**SUPPLEMENTAL INSTRUCTION ACTIVITY**

**TOPIC: Integers**

**APPLICABLE COURSES:** All math courses starting from Math 025/026 and other courses in other disciplines.

**LEARNING OUTCOME:** (What will students be able to do by the end of the workshop?)

After completing this workshop, students should be able to add, subtract, multiply and divide integers and signed numbers.

**CONTENT:** (What do students need to know to accomplish the outcome?)

1. Define an integer.
2. Define the absolute value of an integer.
3. Adding integers with the same sign.
4. Adding integers with the opposite signs.
5. Define the opposite of an integer.
6. Subtract integers by adding the opposite.
7. Multiplying and Dividing integers with the same sign.
8. Multiplying and Dividing integers with the opposite signs.
9. Using the order of operations when simplifying an integer problem with more than one operation.

**METHOD:** (How will the instructor deliver content? Short lecture, handouts, Powerpoint, other audio-visual presentation)

Short lecture followed by active learning exercise and worksheet (45 minutes)

* Teach 1, 2, 3 and 4 (10 minutes)

Practice 1, 2, 3 and 4 (5 minutes)

* Teach 5 and 6 (5 minutes)

Practice 5 and 6 (5 minutes)

* Teach 7 and 8 (5 minutes)

Practice 7 and 8 (5 minutes)

* Teach 9 (5 minutes)

Practice 9 (5 minutes)

* The lesson is divided into segments composed of lecture and examples followed by student practice and sharing.
* First, the instructor distributes the exercise worksheet and any supporting handouts.
* Then the instructor presents segment 1, 2, 3 and 4 (Definition of an integer, example of integers in real life, definition of absolute value, explain how to add integers with the same and opposite signs.)
* After this brief lecture with examples, students will break up into pairs and complete the practice problems (3 min).
* Next, in pairs, students each take a turn explaining to their partner how they solved one of the problems (2 min). At the end of this 5-minute segment, the instructor posts the solutions/answers on the screen/white board for students to check their work.
* Follow the same lecture/practice procedure for segments 5 through 9 (Definition of opposites, subtracting integers, multiplying and dividing integers and reviewing the order of operations.)

Note: If time is short, only one student explains his/her process to the partner for each segment of the lesson, taking turns for each segment.

**ACTIVE LEARNING STRATEGIES:** (How will students apply their knowledge? Solve a problem, create a project, analyze a case, and explain a process)

Students reflect on the exercises and teach each other by verbalizing the steps they took to reach their conclusions.

**ASSESSMENT METHOD:** (How will the instructor know that the students met the outcome? Check for understanding. )

(12 minutes.)

Students will complete a quiz where they are asked to apply the operations of addition, subtraction, multiplication and division to integer problems. After completing the quiz, the instructor posts the solutions/answers on the screen/white board. Students check their results. The instructor can also look over the quizzes while the students are completing the self-reflection activity to give feedback to students.  
If students do not successfully complete the worksheet quiz, they may be referred to individual tutoring or a guided learning activity.

**SELF-REFLECTION ACTIVITY:** (What will the instructor do to get students to reflect on how they learned the content? What they learned, how they learned it, how they will apply it in their coursework)

(3 minutes.)

-Which segment of the exponential expressions was most challenging for you?

-What steps are you going to take to learn this subject?

|  |  |
| --- | --- |
| ***Integers***  **Handout** | **Name: Date:** |

**Objective: Learn how to add, subtract, multiply and divide integers**

**Segment 1**: **Definition of an Integer**

The set of integers is made up of the following numbers:



Notice the set of integers includes the natural numbers 1,2,3,4,… , zero, and the negative numbers -1, -2, -3, …

**Segment 2: Definition of absolute value**

The absolute value of a real number is the distance from zero.   
The absolute value of a number *x* is denoted ****

(Notice that the absolute value of a number is always positive

since distance cannot be negative.)

**Example 1 **

**Example 2** 

**Segment 3: Adding integers with the same sign.**

To add integers with the same sign (both positive or both negative),

add the absolute value of the numbers together and keep the sign the same.

(When you add two integers with the same sign, think “add the

numbers and keep the sign”)

**Example 3 **

**Example 4** 

**Example 5** 

**Note: A good example of integers is seen in the use of money. Think of positive numbers as finding or earning money while negative numbers as losing money. So in Example 3, we can think of the problem as losing $4 and then losing $10. What is your net gain or loss? The person has lost a total of $14 (-14).**

**Segment 4: Adding integers with opposite signs.**

To add integers with the opposite signs (one positive and one negative),  
subtract the absolute value of the numbers and keep the sign   
of the number with the larger absolute value.

