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EDFI 7110

November 3, 2010

Instructional Design Project

**Rationale/ Statement of Purpose**

The Life Skills Center of Toledo is a local Charter School located in Downtown Toledo. Life Skills is a charter school that focuses on credit recovery and dropout prevention. Because of the fact that the majority of our students have either been out of school for extended amounts of time, or because they have struggled continuously in the past, the school has decided to put together a remediational course to attempt to sharpen some of our students math skills upon entry of our school. If a student’s math scores are significantly low upon entry to the school, many of them are required to take this course. The course is organized into a very traditional/basic model stressing repetition and a fixed type of curriculum. Because this course is for remediation and intended to sharpen students’ basic math skills for future higher level math courses, the objectives of this course/ subunit are designed to be very basic and straightforward. This unit will be constructed of lesson plans following the Basic Lesson Planning Model and consist mainly of traditional theories of teaching and learning (Chiarelott, 2006).

Formative assessments will take place daily as homework will be assigned each evening, and discussed for understanding the following day. While the concept of formative assessment itself is not new, what is new is the evidence of the extraordinary effectiveness of formative assessment in teaching and learning (Gareis, 2007). Since students in this course have had trouble in past math courses, formative assessments are crucial in assessing the level of understanding of each and every student on a daily basis. Daily lessons will be evaluated for efficiency and effectiveness based on student feedback.

# Works Cited

Chiarelott, L. (2006). *Curriculum in Context.* Belmont, California: Thompson Higher Education.

Gareis, C. R. (2007, June). Reclaiming an important teacher competency: the lost art of formative assessment. *Journal of Personell Evaluation in Education* , 17-20.

**Subunit 1: Integers and Operations**

* Students will investigate numbers that are less than zero, examine the set of integers and express them in mathematical notation, and define and list pairs of opposite numbers. (Knowledge, comprehension)

 Students will investigate numbers by their sign and their distance from zero, and find the absolute value of numbers and expressions. (Knowledge, application)

* Students will use a number line to get a picture of what it means to add or subtract a negative number, and develop a strategy for adding or subtracting negative numbers.(Comprehension, application)
* Students will investigate what happens when they subtract a negative number from itself. (Knowledge)
* Students will investigate what happens when they multiply different combinations of positive and negative numbers.(Analysis)
* Students will develop a strategy for multiplying or dividing any two integers, and use what they know about multiplication to find a way to divide negative numbers. (Comprehension, application, synthesis)
* Students will define and define and use the commutative and associative properties while solving mathematical expressions. (Knowledge, application)
* Students will review the four main mathematical operations (+ - x /), and use the order of operations to solve mathematical expressions. (Knowledge, Application)
* Students will investigate how using grouping symbols make mathematical expressions much easier to use, and demonstrate how the use of grouping symbols affects the order of operations. (Knowledge, application)
* Students will define and use a number line, and also be able to plot number on a number line and see relationships between them. Students will also write relationships between numbers using inequality signs. (Comprehension, application)

