Weekly Focus: integers
Weekly Skill: addition, subtraction, multiplication, and division

LESSON 9: Integers Computation and Word Problems

Lesson Summary: First, students will solve a word problem with percentages. In Activity 1, they will review vocabulary with true/false statements. In Activity 2, they will put numbers on the number line. In Activity 3, students will practice adding and subtracting integers. Activity 4, they will practice multiplication and division of integers. In Activity 5, they will do word problems. For Activity 6, they will do an application problem related to paying bills. There is an extra problem at the end. Estimated time for the lesson is two hours.

Materials Needed for Lesson 9:

- Post-it notes
- 3 Worksheets with Answers (links embedded in lesson plan)
- Video (length 10 minutes) on 2 methods of adding and subtracting integers. The video is required for teachers and recommended for students.
- Fun music video on adding and subtracting integers (length 2:30)
- Video on multiplying and dividing integers (length 7:31). Required for teacher and recommended for students.
- Exit ticket (attached; use pencils, rulers, flyswatters, etc.)
- *Mathematical Reasoning Test Preparation for the 2014 GED Test* Student Workbook p. 10-13
- Teacher Note: You may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice depending on students' needs and time.

Objectives: Students will be able to:

- Review vocabulary related to integers
- Do computation of integers and word problems
- Solve a real-life application problem

ACES Skills Addressed: N, CT, LS
CCRS Mathematical Practices Addressed: Attend to Precision, Mathematical Fluency, Use Appropriate Tools Strategically
Levels of Knowing Math Addressed: Intuitive, Pictorial, Abstract, and Application

Notes:
You can add more examples if you feel students need them before they work. Any ideas that concretely relates to their lives make good examples.

For more practice as a class, feel free to choose some of the easier problems from the worksheets to do together. The "easier" problems are not necessarily at the beginning of each worksheet. Also, you may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice.

The GED Math test is 115 minutes long and includes approximately 46 questions. The questions have a focus on quantitative problem solving (45%) and algebraic problem solving (55%).

Students must be able to understand math concepts and apply them to new situations, use logical reasoning to explain their answers, evaluate and further the reasoning of others, represent real world problems algebraically and visually, and manipulate and solve algebraic expressions.

This computer-based test includes questions that may be multiple-choice, fill-in-the-blank, choose from a drop-down menu, or drag-and-drop the response from one place to another.

The purpose of the GED test is to provide students with the skills necessary to either further their education or be ready for the demands of today's careers.

Lesson 9 Warm-up: Solve the percent problem	**Time: 10 Minutes**

Write on the board: Cindy wants to save 15% of her gross monthly income for retirement.

Basic Questions:

- If she saves $235.00 a month, how much will she save in a year? *($235 x12 = $2820)*
- At the end of two years, she had an emergency and had to spend ¼ of what she had saved. How much did she take out of her savings? *($2820 x 2 = $5640 divided by 4 = $1410)*

Extension Questions:

- If $235 represents 15% of her income, how much does she make monthly? *(0.15x=235. X=235/0.15 = $1566.67)*
- She wants to increase her monthly savings to 17%. How much is that? (0.17 x 1566.67 = $266.33)

Lesson 9 Activity 1: Vocabulary True or False	**Time: 10 Minutes**

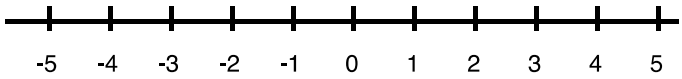
This activity can be projected on the board and done as a whole class. (attached) Have students volunteer to write answers. Then do some examples.

Answers:

1. *True*
2. *False. An integer is a whole number that is either positive or negative. Zero is also an integer.*
3. *True*
4. *True*
5. *False. Absolute value means the distance from zero. It is expressed with a positive number or zero and written with the symbol parallel bars symbol. Ex. l-4l = 4 and l4l = 4. Both positive and negative 4 are four units away from 0 on the number line.*

Lesson 9 Activity 2: Place the numbers on the line	**Time: 10 Minutes**

1. Write a number line on the board from negative 5 to positive 5.



2. Write various positive and negative numbers on post-it notes and hand out to students. Choose the difficulty of the numbers you write according to your students' skill level, but make sure to include a combination of + and – numbers as well as some easy-to-measure fractions (1/10, 2¼, ¾, -1½ for example) and decimals (0.3, -4.7, etc.)

3. Ask them to place the post-it note at about the correct place on the line.

4. As a class discuss whether the posted numbers are in the correct locations.

5. Now talk about **absolute value**. How far is each number from zero? That is its absolute value. Write a few examples, such as I-3/4 I = ¾. Have students come write more examples.

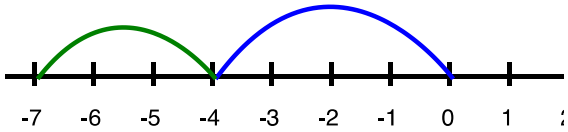
6. Don't erase this line. Use it for the next activity to show addition and subtraction of numbers.