(When you add two integers with opposite signs, think

“subtract the numbers and keep the sign of the larger”)

**Example 6 **

**Example 7** 

**Example 8** 

**Note: Use the example of money again. Notice in Example 7, we can think of the problem as earning $17 and then losing $11. What is your net gain or loss? The person has a net gain of $6 (+6).**

Now it is time for you to practice. Break up into pairs and work on the following problems using the rules discussed above.

**Practice 1  Practice 2 **

**Practice 3**  **Practice 4** 

**Practice 5**  **Practice 6** 

**Practice 7** 

Now explain. Pick one problem above and explain to your partner how you got the answer.

**Segment 5: Definition of an opposite**

Two numbers are considered ***opposites*** if they have the same absolute value

(same distance from zero) but lie on opposite sides of zero on the number line.

(For example -8 and +8 are considered opposites of each other.

**Example 9 What is the opposite of +16?**

**Example 10 What is the opposite of ?**

**Segment 6: Subtracting integers by adding the opposite.**

To subtract an integer from another, add the opposite value of   
the integer you are subtracting. You can use the following formula:



(For example, subtracting 12 is the same as adding  and

subtracting is the same as adding 5.

numbers and keep the sign”)

**Example 11 **

**Example 12** 

**Example 13** 

Now it is time for you to practice. Break up into pairs and work on the following problems using the rules discussed above.

**Practice 8** What is the opposite of ? **Practice 9** What is the opposite of ?

**Practice 10**  **Practice 11** 

**Practice 12**  **Practice 13** 

Now explain. Pick one problem above and explain to your partner how you got the answer.

**Segment 7: Multiplying and Dividing integers with the same sign.**

To multiply or divide integers with the same sign (both positive or both negative),

multiply or divide the absolute value of the numbers. **The answer will be positive.**

(Note: When multiplying negative integers, you will often see   
two parenthesis next to each other.)

**Example 14 **

**Example 15** 

**Example 16** 

**Segment 8: Multiplying and Dividing integers with opposite signs.**

To multiply or divide integers with opposite signs (one positive and one negative),

multiply or divide the absolute value of the numbers. **The answer will be negative.**

(Note: When multiplying negative integers, you will often see   
two parenthesis next to each other.)

**Example 17 **

**Example 18** 

**Example 19** 

Now it is time for you to practice. Break up into pairs and work on the following problems using the rules discussed above.

**Practice 14**  = **Practice 15** =

**Practice 16**  **Practice 17** 

**Practice 18** 

Now explain. Pick one problem above and explain to your partner how you got the answer.

**Segment 9: Order of operations problems with integers**

When simplifying a problem with multiple operations, be sure to follow the following order.

**Order of Operations**

1. **Parenthesis**
2. **Exponents**
3. **Multiplication and Division in order from left to right**
4. **Addition and Subtraction in order from left to right**

**Example 20 **

Now it is time for you to practice. Break up into pairs and work on the following problems using the rules discussed above.

**Practice 14**   **Practice 15 **

Now explain. Pick one problem above and explain to your partner how you got the answer.

**Quiz:** Let’s check to see how much you have learned. Take the quiz. Then check your answers.

When you are done, fill out the following self reflection.

**SELF-REFLECTION**

-Which segment of the exponential expressions was most challenging for you?

-What steps are you going to take to learn this subject?

|  |  |
| --- | --- |
| ***Integers***  **Handout - KEY** | **Name: Date:** |

**Objective: Learn how to add, subtract, multiply and divide integers**

**Segment 1**: **Definition of an Integer**

The set of integers is made up of the following numbers:



Notice the set of integers includes the natural numbers 1,2,3,4,… , zero, and the negative numbers -1, -2, -3, …

**Segment 2: Definition of absolute value**

The absolute value of a real number is the distance from zero.   
The absolute value of a number *x* is denoted ****

(Notice that the absolute value of a number is always positive

since distance cannot be negative.)

**Example 1  14**

**Example 2**  27

**Segment 3: Adding integers with the same sign.**

To add integers with the same sign (both positive or both negative),

add the absolute value of the numbers together and keep the sign the same.

(When you add two integers with the same sign, think “add the

numbers and keep the sign”)

**Example 3  -14**

**Example 4**  20

**Example 5**  -34

**Note: A good example of integers is seen in the use of money. Think of positive numbers as finding or earning money while negative numbers as losing money. So in Example 3, we can think of the problem as losing $4 and then losing $10. What is your net gain or loss? The person has lost a total of $14 (-14).**

**Segment 4: Adding integers with opposite signs.**

To add integers with the opposite signs (one positive and one negative),  
subtract the absolute value of the numbers and keep the sign   
of the number with the larger absolute value.

