions and label your final answers on your answer sheet.

1) The temperature in a certain place is $^{-}2$ °C and is expected to drop by 3° by midnight. What is the expected temperature at midnight?

2) Two dice were tossed simultaneously. The first die contains positive integers while the second die contains negative integers. After tossing the dice, the integers that appeared are $^{+}6$ and $^{-}4$. If you are going to subtract the integer in the first die from the integer in the second die, what is your answer?

Answer Key

What I Know

A. B.

1. A 6. -45
2. C 7. +21
3. C 8. -75
4. A 9. +100
5. A 10. +170

What's More

A.

1. +42
2. -63
3. +23

B.

Equation after changing the operation and getting the opposite sign of the subtrahend	Value of N
(*85) + (*-20)= N	(*105)
(-15) + (-40)= N	(-55)
(*50) + (*90)= N	(*140)
(-16) + (-24)= N	(-40)
(-3) + (-72) = N	(-75)

Assessment

A.

1. C
2. B
3. B
4. D
5. A

B.

6. -156
7. +50
8. -65
9. +25
10. -68

What's In

1. -16
2. +25
3. +25
4. -10
5. -65

What I Can Do

A.

1) +10
2) -20
3) -24
4) +55
5. -60

B.

6) -18°C

Additional Activities

A.

1) -10
2) /
3) /
4) -26
5. +85

B.

1. -5°C
2. -10

What I Know

Solve the following problems. Show your solutions and write your answers on your answer sheet.

1) A roller coaster begins at 98 feet above the ground. Then, it descends 72 feet. Find the height of the coaster after it descended.

2) An elevator is on the 13th floor. It goes down 11 floors and then up 7 floors. What floor is the elevator now?

3) The gold medalist in the 400-meter run reached the finish line in 40 seconds while the bronze medalist was timed 46 seconds. What is the difference between the time of the gold and the bronze medalist?

4) A monkey sits on a limb that is 13 ft. above the ground. He swings up 9 ft, climbs 7 ft. more then jumps down 15 ft. How far off the ground is the monkey now?

5) What is the least possible result if you are going to place this set of integers at random in the equation below?

$(^{+}10),\ (^{-}8),\ (^{-}2)$

$\square - \square + \square = \square$

Lesson 3 Solving Routine and Non-Routine Problems involving Subtraction of integers

In the previous lessons, you have learned how to subtract integers with like signs and how to subtract with unlike signs. In this lesson, you will learn the skill of solving word problems involving subtraction of integers.

What's In

Give the difference of the following integers. Write your answers on your answer sheet.

1) $^{+}15 - {}^{-}15 =$ ☐

2) $^{-}7 - {}^{+}25 =$ ☐

3) $^{-}11 - {}^{-}18 =$ ☐

4) $^{+}30 - {}^{+}50 =$ ☐

5) $^{-}9 - {}^{+}6 =$ ☐

What's New

Read and study the problem below.

Mr. Galvez is a stockbroker. He visits his two clients who live in the same apartment. He uses the elevator to visit his old client on the 28th floor. He then rides down 16 floors from there to visit his new client. On what floor of the apartment does Mr. Galvez's new client live?

What is It

We can solve this problem following Polya's steps in problem solving.

1. Understand

- What is asked in the problem?

  The level of the apartment where Mr. Galvez's new client live.

- What facts are needed to solve the problem?

  28th floor- where Mr. Galvez's old client live

  16 floors- number of floors he went down

2. Plan

- What operation is needed to solve the problem?

  Subtraction

- What is the number sentence?

  $^{+}28 - {}^{+}16 = N$

3. Solve

$^{+}28 - {}^{+}16 = {}^{+}12$

Mr. Galvez's new client lives in the 12th floor of the apartment.

4. Check and Look Back

$^{+}16 + {}^{+}12 = {}^{+}28$

Now that you are already familiar on how to add and subtract integers, you can move on studying the problem below.

To solve the problem, you may use the guess and check or trial and error method.

Arrange the given integers in order to get the highest result.

($^{-}6$), ($^{+}3$), ($^{-}5$)

☐ + ☐ - ☐ = ☐

Trial 1: $^{-}6 + {}^{+}3 - {}^{-}5$

$^{-}3 - {}^{-}5 =$ $\boxed{^{+}2}$

Trial 2: $^{-}6 + {}^{-}5 - {}^{+}3$

$^{-}11 - {}^{+}3 =$ $\boxed{^{-}14}$

Trial 3: $^{+}3 + {}^{-}6 - {}^{-}5$

$^{-}3 - {}^{-}5 =$ $\boxed{^{+}2}$

Trial 4: $^{+}3 + {}^{-}5 - {}^{-}6$

$^{-}2 - {}^{-}6 =$ $\boxed{^{+}4}$

Trial 5: $^{-}5 + {}^{-}6 - {}^{+}3$

$^{-}11 - {}^{+}3 =$ $\boxed{^{-}14}$

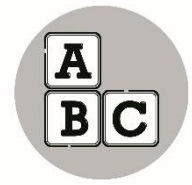
Trial 6: $^{-}5 + {}^{+}3 - {}^{-}6$

$^{-}2 - {}^{-}6 =$ $\boxed{^{+}4}$

Based on the results of the trials using different possible arrangement of the given integers, the highest result is ($^{+}4$).

