**NUMBERS AND OPERATIONS IN BASE TEN**

**(Place Value, Basic Operations,
Order of Operations, Measurement)**

 **Communication Skills in Math Unit Outline
Grade Level Cluster 9-12: Unit 1, Weeks 1-4.5**

***Introduction***

This unit is designed for Newcomer English Learners (ELs) in grades 9-12 whose proficiency levels range from WIDA 1.0 (Entering) to 2.9 (Beginning).

Students at these levels vary widely in their educational backgrounds, and a number will have experienced interruptions in education or low-level education. Students with high literacy in their first language and high levels of education generally progress much more quickly. Reading levels (in English) of students at these levels of language proficiency will vary, ranging from approximately grade level Readiness-Grade 2, Guided Reading levels A-K, or Lexiles 0-400. Note that cultural and other background knowledge will interact strongly with learners’ ability to read a text, regardless of measured reading level.

Cognitive ability will be equivalent to range of levels language proficient students of the same age, but this cognitive ability is sometimes difficult for students to demonstrate in oral and written language because of their English language proficiency levels. Content knowledge will vary with students’ educational level, but again will be difficult to determine without L1 assessment.

Because of these issues, ESOL students at levels 1 (Entering) and 2 (Beginning) will work to meet WIDA standards for their level and to approach grade-level standards. Because of interruptions in education, learners may need to address standards at lower grade levels that they have not yet attained and that are necessary prerequisites for achieving grade level standards, Teachers should use texts and supplements that are accessible to newcomers, but every effort should be made to provide grade-level cognitive challenge within language limitations.

Because learners in the ESOL class will be at different levels of proficiency, teachers will need to differentiate levels and types of scaffolding to meet the needs of learners, challenging every student yet providing goals within reach to all.

WIDA Performance Definitions for Listening, Reading, Writing, and Speaking at 6 levels is included in Table 1 at the beginning of this guide. The WIDA Can-Do Descriptors for grade level cluster 6-8 are found at the beginning of this guide. The guide will focus on the Can-Do Descriptors at levels 1-2; providing access to level 3 for learners who need that level.

The guide also addresses key vocabulary and themes for beginning learners as assessed by the DeKalb Audio-Lingual Assessment. These key areas for this grade level cluster are included in Table 3 at the beginning of this guide.

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| **WIDA CAN-DO DESCRIPTORS GRADES 9-12, LEVELS 1-2** |
|  | **Level 1 Entering** | **Level 2 Beginning** |
| Listening | L1.1 Point to or show basic parts, components, features, characteristics, and properties of objects, organisms, or persons named orally L1.2 Match everyday oral information to pictures, diagrams, or photographs L1.3 Group visuals by common traits named orally (e.g., “These are polygons.”) L1.4 Identify resources, places, products, figures from oral | L2.1 Match or classify oral descriptions to real-life experiences or visually-represented, content-related examples L2.2 Sort oral language statements according to time framesL2.3 Sequence visuals according to oral directions  |
| Speaking | S1.1 Answer yes/no or choice questions within context of lessons or personal experiences S1.2 Provide identifying information about self S1.3 Name everyday objects and pre-taught vocabulary S1.4 Repeat words, short phrases, memorized chunks of language  | S2.1 Describe persons, places, events, or objects S2.2 Ask WH- questions to clarify meaning S2.3 Give features of content-based material (e.g., time periods) S2.4 Characterize issues, situations, regions shown in illustrations  |
| Reading | R1.1 Match visual representations to words/phrases R1.2 Read everyday signs, symbols, schedules, and school-related words/phrases R1.3 Respond to WH- questions related to illustrated text R1.4 Use references (e.g., picture dictionaries, bilingual glossaries, technology)  | R1.1 Match data or information with its source or genre (e.g., description of element to its symbol on periodic table) R1.2 Classify or organize information presented in visuals or graphs R1.3 Follow multi-step instructions supported by visuals or data R1.4 Match sentence-level descriptions to visual representations R1.5 Compare content-related features in visuals and graphics R1.6 Locate main ideas in a series of related sentences  |
| Writing | W1.1 Label content-related diagrams, pictures from word/phrase banks W1.2 Provide personal information on forms read orally W1.3 Produce short answer responses to oral questions with visual support W1.4 Supply missing words in short sentences  | W1.1 Make content-related lists of words, phrases, or expressions W1.2 Take notes using graphic organizers or models W1.4 Formulate yes/no, choice and WH- questions from models W1.4 Correspond for social purposes (e.g., memos, e-mails, notes)  |

**Communication Skills in Math, Unit 1:
Numbers and Operations in Base Ten**

**Unit Outline**

**Abbreviations for Resources**

**OPDCA:** *Oxford Picture Dictionary for the Content Areas:* (Also refers to related Teacher’s Edition (TE), Workbook (WB) pages and iPack)