**Pre-Assessment: (Developed by Apex Learning)**

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|  | **Question 1** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What number is the opposite of 31? | |
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|  | **Question 2** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What number is the opposite of -57? | |
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|  | **Question 3** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What number is equal to its opposite? | |
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|  | **Question 4** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  |-72| | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 5** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  17 + |10 - 17| | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 6** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  10 - |7 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif5| | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 7** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  -5 + 89 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 8** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  7 + (-17) | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 9** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  -17 + 12 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 10** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  5 - 21 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 11** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  10 - (-72) | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 12** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  -27 - (-10) | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 13** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  -100 - 13 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 14** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  -22 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif-4 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 15** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  -10 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif12 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 16** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  48 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif-4 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 17** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  -60 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif-4 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 18** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  -27 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif9 | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 19** | |
|  |  | (1 point possible) |
|  |  | **Multiple Choice:** Please select the best answer and click "submit." |
|  | Choose the one expression below that is true. | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** 13 - (8 + 9) = (13 - 8) + 9 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** (7 - 12) + 5 = 7 - (12 + 5) * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** (17 + 15) + 10 = 17 + (15 + 10) * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** 11 - (7 + 2) = (11 - 7) + 2 | |
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|  | **Question 20** | |
|  |  | (1 point possible) |
|  |  | **Multiple Choice:** Please select the best answer and click "submit." |
|  | Which of the expressions below cannot be rewritten using the associative property? | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** 13 + 2 + 7 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** (5 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif24) http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif10 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** (15 + 4) + 10 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** 12 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(17 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif1) | |
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|  | **Question 21** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  (6 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif4) http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif3 - (16 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif2) | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 22** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  (4 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif7) - [(17 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif2) - 1] | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 23** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  [(-35 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif(-5)) - 12] http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif|2 + (-5)| | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 24** | |
|  |  | (1 point possible) |
|  |  | **:** Write your answer in the box below |
|  | What is the value of the expression below?  [(-6 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-3)) + (-8)] http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-18 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif(-2)) | |
|  | Top of Form  **Answer:** Bottom of Form | |
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|  | **Question 25** | |
|  |  | (1 point possible) |
|  |  | **Multiple Choice:** Please select the best answer and click "submit." |
|  | What should be calculated first when finding the value of the following expression?  [(-9 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-5)) + (-3)] http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-2 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif(-8)) | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** -9 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-5) * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** (-5) + (-3) * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** -2 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif(-8) * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** -3 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif-2 | |
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|  | **Question 26** | |
|  |  | (1 point possible) |
|  |  | **Multiple Choice:** Please select the best answer and click "submit." |
|  | Where would -22 appear on a number line? | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** In exactly the same location as 0 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** To the left of 0 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** To the right of 0 | |
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|  | **Question 27** | |
|  |  | (1 point possible) |
|  |  | **Multiple Choice:** Please select the best answer and click "submit." |
|  | How would the numbers -9, 0, and 9 appear on a number line? | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** 9 on the left end, 0 in the middle, and -9 on the right end * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** 0 on the left end, and both 9 and -9 on the right end * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** 0 on the left end, -9 in the middle, and 9 on the right end * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** -9 on the left end, 0 in the middle, and 9 on the right end | |
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|  | **Question 28** | |
|  |  | (1 point possible) |
|  |  | **Multiple Choice:** Please select the best answer and click "submit." |
|  | What conclusion can be drawn by observing that 5 is to the left of 10 on a number line? | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** 10 > 5 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** 20 < 5 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** 5 = 10 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** 5 > 10 | |
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|  | **Question 29** | |
|  |  | (1 point possible) |
|  |  | **Multiple Choice:** Please select the best answer and click "submit." |
|  | Where would the value of the expression below be found on a number line?  3 + |-29 + 5| | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** Between -30 and -25 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** Between -25 and 0 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** At 0 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** Between 25 and 30 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**E.** Between 10 and 25 | |
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|  | **Question 30** | |
|  |  | (1 point possible) |
|  |  | **Multiple Choice:** Please select the best answer and click "submit." |
|  | Which of the expressions below has the value found farthest to the right on a number line? | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** -8 - 32 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** 8 - 32 * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** 32 - (-8) * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** -8 + 32 | |
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**Lesson/Class Period 1**

**Lesson Outcomes:**

* Students will investigate numbers that are less than zero, examine the set of integers and express them in mathematical notation, and define and list pairs of opposite numbers. (Knowledge, comprehension)

 Students will investigate numbers by their sign and their distance from zero, and find the absolute value of numbers and expressions. (Knowledge, application)

* Students will use a number line to get a picture of what it means to add or subtract a negative number, and develop a strategy for adding or subtracting negative numbers.(Comprehension, application)
* Students will investigate what happens when they subtract a negative number from itself. (Knowledge)

**Lesson Objectives:**

* Students will be able to recognize the difference between a positive and ne4gative number.
* Students will understand what absolute value is and how to use it.
* Students will understand how to add and subtract integers.

**Materials:**

* Whiteboards
* Dry Erase Markers

**Introductory Activity (Key Terms): 15 Minutes**

**Integers:** The integers are the whole numbers and their opposites. They are the numbers {..., -3, -2, -1, 0, 1, 2, 3,...}. The ellipses (...) indicate that the integers go on forever in both directions.   
The positive integers, negative integers, and whole numbers are all subsets of the set of integers.

**Negative Numbers:** A negative number is a number that is less than zero. A negative number is preceded by a minus sign. The following are some examples of negative numbers: -3, -17, and -108.