Therefore, the possible combination of these integers are:

($^{+}3$) + ($^{-}5$) – ($^{-}6$) and ($^{-}5$) + ($^{+}3$) – ($^{-}6$).



What's More

Solve the problems below. Show your solutions and write your answers on your answer sheet.

1) The descriptions of the temperatures in two cities are as follows:
City A ➡ 5 degrees below 30 °C City B ➡ 15 degrees above ⁻5 °C
Which city is hotter? By how much?

2) Carol lost 4 kilograms after a month of suffering from a heart ailment. If Carol was 48 kilograms last month, how heavy is she now?

3) What is the difference between the sum of all integers from ⁺5 to ⁺10 and the sum of integers from ⁻5 to ⁻10?

What I Have Learned

Routine problems are problems having readily available solutions. The methods/processes can easily be identified. We can solve routine problems using Polya's steps in problem solving as follows:

1. Understand
2. Plan
3. Solve
4. Check and Look Back

Non-routine problems are problems that do not have readily available procedure to solve them. Non routine problems can be solved using different strategies such as Guess and Check, Using Models, Acting Out, Logical Reasoning, Working Backwards and others.

What I Can Do

Solve the problems below. Show your solutions and write your answers on your answer sheet.

1) Jeus is making a fence in his backyard. He used a 5-meter bamboo for the poles. To make the bamboo poles stand stronger, he buried the lower portion measuring 50 centimeters. What is the length in centimeters of the visible portion of the pole on the ground.

2) A parachute was seen 198 feet above the ground. It slowly descended 64 feet. What is the parachute's new position?

3) The sum of three consecutive negative odd integers is $^{-}33$. What is the difference if you are going to subtract the smallest integer from the biggest integer?

Assessment

Solve the problems below. Show your solutions and write your answers on your answer sheet.

1) Two hundred fourteen reams of bond papers from a total of 312 reams were delivered to schools for the printing of modules. How many reams of bond papers were left?

2) The sum of 2 negative integers is $^{-}8$. Their difference is $^{+}4$. What are the two integers?

3) Ambriel is 12 years old now. Two years ago, he is 3 years older than his brother. How old is Ambriel's brother now?

4) The recorded highest temperature of a certain place is 40°C. The recorded lowest temperature is -6°C. What is the difference between the highest and lowest temperature of the place?

5) Insert both addition (+) and subtraction (-) operations in the number sentence below to make it true.

$^{-}3$ ☐ $^{-}12$ ☐ $^{+}6$ ☐ $^{+}9$: $^{-}12$

Additional Activities

Solve the following problems below. Show your solutions and write your answers on your answer sheet.

1) The first L300 van arrives 13 hours ahead and the next van arrives to their destination 5 hours after. Find the difference in time of their arrival.
2) An airplane takes off and then climbs 2600 feet. After 25 minutes, it descends 150 feet. What is the airplane's current height from the ground?
3) Find the difference between the sum of the first three consecutive integers from $^{+}2$ and the sum of the first four consecutive negative integers starting from $^{-}1$. The positive integers being the minuend.
4) The reported temperatures in two provinces are as follows:
   Province A- 7˚ above 25 degrees
   Province B- 35 degrees above $^{-}7^{\circ}$
   Which province is colder? By how much?
5) Insert positive (+) or negative (-) sign before each given to make the equation true.

   $\square_4 + \square_3 - \square_8 = {}^{+}1$

Answer Key

What I Know	What's more	Assessment
1. 26 ft above the ground ($^{+}26$) 2. 9th floor 3. 6 seconds 4. 14 ft above the ground ($^{+}14$) 5. $^{-}20$	1. City A 15 degrees hotter ($^{+}15$) 2. 44 kg 3. $^{+}90$	1. 98 2. $^{-}6$, $^{-}2$ 3. 9 years old 4. $^{+}46\ ^{\circ}C$ 5. +, --, +

What's In	What I Can Do	Additional Activities
1. $^{+}20$ 2. $^{-}32$ 3. $^{+}7$ 4. $^{-}20$ 5. $^{-}15$	1. 450 cm 2. 134 ft above the ground 3. $^{+}4$	1. 8 hours 2. 2 450 ft above the ground 3. $^{+}19$ 4. Province B 4 degrees colder 5. $^{-}4$, $^{-}3$, $^{-}8$

References

Most Essential Learning Competencies 6, M6NS-IIi-156

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