**OIDM** *Oxford Illustrated Dictionaries for Math*

**Edge** National Geographic Edge Fundamentals (and supplemental materials).

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| **Grade levels:** **9-12** | **Level:** WIDA Levels 1: Entering – 2: Emerging | **Subject:** Communication Skills in Math | **Weeks** 1 to 2 | **Time:** 2 weeks |
| **Unit Title** | Numbers and Operations in Base Ten |
| **Unit Overview** | Unit 1 covers the essential academic language and subject matter concerned with numbers and the four basic operations using a controlled, basic linguistic representation. The unit outline provides specific strategies for introducing and developing language in mathematics class. Learners will:* Read, write, and spell numbers to 1,000,000,000.
* Count, read, represent numbers with place value.
* Compare and order numbers through one hundred billion using the symbols <, >, and =.
* Explain the relationship among place values of numbers up to one billion.
* Round whole numbers and decimals to different place values
* Use cardinal and ordinal numbers.
* Add whole numbers with and without regrouping.
* Subtract whole numbers with and without regrouping.
* Multiply multi-digit numbers.
* Divide whole numbers by one-digit divisors.
* Divide whole numbers by multi-digit divisors.
* Identify and apply the properties of addition and multiplication.
* Understand and apply the correct order of operations.
* Solve multi-step word problems.
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| **Unit WIDA Standards**  | **WIDA 1.** English language learners **communicate** for **Social** and **Instructional** purposes within the school setting **WIDA 3.** English language learners **communicate** information, ideas and concepts necessary for academic success in the content areas of **Mathematics****WIDA Can-Do Descriptors:** See previous page. |
| **Enduring Understandings** | **Essential Questions** |
| * Using rounding is an appropriate estimation strategy for solving problems and estimating.
* The value of a number is determined by the place of its digits.
* Multiplication may be used to find the total number of objects when objects are arranged in equal groups.
* One of the factors in multiplication indicates the number of objects in a group and the other factor indicates the number of groups.
* There are two common situations where division may be used: fair sharing (given the total amount and the number of equal groups, determine how many/much in each group) and measurement (given the total amount and the amount in a group, determine how many groups of the same size can be created).
* The properties of multiplication and division help us solve computation problems easily and provide reasoning for choices we make in problem solving.
 | * How do digit values change as they are moved around in large numbers?
* What determines the value of a digit?
* How can rounding help me compute numbers?
* How can we compare large numbers?
* What information is needed in order to round whole numbers to any place?
* What real life situations require the use of multiplication?
* How will diagrams help us determine and show products?
* How is multiplication related to division?
* How are factors and multiples defined?
* How are multiplication and division related to each other?
* How are remainders and divisors related?
* How can a remainder affect the answer in a division problem?
* How can I mentally compute a division problem? What is the meaning of a remainder in a division problem?
* What opposite operations do you know?
* What is the connection between powers and multiplication?
* How do we multiply two powers with the same base?
* How do we divide two powers with the same base?
* How do we find the power of a power?
* What is the correct order of operation?
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| **Content** * Place Value
* Comparing Numbers
* Ordering Numbers
* Properties of Addition
* Properties of Multiplication
* Add Whole Numbers
* Subtract Whole Numbers
* Multiply Whole Numbers
* Divide Whole Numbers
* Powers and Exponents
* Order of Operations
* Word Problems
 | **Skills** * READ (using base-ten numerals, number names and expanded form)
* WRITE (using base-ten numerals, number names and expanded form)
* COMPARE (two multi-digit numbers based on digits in each place using >, =, < symbols)
* ROUND (to any place using place value understanding)
* MULTIPLY (using strategies based on place value and properties of operations)
* ILLUSTRATE (calculation using equations, rectangular arrays and/or area models)
* EXPLAIN (calculation using equations, rectangular arrays and/or area models)
* RECOGNIZE (a digit in the ones place represents 10 times what it represents in the place to its right)
* ADD (fluently using standard algorithm)
* SUBTRACT (fluently using standard algorithm)
* FIND (up to four-digit dividend and one-digit divisors using strategies based on place value, properties of operations, and/or relationships between multiplication and division)
* ILLUSTRATE (calculation using equations, rectangular arrays and/or area models)
* EXPLAIN (calculation using equations, rectangular arrays and/or area models)
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| **Essential Vocabulary** | **WIDA Level 1 students -** Tier 1 Vocabulary - Examples: digit, number, equal, less than, more than, how many, count, one, two, three, four, compare, order, addition, subtraction, multiplication, division, group, regroup, before, after, between, fewer, more, less**WIDA Level 2 students:** Tier 1 and Tier 2 vocabulary/academic vocabulary. Examples: sum, difference, ordinal numbers, digits, thousand, thousands, ten thousands, hundred thousands, addends, factors, multiples, quotient, base, exponent, power, square, cube, word problem, operation, inverse, order, **All Students:** Tier 3 vocabulary required for content discussion Examples: standard form, expanded form, word form, millions, billions, multiplicand, multiplier, algorithm, round, estimate, commutative property of addition, associative property of addition, identity property of addition, parentheses, brackets, or braces in numerical expressions, standard notation, order of operations, addend, sum |
| **Sample Assessments** | math journal reflections, oral responses and explanations, student portfolio, teacher observation, checklists, rubrics, exit tickets, quizzes, students summary of the lesson, hand signals, response cards, four corners activity, 3-2-1, anticipation guides, misconception check, four corners activity |
| **Unit Instructional Guide** |