**Opposites:** Two numbers are opposites if they are equally far from zero in opposite directions along the number line. Adding a minus sign to a positive number creates its opposite. Removing the minus sign from a negative number creates its opposite. The absolute value of a negative number is its opposite.

**Positive Number:** A positive number is a number that is greater than zero. A positive number can, but does not have to, be preceded by a plus sign.

**AbsoluteValue:** The absolute value of a number is the distance between that number and zero on the number line. An absolute value is always positive, because it represents a distance. The symbol for absolute value is a pair of vertical bars surrounding the number value.

**Developmental Activity: 40 Minutes**

* **(Group Work)** Break students apart in groups and have them list on their whiteboards as many different “types” of numbers that they can think of using every day outside of school.
* **(New Material)** Discuss how each of these different types of numbers are different after students have taken about 5 minutes to collaborate.
* Make a list of ten different numbers on the board from the numbers that the students have come up with. Have the students make a number line on their whiteboard and place the numbers from the board in the correct location on the number line.
* Discuss any deductions about the location of the positive number as opposed to the negative numbers.
* Ask students to describe the difference between +3 and -3.
* Begin to discuss distance from zero and absolute value by discussing the definition of absolute value.
* Have students stand three desks one each side of the student in the middle of the room, and have them decide how far away each of the two students are from the student in the middle desk.
* Describe how the absolute value means the distance from zero on a number line.
* **(Group Work)** Discuss some addition and subtraction problems with negative numbers and then ask the students (in groups) to talk about developing an algorithm for adding and subtracting different types of numbers.
* **(New Material)** Discuss algorithms for adding and subtracting using negative numbers using examples from the chalkboard.

**Summary/ Closure/ Evaluation: 10 Minutes**

* **(Closure)** Students will complete an assignment that asks them to solve different types of arithmetic problems using the algorithms they “invented” in groups.

1. -4+(-9) **2)** -15+27 **3)** 81+(-14) **4)** -27+6 **5)** -9 – 8 **6)** 25-(-25)

**7)** -11-(-7) **8)** 199-199 **9)** -67-(-67) **10)** 21+(-21) **11)** 62-(-26)

**Evaluation: 20 Minutes (at home)**

* Students will complete the practice assignment for homework.

**Positive and Negative Numbers** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Developed by Apex Learning)

For questions 1-6 write the opposite of each number:

1. 17 **2)** -21 **3)** 15 **4)** 0 **5)** -9 **6)** 8

For questions 7-11 solve the by finding the sum or difference:

**7)** -8-(-15) **8)** 9-18 **9)** -41-(-41)

**10)** 18+(-25) **11)** 75-(-75)

For questions 12-17 find the absolute value by first computing the sun or difference:

**12)** │51+(-18)│  **13)** │8+(-6)│ **14)** │-2+(2)│

**15)** 3+│53-(-15)│  **16)** │-18+(-15)│+(-15)  **17)** │15-(15)│+ (-7)

**Lesson/Class Period 2**

**Lesson Outcomes:**

* Students will develop a strategy for multiplying or dividing any two integers, and use what they know about multiplication to find a way to divide negative numbers. (Comprehension, application, synthesis)
* Students will define and define and use the commutative and associative properties while solving mathematical expressions. (Knowledge, application)

**Lesson Objectives:**

* Students will be able to multiply and divide positive and negative numbers.
* Students will understand how to use the commutative and associative property

**Materials:**

* Whiteboards
* Dry Erase Markers

**Introductory Activity (Key Terms): 15 Minutes**

**Associative Operation:** An associative operation is an operation for which the associative property applies -- like addition and multiplication. According to the Associative Property of Addition, you can add numbers in any order you want. According to the Associative Property of Multiplication, you can multiply numbers in any order you want.

**Commutative Operation:** one can reverse the order of an addition or multiplication problem and maintain the same outcome.