Activity 3: Addition and Subtraction of + and - Numbers	**Time: 20-25 Minutes**

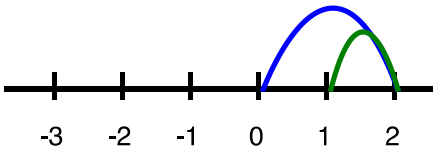
Use the number line to show how addition and subtraction of integers works. Some students prefer to see how the numbers move along the number line, whereas others prefer to know the rules. To add, go right on the number line. To subtract, go left on the number line. Here are examples of each:

- If integers have like signs, add and keep the common sign. If integers have different signs, find the difference. Then use the sign of the number with the greater absolute value.

Example:

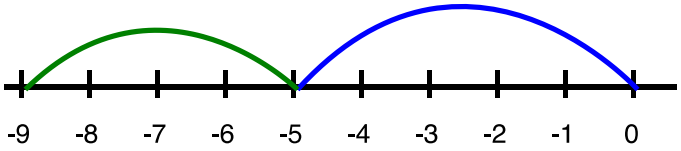


-4 + -3 = -7



2 + -1 = 1

- To subtract an integer, go left on the number line. Example: -5 -4 = -9



- If there are two negatives next to each other, they become a positive because you start going left on the number line, and then need to switch directions again for the second sign.
  Example: -9 - -4 = -9 + 4 = -5.
  Example: 18 - - 5 = 18 + 5 = 23

It is very helpful to watch the **video** assigned to this lesson for more explanations.

Do **Worksheet 9.1**. Have students volunteer to do a few problems on the number using the number line.

Lesson 9 Activity 1 Vocabulary: True or False

1. _____ A positive whole number is an integer.

2. _____ A positive fraction is an integer.

3. _____ Zero is an integer.

4. _____ A negative whole number is an integer.

5. _____ The absolute value of a number is always negative.

Lesson 9 Activity 4: Multiplication and Division of + and - Integers	Time: 15-20 Minutes

For multiplying and dividing integers:

- If the signs are the same, the answer will be positive. Example: (-2)(-6)= 12
- If the signs are different, the answer will be negative. Example: -6/2 = -3

Do **Worksheet 9.2 and Worksheet 9.3**. Choose a few problems to do on the board.

Note to teacher: It is difficult to explain why the rules are such for multiplying and dividing + and – integers. This is one of the rare occasions it is easier just to know the rule. You can find the explanation if you search online.

Lesson 9 Activity 5: Word Problems	Time: 25-30 Minutes

Do the word problems on pages **10-13 of the workbook**. Choose a few more challenging problems for students (or you) to do on the board.

Lesson 9 Activity 6: Application Problem	Time: 10 Minutes

Jason keeps track of his checking account every month. He uses his debit card to pay for his expenses so they are withdrawn immediately. Here are this month's expenses:

- He started with a beginning balance of $1,000 on the first of the month
- He paid his rent of $825 on the 2nd of the month
- He bought groceries for $130 on the 6th of the month
- He put gas in his truck twice at $55 each time the week of the 10th
- He was paid $1,010 on the 15th of the month

1. How much money does he have at the end of the month?
2. Was he ever overdrawn on his account? If so, by how much?
3. Write an equation to show the changes to his account.
4. If he gets paid twice a month, what percent of his income goes toward rent?

Lesson 9 Exit Ticket	Time: 5 Minutes

Write "Negative" and "Positive" on the board or on two pieces of paper. Give some students pencils, rulers or flyswatters and as you write an equation, have them race to hit one of the

words to show that the solution is either negative or positive (you can divide them into teams or call students up two at a time).

- *-5 + 8* *(Positive)*
- *-1 – 3* *(Negative)*
- *-10 – (-11)* *(Positive)*
- *-41 + (-11) + 51* *(Negative)*
- *-8 / 4* *(Negative)*
- *(-3) (-6)* *(Positive)*

Lesson 9 Extra Problem	**Time: 3-5 Minutes**

Write on the board:

- The temperature this morning was -8 and now it's +15. How much did the temperature change from the morning until now? (23 degrees)
- Yesterday the temperature went from +2 to -12. What was the change in temperature? (14 degrees)

Draw a vertical number line (thermometer) and have students use it to show how they obtained the answer.

Lesson 9 Activity 6 Application Problem Answers

Jason keeps track of his checking account every month. He uses his debit card to pay for his expenses so they are withdrawn immediately. Here are this month's expenses:

- A beginning balance of $1,000 on the first of the month
- He paid his rent of $825 on the 2nd of the month
- He bought groceries for $130 on the 6th of the month
- He put gas in his truck at $55 each time twice the week of the 10th
- He was paid $1,010 on the 15th of the month

1. How much money does he have at the end of the month? *$945*
2. Was he ever overdrawn on his account? If so, by how much? *Yes, by $65*
3. Write an equation to show the changes to his account.
   $1,000 - $825 -$130- (2 x 55) + 1,010 = $945
4. If he gets paid twice a month, what percent of his income goes toward rent?
   $1,010 x 2 = $2,020. $825/$2,020 = 0.408 = 40.8%