| **Capacities of the Literate Individual (Aligned to the Essential Questions)** |  **CLI 1.** They demonstrate independence. Students can, without significant scaffolding, comprehend and evaluate texts across a range of types and disciplines, and they can construct effective arguments and convey intricate or multifaceted information. Likewise, students are able independently to discern a speaker’s key points, request clarification, and ask relevant questions. They build on others’ ideas, articulate their own ideas, and confirm they have been understood. Without prompting, they demonstrate command of standard English and acquire and use a wide-ranging vocabulary. More broadly, they become self-directed learners, effectively seeking out and using resources to assist them, including teachers, peers, and print and digital reference materials. **CLI 2**. They build strong content knowledge. Students establish a base of knowledge across a wide range of subject matter by engaging with works of quality and substance. They become proficient in new areas through research and study. They ad read purposefully and listen attentively to gain both general knowledge and discipline-specific expertise.**CLI 3.** They respond to the varying demands of audience, task, purpose, and discipline. Students adapt their communication in relation to audience, task, purpose, and discipline. They set and adjust purpose for reading, writing, speaking, listening, and language use as warranted by the task. They appreciate nuances, such as how the composition of an audience should affect tone when speaking and how the connotations of words affect meaning. They also know that different disciplines call for different types of evidence (e.g., documentary evidence in history, experimental evidence in science).**CLI 4.** They comprehend as well as critique. Students are engaged and open-minded—but discerning—readers and listeners. They work diligently to understand precisely what an author or speaker is saying, but they also question an author’s or speaker’s assumptions and premises and assess the veracity of claims and the soundness of reasoning.**CLI 5**. They value evidence. Students cite specific evidence when offering an oral or written interpretation of a text. They use relevant evidence when supporting their own points in writing and speaking, making their reasoning clear to the reader or listener, and they constructively evaluate others’ use of evidence.**CLI 6**. They use technology and digital media strategically and capably. Students employ technology thoughtfully to enhance their reading, writing, speaking, listening and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals.**CLI 7.** They come to understand other perspectives and cultures. Students appreciate that the twenty-first-century classroom and workplace are settings in which people from often widely divergent cultures and those who represent diverse experiences and perspectives must learn and work together. Students actively seek to understand other perspectives and cultures through reading and listening, and they are able to communicate effectively with people of varied backgrounds. They evaluate other points of view critically and constructively. Through reading great classic and contemporary works of literature representative of a variety of periods, cultures, and worldviews, students can vicariously inhabit worlds and have experiences much different from their own. |
| **Student Misconcep-tions** | * Learners may confuse numbers such as 13 and 30, 15 and 50, etc. They may have difficulty hearing the difference between the similar-sounding words, making the distinction, or pronouncing the words so others can hear the distinction. These are listening and speaking skills that take time to develop.
* Students may lose their place on a place value chart.
* Students may write the incorrect value of a digit in expanded form.
* Students may confuse the terms before, between, and after.
* Students may round to the wrong place.
* Students may confuse the Commutative and Associative Properties. Relate the familiar words *commute*, meaning “to go from one place to another,” and *associate* meaning “to be grouped with or to befriends with,” to help students use the labels more accurately.
* Students may not be able to identify coins showing tails.
* Students may find it difficult to count bills and then switch to counting coins.
* Students may identify a group of coins as having a greater value because it has more coins.
* When estimating sums, students may first find an exact sum and round the sum, rather than rounding each addend.
* Students may invert the digits in a column, rather than regrouping.
* When subtracting numbers, students may invert the digits in a column, rather than regrouping.
* Students may think that changing the order of factors in a multiplication sentence changes the product.
* Students may skip count incorrectly.
* Students may not properly align arrays in straight rows and columns.
* When listing multiples of numbers, students may not list the number itself. Emphasize that the smallest multiple is the number itself.
* Some students may think that larger numbers have more factors. Having students share all factor pairs and how they found them will clear up this misconception.
* There are several misconceptions students may have about writing numerals from verbal descriptions.
* Students often assume that the first digit of a multi-digit number indicates the "greatness" of a number. The assumption is made that 954 is greater than 1002 because students are focusing on the first digit instead of the number as a whole.
* Often students mix up when to 'carry' and when to 'borrow'. Also students often do not notice the need of borrowing and just take the smaller digit from the larger one. Emphasize place value and the meaning of each of the digits.
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| **Information Processing Skills** | * Make sense of problems and persevere in solving them.
* Reason abstractly and quantitatively.
* Construct viable arguments and critique the reasoning of others.
* Model with mathematics.
* Attend to precision.
* Look for and make use of structure.
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| **Suggested Lessons**  |
|  | **Language and Math Workout**Start each day with a lively and interactive oral language and math workout. This consists of 3 short oral activities, including:1. Interaction/conversation – this might include a dialogue, a paired explanation, etc. reviewing a concept
2. A physical activity, such as line-up, or movement that demonstrates concepts.
3. A chant or other activity (e.g., Strategy #32: I Have, Who Has) to practice patterned language and math facts.