**Numerical Expression:** A collection of numbers and operations arranged in a meaningful order

**Developmental Activity: 40 Minutes**

* (Review) Give students a list of various different multiplication problems on the front board. Have each student solve these problems independently.
* Group Work) Have each group attempt to try to develop some sort of rule for multiplication of positive and negative numbers.
* After groups have collaborated, have students share what they have found
* E.g.: Positive x Positive = Positive

Negative x Negative = Positive

Negative x Positive = Negative

Positive x Positive = Negative

* Through some examples, show students how division rules are the same as multiplication.
* (Group Work) Break students apart in groups. Each group of students will receive a bag of 5 different numbers with each of the four different operations (+-\*/) and one “=” sign. Student will be asked to write on their dry erase markers as many different combinations of the 5 numbers and operations as they can. Each equation must have only one operation at a time, and each equation must have the equals sign as well.
* After students have made the lists on their whiteboards, have them share with the class. Ask each group to take five minutes and regroup each equation with other **equations** with the same numbers and signs (many will have duplicates in different orders).
* Many students should have duplicates of many different types of equations that have matches [ ex: 3+2=5 and 2+3 =5…..or -2+11=9 and 11+(-2)=9 ]
* Define commutative and Associative properties and show how these relate to the expressions that they have just put together.

**Summary/ Closure/ Evaluation: 10 Minutes**

* **(Closure)** Ask students to explain in a few short sentences how the use of properties like the associative and commutative properties can be useful in solving mathematical expressions, and why they think these properties don’t work with division and subtraction.

**Evaluation: 20 Minutes (at home)**

* Students will complete the practice assignment for homework

**Commutative and Associative Properties** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Developed by Apex Learning)

**For questions 1 – 5, calculate the product.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **1.** | http://media.apexlearning.com/Images/200804/07/88471e65-994e-4adf-a011-43c3fe41bcc8.gif | **2.** | http://media.apexlearning.com/Images/200804/07/22243255-d454-4f25-820f-96339c413ad4.gif | **3.** | http://media.apexlearning.com/Images/200804/07/5d422472-6ebf-4091-b498-5340c72bbccc.gif |

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| **4.** | http://media.apexlearning.com/Images/200804/07/74fbdd38-b698-4e84-b6c1-7eb2065d9338.gif | **5.** | http://media.apexlearning.com/Images/200804/07/bfef9b74-04fa-4808-9a24-60fe92d1950d.gif |

**For questions 6 – 10, calculate the quotient.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **6.** | | http://media.apexlearning.com/Images/200804/07/01c46449-2950-468b-aef1-cc0727930806.gif | **7.** | http://media.apexlearning.com/Images/200804/07/a6284c14-62d6-40e5-be99-1473e17c2a9f.gif | | | **8.** | http://media.apexlearning.com/Images/200804/07/245e1d79-a6d0-4a49-bf31-34b8f9c210bd.gif |
| **9.** | http://media.apexlearning.com/Images/200804/07/9a5245fb-7fdb-486f-aa49-a909938d758c.gif | | | | **10.** | http://media.apexlearning.com/Images/200804/07/a0f6e846-5142-4c5f-b78e-86761896ac3f.gif | | | |

**For questions 11 – 15, determine whether the associative property means that the two expressions are equal.**

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| **11.** | http://media.apexlearning.com/Images/200803/31/54dcdf23-9236-4fa5-b4f9-92ff819318ac.gif | **12.** | http://media.apexlearning.com/Images/200803/31/1f05d66d-931e-4b82-9781-6bf2e64c618b.gif | **13.** | http://media.apexlearning.com/Images/200803/31/efd83d25-cfc5-44a8-992c-09e4b82c887c.gif |

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| **14.** | http://media.apexlearning.com/Images/200803/31/66ef85e4-aa70-4d56-b22d-296fd3bfeeac.gif | **15.** | http://media.apexlearning.com/Images/200803/31/2057b25f-60a5-4896-9024-7a3bd6ad074a.gif |

**For questions 16 –18, determine whether the equation correctly shows the commutative property.**

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| **16.** | http://media.apexlearning.com/Images/200803/31/b9b9618d-3380-478f-b41e-181163c9492e.gif | **17.** | http://media.apexlearning.com/Images/200803/31/f9d4f581-70ac-4ae8-b6a0-64de7ddec416.gif | **18.** | http://media.apexlearning.com/Images/200803/31/d609974f-1619-40f4-9d3c-4b6b76e5d990.gif |

**Lesson/Class Period 3**

**Lesson Outcomes:**

* Students will review the four main mathematical operations (+ - x /), and use the order of operations to solve mathematical expressions. (Knowledge, Application)
* Students will investigate how using grouping symbols make mathematical expressions much easier to use, and demonstrate how the use of grouping symbols affects the order of operations. (Knowledge, application)
* Students will define and use a number line, and also be able to plot number on a number line and see relationships between them. Students will also write relationships between numbers using inequality signs. (Comprehension, application)

**Lesson Objectives:**

* Students will learn to use the order of operations to solve mathematical expressions and applying the operation rules for +-\*/
* Students will be able to describe different types of numbers on a number line using inequality signs >,<, etc.