(When you add two integers with opposite signs, think

“subtract the numbers and keep the sign of the larger”)

**Example 6  -6**

**Example 7**  6

**Example 8**  -24

**Note: Use the example of money again. Notice in Example 7, we can think of the problem as earning $17 and then losing $11. What is your net gain or loss? The person has a net gain of $6 (+6).**

Now it is time for you to practice. Break up into pairs and work on the following problems using the rules discussed above.

**Practice 1  19 Practice 2  23**

**Practice 3**  7 **Practice 4**  -21

**Practice 5**  -180 **Practice 6**  -18

**Practice 7**  -60

Now explain. Pick one problem above and explain to your partner how you got the answer.

**Segment 5: Definition of an opposite**

Two numbers are considered ***opposites*** if they have the same absolute value

(same distance from zero) but lie on opposite sides of zero on the number line.

(For example -8 and +8 are considered opposites of each other.

**Example 9 What is the opposite of +16? -16**

**Example 10 What is the opposite of ? +7**

**Segment 6: Subtracting integers by adding the opposite.**

To subtract an integer from another, add the opposite value of   
the integer you are subtracting. You can use the following formula:



(For example, subtracting 12 is the same as adding  and

subtracting is the same as adding 5.

numbers and keep the sign”)

**Example 11  -10**

**Example 12**  -7

**Example 13**  3

Now it is time for you to practice. Break up into pairs and work on the following problems using the rules discussed above.

**Practice 8** What is the opposite of ? **14 Practice 9** What is the opposite of ? **-21**

**Practice 10**  25 **Practice 11**  -33

**Practice 12**  -64 **Practice 13**  -18

Now explain. Pick one problem above and explain to your partner how you got the answer.

**Segment 7: Multiplying and Dividing integers with the same sign.**

To multiply or divide integers with the same sign (both positive or both negative),

multiply or divide the absolute value of the numbers. **The answer will be positive.**

(Note: When multiplying negative integers, you will often see   
two parenthesis next to each other.)

**Example 14  42**

**Example 15**  168

**Example 16**  2,135

**Segment 8: Multiplying and Dividing integers with opposite signs.**

To multiply or divide integers with opposite signs (one positive and one negative),

multiply or divide the absolute value of the numbers. **The answer will be negative.**

(Note: When multiplying negative integers, you will often see   
two parenthesis next to each other.)

**Example 17  -80**

**Example 18**  -92

**Example 19**  -840

Now it is time for you to practice. Break up into pairs and work on the following problems using the rules discussed above.

**Practice 14**  = **56 Practice 15** = **-126**

**Practice 16**  -96 **Practice 17**  2,000

**Practice 18**  -810

Now explain. Pick one problem above and explain to your partner how you got the answer.

**Segment 9: Order of operations problems with integers**

When simplifying a problem with multiple operations, be sure to follow the following order.

**Order of Operations**

1. **Parenthesis**
2. **Exponents**
3. **Multiplication and Division in order from left to right**
4. **Addition and Subtraction in order from left to right**

**Example 20  -55**

Now it is time for you to practice. Break up into pairs and work on the following problems using the rules discussed above.

**Practice 14**   **9   
Practice 15  3**

Now explain. Pick one problem above and explain to your partner how you got the answer.

**Quiz:** Let’s check to see how much you have learned. Take the quiz. Then check your answers.

When you are done, fill out the following self reflection.

|  |  |
| --- | --- |
| ***Integers***  **Quiz** | **Name: Date:** |

1.  1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2.  2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3.  3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4.  4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5.  5.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. **** 6**.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |
| --- | --- |
| ***Integers***  **Quiz - KEY** | **Name: Date:** |

1.  1. \_\_\_\_\_\_**-31**\_\_\_\_\_\_\_\_
2.  2. \_\_\_\_\_\_\_**-9**\_\_\_\_\_\_\_\_
3.  3. \_\_\_\_\_\_**-23**\_\_\_\_\_\_\_\_\_
4.  4. \_\_\_\_\_\_\_**-27**\_\_\_\_\_\_\_\_
5.  5.\_\_\_\_\_\_\_**-12**\_\_\_\_\_\_\_\_
6. ** .\_\_\_\_\_\_\_-42\_\_\_\_\_\_\_\_\_\_**