Many examples can be found in the Lessons below as well as in the dialogue boxes of the OPDCA, in Edge, and in the Strategies Guide and Strategies for Newcomers Guide. Math facts and number words can be practiced with counting, flash cards, skip counting (by 2’s 5’s 10’s 3’s, etc.), reciting facts, etc. Many activities using a hundreds chart on the Projethean or the wall can reinforce both conceptual learning and automaticity with numbers. [Hundreds Chart Activities.](http://letsplaymath.net/2008/09/22/things-to-do-hundred-chart/) |
| **Lesson 1** | **Title:** **Place Value** **Language objective(s)/WIDA descriptors addressed:** * Learnersread and write whole numbers up to billions (depending on proficiency level in English and educational background.
* Learners write numbers correctly up to billions in standard form (depending on proficiency level in English and educational background.
* Learners write numbers correctly up to billions in expanded form (depending on proficiency level in English and educational background.

**Content Objective(s), topic, and/or genre:** * Learners identify and place of a digit in numerals up to billions.
* Learners identify the value of a digit in numerals up to billions.
* Students will compare two- to multiple-digit numbers and identify which number is greater.
* Students will arrange numerals to build the greatest possible number for each given number of digits.

**Description:** * **Intro/Opening:** Write *459* and *271* on the board. Have students refer to the place-value diagram. Ask students to tell you which number is greater. Then ask, “Which place value did you compare to know that this is true? Why?” Guide students to understand that they compared the hundreds place because it is the highest place value in both numbers. Reinforce the concept by underlining the hundreds place in each number and telling students that four hundreds is greater than two hundreds. Now ask, “What if the numerals in the hundreds place are the same? Which number is bigger, *459* or *271*?” Guide students to understand that they should compare the next highest place value—the tens place.
* **Opening Chant:** Once learners have mastered speaking/reading numerals to 100, and have demonstrated that they understand place value to 100, move on to the Millions Billions - Place Value Song - <http://mathstory.com/youtubevids/millions.html>

**LYRICS:** Ones, thousands, what comes next? Millions, billions, that's correct! Ones, thousands, what comes next? Millions, billions, that's correct!* **Activity 1: Modified Lineup.**

**Preparation:** * + **Reading numerals.** Use a hundred chart to assess learners’ knowledge of numerals/numbers in English. Provide practice with games and flash cards for learners who need.
	+ **Greater than/less than sentences.** Model number sentences about higher/lower, using the number sign“10 is greater than 8 written “10 > 8. Have learners practice these number statements in pairs.

**Modified Lineup (Strategy #6):** Ask eight volunteers to come to the front of the room. Give each volunteer a number card. Divide the volunteers into two groups. Have each group arrange themselves into a four-digit number. Challenge the class to decide which group formed the greater number. Remind the students to compare the values in the thousands place. To reinforce the concept, write the inequality on the board or on chart paper ( \_\_\_\_ > \_\_\_\_ ). Now ask the groups to make two new numbers. Invite the class to compare the numbers and then write the inequality on the board. Repeat the activity using ten volunteers instead of eight. Have students compare the values in the ten thousands place. * **Activity 2:** Each student gets a set of index cards with numbers 0 - 9 on them. Each number is used only once. As the teacher calls out the numbers, the students have to use the index cards to display the number that was called out. Example: one thousand, four hundred twenty - Students place the numbers: 1 420 (with space for comma.) The students can then point to the number in the thousands place, or any other place value that the teacher might ask.
* **Activity 3 (Strategy # 18: Reciprocal Teaching):** Working in pairs, students create a three-column chart labeled *Word Form, Standard Form*, and *Expanded Form*. Have one student name a seven-digit number. Have the other student write the number in words, in standard form, and in expanded form in the appropriate columns. Have pairs repeat the activity, switching roles each time.
* **Activity 4:** For the next activity, students work in pairs or small groups. They roll a die. Each student makes an educated choice about recording the number displayed on the die in a strategic location on the place value chart. The students continue rolling for a set amount of times, and then they compare numbers. Whoever has the greatest (or smallest) number earns a point or a price. The key is that once a number is written, it cannot be changed.