**Materials:**

* Whiteboards
* Dry Erase Markers

**Introductory Activity (Key Terms): 15 Minutes**

**Numerical Expression:**A collection of numbers and operations arranged in a meaningful order.

**Equals Sign:** An equation has an equals sign in it to show that the expressions on either side of an equation have the same value. It is represented by the symbol " = ". For example, 5 + 3 = 8.

**Equation:** An equation is a mathematical statement that has an equals sign. In an equation, the amounts or expressions on either side of the equals sign have the same value.

**Inequality:** An inequality is a mathematical sentence that compares two unequal values. The symbols for an inequality are <, >, or http://media.apexlearning.com/Images/200511/15/930b1e48-f459-4da7-bbc8-64499bf18cc2.gif.

**Inequality Sign:** An inequality sign http://media.apexlearning.com/Images/200511/15/930b1e48-f459-4da7-bbc8-64499bf18cc2.gifis the symbol used to show that two expressions do not have the same value. It does not indicate whether one expression is larger than the other, but only that they are not equal.

**Number Line:** A number line is a line that uses equally spaced marks to represent numbers. The larger the number, the further you will find it on the number line.

**Scale:** The scale of a number line or Cartesian coordinate system determines the amount of detail, just as it does on a map.

**Developmental Activity: 40 Minutes**

* Ask the class why they think the U.S. decided to make it a rule for people to drive on the right side of the road. Is it important to have a consistent set of rules? Ask the class to name other instances where they have noticed importance in maintaining a consistent set of rules and procedures.
* List the five different operations on the board, and order them in four different ways (+-\*/, /\*-+, \*-/+, and +\*-/)
* Break student up into groups to solve a set of problems that will be projected onto the smart board. The smart board will have each operation hyperlinked so that when the students come up to solve the problems, when they press which operation they want to do, the computer will do the computation for them.
* Assign each student a set of “order of operations” that were randomly chosen by me. (+-\*/, /\*-+, \*-/+, and +\*-/)
* Each group will take 10 minutes to solve each set of problems using their particular “order of operations”

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| **1.** | http://media.apexlearning.com/Images/200803/31/9a543d57-2c2f-443c-a148-e87736baa11f.gif | **2.** | http://media.apexlearning.com/Images/200803/31/a1ce72ab-0b4e-435b-ab2d-816507891905.gif | **3.** | http://media.apexlearning.com/Images/200803/31/d86016a2-078c-4cc4-b50f-a12848b99634.gif |

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| **4.** | http://media.apexlearning.com/Images/200803/31/58e47bb9-8905-4e49-987a-cd6022aa6984.gif | **5.** | http://media.apexlearning.com/Images/200803/31/df073d53-0f92-4790-8671-e40cca39a265.gif | **6.** | http://media.apexlearning.com/Images/200803/31/24326edb-8b92-4582-8264-ce2315bd7238.gif |

* After students finish, begin discussing how order of operations are important, and then give students the actual order of operations that we use today. Students will practice with using grouping symbols for homework. I will briefly add the use of parenthesis purposefully without much explanation as to see what the students come up with.
* Discuss the use of comparison symbols when comparing numbers on a number line Also discuss the meaning of each comparison symbol. (http://media.apexlearning.com/Images/200803/26/160e41b1-c879-4220-9a55-b8f907b15736.gif)

**Summary/ Closure/ Evaluation: 10 Minutes**

* **(Closure)** Ask students to describe a scenario when they had to use a value comparison in the real world. Ask them to explain in three to five sentences the scenario and how the use of comparison symbols cold have helped.

**Evaluation: 20 Minutes (at home)**

* Students will complete the practice assignment for homework

**Order of Operations and Comparison Symbols** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Developed by Apex Learning )

For questions 1 – 7, evaluate the expressions.