**Materials:** index cards, place value charts, place value mats, dice, large number cards, song lyrics, dictionaries, math picture dictionaries**Strategies:** #18 Reciprocal Teaching, # 6 Lineup, #N4 Chants and Songs, #N 10 Vocabulary Introduction, # N1 Adapting Oral Language to Increase Comprehension, Cooperative Learning, Exit Ticket, Direct Paraphrasing**Differentiation:** * **Level 1:** Students point to the example showing numbers up to six digits in the place-value chart. (Adjust number of digits for learner levels.)
* **Level 1.5:** Students name the value of digits through billions.
* **Level 2.0:** Students explain how to read a place-value chart.

**Assessments:** * **Direct Paraphrasing:** Have students paraphrase different ways to write a number. Encourage them to show an example of each. Sample answer: 3 ways; standard form, use digits to write the number; word form, use words to write the number; and expanded form, write the number showing the value of each digit.
* **Exit Ticket:** *Use the digits 5, 7, 1, 9, 2, 6 to write the greatest 6-digit number possible without repeating any digit. Explain your reasoning.* 976, 521; Sample answer: 9 has the greatest value of the givendigits so I put it in the greatest place value position, continuing in the same manner for the remainingdigits.
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| **Lesson 2** | **Title:** Comparing and Ordering Numbers**Language objective(s)/WIDA descriptors addressed:** * Students explain to a partner how to compare two numbers using a number line or a place value chart.
* Students will use key vocabulary words such as “greater than”, “less than” or “equal to” to compare numbers orally and in writing.

**Content Objective(s), topic, and/or genre:** * Students use a number line or a place-value chart to compare two numbers.
* Students order numbers from least to greatest and greatest to least.

**Description:** **Intro/Opening:** Display the following symbols on an interactive whiteboard: >,  <,  = Invite students to discuss what each symbol means (greater than, less than and equal to). Reinforce the English words for these symbols. Provide paired practice using the symbols in number sentences. Remind students that these symbols are used when comparing two numbers to determine which is larger (greater than) or smaller (less than) or if they are equal. Demonstrate with many examples, having students tell you when you are right or wrong. In addition to knowing these symbols, model for students how to look at place value to compare numbers. Show them how putting numbers in a place value chart will help them compare the digits to determine which number is greater. Help them create their own place value charts for reference.**Opening Chant (Strategy N:** Greater Than, Less Than, Equal To **Comparing Numbers Song:** <https://www.youtube.com/watch?v=4LctQ_30sJ0>**LYRICS:**Comparing numbers, that’s the gameBigger, smaller, or the sameComparing numbers, what is trueGreater than, less than, or equal to?**Activity 1: Think Pair Share** (Strategy #35):Students work in pairs and use the number line to compare and order different numbers. Have partners check one another’s work and explain why they know it is right or wrong. **Activity 2:** Pass out two unlined index cards to each student. Have students write their birth date (ddmmyy) on one, and a phone number (not a real one) on the second index card. Stack the birthday cards in one pile and the phone numbers in another one. Explain to the students that they are going to practice putting the cards in numerical order. Model with a “think aloud”, review, and have learners practice how to compare two numbers. Have them “think aloud” with partners as they compare numbers. Divide the class into groups of three and each group will pick five cards from either the birthday pile or the phone number pile. Have them work together to place the cards in order, discussing the process they are using. When each group is finished, collect the cards, shuffle them, and pass them back out for another round.After a few rounds, have the students compete to see who can have their cards ordered the fastest. Pass the cards out face down and have them turn them over all together. When a group is finished they should stand up. Have the class review the first group's cards to see if they are correct. **Activity 3: Guess My Number Game:** In this activity the students work in pairs. Student A thinks of a number and gives a range in which that number can be found, e.g. "My number is between 0 and 100" or "My number is between 250 and 500". Student B has to ask student A questions in order to find out the number, but A can only reply using "Yes" or "No" answers. *For example:*Student A: My number is between 50 and 150Student B: Is it less than 100?Student A: Yes.Student B: Is it more than 75?Student A: No.For an additional challenge, have students count the number of questions that they each asked, seeing who found the mystery number in the lowest number of questions.**Materials:** index cards, number line, song lyrics, place value charts, dictionaries, math picture dictionaries**Strategies:** #N4 Chants and Songs, #N 10 Vocabulary Introduction, # N1 Adapting Oral Language to Increase Comprehension, #35 Think-Pair-Share, Cooperative Learning, Exit Ticket, Four Corners, Guess My Number Game**Differentiation:** * **Level 1:** Match, point, or use symbols (>, =, <) to identify the greatest (or the least) number, or equal numbers in a group, or a pair of numbers.
* **Level 1.5:** Use pre-taught vocabulary and language frames to compare and order whole numbers using simple sentences.
* **Level 2.0:** Convey content through high frequency words/phrases.

**Assessments:** * **Four Corners:** Create four large signs. On one sign, write a large letter A. Write a large letter B on the second sign; a C on the third sign; and a D on the fourth. Post one of the signs in each corner of your classroom. Obtain one index card for every student in the class. Write the word *Player* on about three-fourths of the cards; write the word *Fibber* on the remaining cards. Prepare in advance at least 5 multiple-choice questions about comparing and ordering whole numbers. Place one of the index cards face down on each student's desk. Instruct students to look at their cards privately to find out if their role in the game is that of a Player or a Fibber. Tell students to not reveal their roles to their classmates. Pose the first question and four possible responses. Ask students which response they think is the correct one. Have students who think the correct answer is A stand by the A sign. Students who think the correct answer is B, C, or D gather near their respective signs. Here's the catch! Students who hold the Player cards go to their appropriate corners while students who hold the Fibber cards are free to go to any corner. The Fibber's movements are intended to throw off the other students. Some players will be tempted to follow the fibbers to the wrong corners. Doing this encourages students to think for themselves, not just follow the flock. When all students have taken their corners, reveal the correct answer to the question. Ask students who chose the correct answer to explain why they selected that answer. Then you're ready to pose the next question.
* **Exit Ticket:** Name three numbers that are greater than 3,561 and less than 5,039. (Adjust size of numbers as needed for learners’ proficiency levels.)
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| **Lesson 3** | **Title:** **Properties of Addition****Language objective(s)/WIDA descriptors addressed:** Students will be able to use key language to identify and apply the commutative and associative properties of addition.***Note:*** It will probably work best to teach the three properties on separate days, with reinforcement in between. This will depend on learners’ English language proficiency and previous math instruction. **Content Objective(s):**Students will explain and apply the associative, commutative, and identity properties of addition when adding whole numbers.**Description:** * **Intro/Opening:**

Ask 5 five students to stand together in the front of the room. Counts the students out loud and say: "We have a whole group of five students.” Then separate the group into a group of 3 and a group of 2. Ask a student to hold the large addition sign between the two groups. Explain that this sign means to join two groups together, or to add. When we add groups together we say plus. As you teacher point to each part of the whole, explains: “Three plus two is five.” Introduce the term “addends” as the numbers you add. Explain that the sum of the addends 2 and 3 is 5; that sum is the answer when you add. Have learners repeat and pair-share to use the new terms correctly. Ask students for different ways to group the 5 students into 2 groups. (4 and 1, 1 and 4, 2 and 3) Help them use number sentences to describe the groups. Repeat the above procedure with the new groups and numbers, emphasizing that the words add and plus mean join together.Write each addition property on the board. Tell students the words or phrase *property of addition* tells the reader that the vocabulary terms are rules that can be used when adding numbers.Write 3 + 5 on the board.Model a row of 3 purple cubes and a row of 5 green cubes. Using the two sets of colored cubes, model the number sentence. Ask, “What is the sum of this number sentence? Can you use the same cubes to show the addition sentence in another order?” Students should change the order of the cubes to show 5 + 3. Ask, “Does the sum change?” No. Have learners demonstrate with cubes that the sum is the same no matter what order you add the numbers in. Say that has a name: “commutative property.” (OIDM p. 22) The commutative property is a rule that means you can add numbers in any order. Write (5 + 3)+ 4 = ? on the board. Show the learners the parentheses, and help them recognize and practice using it. If learners know about using parentheses in writing, draw a parallel. Explain and demonstrate that in math, you do the operation (adding, here) inside the parentheses first. Using different colored cubes, model the number sentence. What is the sum? 12. Separate the 3 sets of cubes and model the number sentence 5 + (3 + 4). What is the sum? 12 Does changing how the numbers are grouped change the sum? No. Explain. The number of cubes used is the same. Introduce the term “associative property.” (OIDM, p. 8). The associative property is a rule that says you can add numbers in any order and the sum will be the same. * **Opening Chant:**

When you’re adding numbersDid you know? Did you know?We can change the addendsIt won’t mess up the flow.When we change the addendsThe sum stays the same.When we flip the addendsThe sum doesn’t change* **Activity 1 (Think-Pair-Share)**