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| **1.** | http://media.apexlearning.com/Images/200803/31/58e47bb9-8905-4e49-987a-cd6022aa6984.gif | **2.** | http://media.apexlearning.com/Images/200803/31/df073d53-0f92-4790-8671-e40cca39a265.gif | **3.** | http://media.apexlearning.com/Images/200803/31/24326edb-8b92-4582-8264-ce2315bd7238.gif |

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| **4.** | http://media.apexlearning.com/Images/200803/31/fcd519d1-439f-44a6-a53d-f52380b1d144.gif | **5.** | http://media.apexlearning.com/Images/200803/31/1cce7af6-6168-4b8a-b6e7-3c2ac46698d4.gif |

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| **6.** | http://media.apexlearning.com/Images/200803/31/93352728-4773-4fcd-a157-67a496d8e4b0.gif | **7.** | http://media.apexlearning.com/Images/200803/31/95b1da61-7b23-45a3-8d87-6aeb02d57d4c.gif |

For questions 8-15, which of the symbols (http://media.apexlearning.com/Images/200803/26/160e41b1-c879-4220-9a55-b8f907b15736.gif) correctly relates the two numbers below? Write all that apply.

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| **8.** | http://media.apexlearning.com/Images/200803/26/f7f990f5-6a88-48d3-9eb3-c44ee0e57736.gif | **9.** | http://media.apexlearning.com/Images/200803/26/bc388f3f-bdaa-481c-b450-7e83d7d50298.gif | **10.** | http://media.apexlearning.com/Images/200803/26/fa7ae525-7a0b-43bd-a35e-e3ad494be938.gif | **11.** | http://media.apexlearning.com/Images/200803/26/280bb77c-87d7-4179-87e5-4929b9bcd54a.gif |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **12.** | http://media.apexlearning.com/Images/200803/26/7197701b-e3ab-49a0-b274-bfeb40ce35c7.gif | **13.** | http://media.apexlearning.com/Images/200803/26/de0fa946-a57f-4af5-89b5-8d1956cb9218.gif | **14.** | http://media.apexlearning.com/Images/200803/26/76e5d924-3177-4514-a447-70c526cd4018.gif | **15.** | http://media.apexlearning.com/Images/200803/26/9bcb2251-f8cc-4a8f-99d0-ebba935dcc6e.gif |

For questions 16-17, what inequality is represented by the scale?

|  |  |  |  |
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| **16.** | http://media.apexlearning.com/Images/200803/26/e3bb49a7-947d-4689-aef3-e041cc24f342.gif | **17.** | http://media.apexlearning.com/Images/200803/26/f970dafa-346b-42d2-adf7-4d11926e0f3a.gif |

**Post Assessment: (Developed from Apex Learning)**

**Question 1 of 30** **:** Write your answer in the box (2 points possible)

What number is the opposite of 2?

Top of Form

**Answer:** 

Bottom of Form

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|  |  |

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| --- | --- | --- |
|  | **Question 2b of 30** | |
|  |  |  |
|  |  | Write your answer in the box (2 points possible) |
|  | What number is the opposite of 20? | |
|  | Top of Form  **Answer:**  Bottom of Form | |

**Question 3b of 30**

Write your answer in the box (2 points possible)

What number is equal to its opposite?

Top of Form

**Answer:** 

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| --- | --- |
|  |  |

|  |  |  |
| --- | --- | --- |
|  | **Question 4b of 30** | |
|  |  |  |
|  |  | Write your answer in the box (2 points possible) |
|  | What is the value of the expression below?  |-12| | |
|  | Top of Form  **Answer:**  Bottom of Form | |

**Question 5b of 30** Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
15 + |7 - 10|

Top of Form

**Answer:** 

Bottom of Form

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|  | **Question 6b of 30** | |
|  |  |  |
|  |  | Write your answer in the box (2 points possible) |
|  | What is the value of the expression below?  15 - |5 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif5| | |
|  | Top of Form  **Answer:**  Bottom of Form | |

**Question 7b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
-4 + 17

Top of Form

**Answer:** 

**Question 8b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
9 + (-17)

Top of Form

**Answer:** 

**Question 9b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
-18 + 9

Top of Form

**Answer:** 

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|  |

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| --- | --- | --- |
|  | **Question 10b of 30** | |
|  |  |  |
|  |  | Write your answer in the box (2 points possible) |
|  | What is the value of the expression below?  8 - 14 | |
|  | Top of Form  **Answer:**  Bottom of Form | |