Group students in pairs and have partners write definitions and examples of the Commutative,Associative, and Identity Properties of Addition. Explain that learning the associative property can help them do math better and faster. Demonstrate your own mental math using the property ([Examples](http://www.plpsd.mb.ca/division/Rubrics/Mental%20Math%20Strategies.pdf).) Invite volunteers to share their own mental math explanations with the class.* **Activity 2**

Write the numbers 1 through 9 on index cards in blue. These cards represent the addends. Write the numbers 10 through 18 on index cards in red. These cards represent the sums. Write the addition properties: Commutative, Associative, and Identity in green with each word on a different card. Have students shuffle each pile of cards and place them facedown. Students flip over the top card in each deck and determine what missing addend is needed to form a true addition sentence that follows the property that was flipped.* **Activity 3**:

Students work alone or in pairs to create a 3-chart graphic organizer (Strategy #26) illustrating the 3 properties of addition.**Materials:** colored cubes, counters, index cards, number line, song lyrics, markers, dictionaries, math picture dictionaries**Strategies:** #N4 Chants and Songs; #N10: Vocabulary Intro; #9: Language Experience; #26 Graphic Organizer (T-Chart); #11 Quick Write; #35 Think-Pair-Share, Modeling, Four Corners**Differentiation:** **Level 1:** Learners use objects such as counters or colored cubes to illustrate addition problems.**Level 1.5:** Learners give examples of addition problems for that illustrate each property of addition. **Level 2.0:** Learners describe how the three properties of addition help them add mentally.**Assessments:*** **Quickwrite (Strategy #11):** Ask students to take one minute to write in their journals answering one of the following questions: What are 3 new concepts that I have learned today? How do the three properties of addition help you add mentally? Provide language frames for the writing if needed.
* **Four Corners:** Create four large signs. On one sign, write "**commutative property of addition**" Write the words "**associative property of addition**" on the second sign, "**identity property of addition**" on the third sign; and "**not an addition property**" on the fourth sign. Post one of the signs in each corner of your classroom. Prepare in advance at least 5 problems illustrating a property of addition. Display the first problem on the Promethean Board. Ask students to go to the corner they believe to have the correct answer. When all students have taken their corners, reveal the correct answer to the question. Ask students who chose the correct answer to explain why they selected that answer. Reveal the next problems, one question at a time.
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| **Lesson 4** | **Title:** **Subtracting Whole Numbers****Language objective(s)/WIDA descriptors addressed:** Students will be able to describe how addition and subtraction are related.**Content Objective(s):** Students subtract multi-digit whole numbers with and without regrouping.Students subtract mentally using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.**Description:** **Intro/Opening:** Frontload/ pre-teach new vocabulary using visuals and demonstrations in sentences. New vocabulary terms (difference, minus, subtraction, inverse operation, regrouping) are introduced through various examples. Review the process of subtraction and give learners opportunities to use the terms in describing and explaining simple subtraction problems. Discuss, you *subtract* one number from another and the answer is the *difference*. The *minus sign* shows that you are subtracting. Assure that learners can do subtraction easily without regrouping before moving on to the next step. With student input, create a numbered chart listing the steps for subtracting multi-digit whole numbers. (Start with 2—digit, then move to more when learners have reached mastery.) 1.Subtract the ones. 2.Subtract the tens. 3. “Subtract the hundreds” and 4. “Subtract the thousands.” 5. Check your answer by adding. Direct students to copy the chart in their math journals, and have them refer to the chart for answering other problems.Use pictures, drawings, or realia to help students understand different subtraction problems. Have learners demonstrate sample activities and tell how they use the process.* **Opening Chant:**

More on top,No need to stop.More on the floor.Go next door and get ten more.Numbers the sameZero is the game.* **Activity 1 (Who has? I have!)** Create cards like these: Who has the difference between 45 and 21? I have 24! Who has the sum of 35 and 236? I have 271. [Template for making cards](http://www.mlmcc.com/docs/I%20have%20who%20has%2018.docx)
* **Activity 2 (Math Game – Finding Zero First)**

Students will play a game in which the object is to force their opponents to reach (or surpass) zero. Three cards are dealt to each player, and the rest of the deck is stacked facedown. Students take turns playing one card at a time and subtracting their cards from the starting value of 99. Each time a card is played, one must be drawn from the stack. Students may use mental math or paper to keep their running differences until zero is reached.* **Activity 3 (Think-Pair-Share)**

Students work in pairs to create three different subtraction problems with three-digit numbers that have the same difference: with no regrouping, with one regrouping, with two regroupings. Students share and then exchange their work with another pair and each pair solves the other’s problems.**Strategies:** #N4 Chants and Songs; #N10: Vocabulary Intro; #9: Language Experience, #11 Quick Write; #35 Think-Pair-Share, # 32 Who has? I Have, 3-2-1 Closing Activity**Materials:** number cube, paper, pencil, game cards, place-value charts, pictures, drawings, realia, dictionaries, math picture dictionaries, hundreds chart, cards**Differentiation:*** **Level 1:** Students represent subtraction problems with objects and actions.
* **Level 1.5:** Students take notes using graphic organizers, anchor charts, or other models.
* **Level 2.0:** Students write verbal subtraction sentences for each problem.