**Question 11b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
11 - (-10)

Top of Form

**Answer:** 

**Question 12b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
-15 - (-11)

Top of Form

**Answer:** 

**Question 13b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
-11 - 9

Top of Form

**Answer:** 

**Question 14b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
-20 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif-2

Top of Form

**Answer:** 

**Question 15b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
30 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif-2

Top of Form

**Answer:** 

**Question 16b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
24 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif-6

Top of Form

**Answer:** 

**Question 17b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
-28 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif-4

Top of Form

**Answer:** 

**Question 18b of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
-27 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif9

Top of Form

**Answer:** 

**Question 19b of 30**

**Multiple Choice:** Please select the best answer (2 points possible)  
Choose the one expression below that is true.

* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** 18 - (10 + 9) = (18 - 9) + 10
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** 14 - (19 + 3) = (14 - 19) + 3
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** (6 - 5) + 11 = 6 - (5 + 11)
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** (3 + 2) + 10 = 3 + (2 + 10)

**Question 20b of 30**

**Multiple Choice:** Please select the best answer (2 points possible)  
Which of the expressions below cannot be rewritten using the associative property?

* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** (2 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif12) http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif5
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** (5 + 14) + 10
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** 5 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif4 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif7
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** 12 + 13 + 45

**Question 21b of 30**

Write your answer in the box (2 points possible)  
What is the value of the expression below?  
  
(6 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif3) http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif2 - (18 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif3)

Top of Form

**Answer:** 

**Question 22b of 30**

Write your answer in the box (2 points possible)  
What is the value of the expression below?  
  
(4 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif8) - [(10 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif2) - 8]

Top of Form

**Answer:** 

**Question 23a of 30**

Write your answer in the box (2 points possible)

What is the value of the expression below?  
  
[(3 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-5)) - 10] http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif|2 + (-7)|

Top of Form

**Answer:** 

**Question 24a of 30**

Write your answer in the box (2 points possible)  
What is the value of the expression below?  
  
[(-3 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif3) + (-5)] http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif(-7 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-1))

Top of Form

**Answer:** 

**Question 25b of 30**

**Multiple Choice:** Please select the best answer (2 points possible)

What should be calculated first when finding the value of the following expression?  
  
[(-6 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-3)) + (-8)] http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-6 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif(-2))

* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** -6 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif(-3)
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** (-3) + (-8)
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** -6 http://media.apexlearning.com/Images/200707/20/1180ffe6-0240-4f49-ae6a-4001c6e98255.gif(-2)
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** -8 http://media.apexlearning.com/Images/200707/05/8e65d25b-60c2-4dd1-9ea6-75939fe8aafc.gif-6

**Question 26b of 30**

**Multiple Choice:** Please select the best answer (2 points possible)  
Where would -10 appear on a number line?

* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** In exactly the same location as 0
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** To the left of 0
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** To the right of 0

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| --- | --- | --- |
|  | **Question 27b of 30** | |
|  |  |  |
|  |  | **Multiple Choice:** Please select the best answer (2 points possible) |
|  | How would the numbers -10, 0, and 10 appear on a number line? | |
|  | * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** 10 on the left end, 0 in the middle, and -10 on the right end * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** -10 on the left end, 0 in the middle, and 10 on the right end * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** 0 on the left end, and both 10 and -10 on the right end * http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** 0 on the left end, -10 in the middle, and 10 on the right end | |

**Question 28b of 30**

**Multiple Choice:** Please select the best answer (2 points possible)  
What conclusion can be drawn by observing that 30 is to the right of 10 on a number line?

* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** 30 > 10
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** 30 < 10
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** 10 > 30
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** 30 = 10

**Question 29b of 30**

**Multiple Choice:** Please select the best answer (2 points possible)

Where would the value of the expression below be found on a number line?  
  
4 - |-9 + 4|

* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** Between -10 and -5
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** Between -5 and 0
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** At 0
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** Between 0 and 5
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**E.** Between 5 and 10

**Question 30b of 30**

**Multiple Choice:** Please select the best answer (2 points possible)

Which of the expressions below has the value found farthest to the left on a number line?

* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**A.** 7 - 10
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**B.** 10 - 7
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**C.** 10 - (-7)
* http://media.apexlearning.com/AceWeb/images/ole_images/rnrm.gif**D.** -7 - 10

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