**Assessments:** * **Quick Write**: In a math journal, students demonstrate with words or pictures how they would solve a subtraction problem.
* **3-2-1 Activity:**  Students consider what they have learned by responding to the following prompt at the end of the lesson: 3) things they learned from your lesson; 2) things they want to know more about; and 1) questions they have
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| **Lesson 5** | **Title:** **Multiplying Whole Numbers****Language objective(s)/WIDA descriptors addressed:** Students recognize and use language and symbols to represent multiplication problems.**Content Objective(s), topic, and/or genre:** Students explore, model, and solve multiplication problems.Students are able to estimate the product of two numbers by rounding each number to the nearest ten.**Description:** * **Intro/Opening:**

1. Write the prefix multi- on the board. Tell students that when this prefix comes at the beginning of a word, it means many or more than one. Give some examples, such as multicolored, multimedia, multivitamin, multinational, multilingual, and multipurpose. Ask students if they can think of other words like these. 2. Now, put the adjective multiple on the board. Show a picture of multiple items, e.g., quadruplets. Explain that it means many. It is used to describe things. Give examples like multiple parts, multiple chairs, etc. Ask students for other examples. Remind students that on tests, they may have multiple choice questions, meaning that they have many choices for the answer.3. Tell students that the verb to multiply means to make many or to increase in number. In this lesson, they will put groups of things together to make many things. Multiplication is the process, or what we do when we multiply numbers.* **Activity 1 (Frayer Model):** Students will work in pairs to create a Frayer model about multiplication.
* **Activity 2 (Number Heads):** Students will work in small groups to solve together several multiplication problems and use key vocabulary words to describe each problem. The students collaborate to ensure that everyone in the group can answer the questions. The teacher will then ask for an answer by calling out a number. The students with the number called take turns to answer.
* **Activity 3 (Estimation Spinner Game):** In groups of three, the student roles are recorder, spinner, and opponent. Roles switch each round. Spinner spins two numbers quickly. Recorder records it, while the spinner and opponent quickly round the two-digit number mentally. Repeat with two more numbers, at which time the two players quickly round the second number and mentally find the estimated product of the two estimates. Recorder checks and winner is first player to answer correctly.

**Materials:** anchor charts, spinners with numbers on them, markers, Frayer Model diagrams, dictionaries, math picture dictionaries**Strategies:** #33 Number Heads, #N 10 Vocabulary Introduction, # N1 Adapting Oral Language to Increase Comprehension, Frayer Model, Spinner Game, Sequence **Differentiation:** * **Level 1:** Students respond to WH- questions related to multiplication.
* **Level 1.5:** Students follow multi-step instructions supported by visuals, tables, and anchor charts when multiplying whole numbers.
* **Level 2.0:** Students explain how they use regrouping or estimation strategies when multiplying multi-digit whole numbers.

**Assessments:** * **Sequence:** Students use the problem 88 × 47 to write the steps in the standard algorithm. Level 2 students explain how they use regrouping or estimation strategies when multiplying multi-digit whole numbers.
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| **Lesson 6** | **Title:** **Dividing Whole Numbers****Language objective(s)/WIDA descriptors addressed:** Students will write related division and multiplication sentences for models.**Content Objective(s):** Students will divide whole numbers by multi-digit divisors.Students will use multiplication facts in a division problem.**Description:** **Intro/Opening:** Give each student or group of students 21 counters.Model dividing the number 21 by 3 using cubes. Show the number 21 using counters. Divide the counters into 3 equal groups. Have students draw the model in their books. How many counters are in each group? 7 countersIntroduce the term dividend (OIDM p. 44), the number that will be divided. Provide several sample problems and ask learners to point to the dividend. In Step 2, guide students to write a division sentence. Point out that the dividend represents the total number of counters. What is the dividend? 21. Introduce the term divisor (OIDM p. 44). Point out that the divisor is the number that goes into the dividend. What is the divisor? 3. Provide several sample problems and ask learners to point to the divisor. Whatever number the dividend is being divided by, that number represents the divisor. Point out that the answer is the quotient. What is the quotient? (OIDM p. 111). The quotient is the answer to a division problem. Provide several sample problems and ask learners to point to the quotient. In Step 3, (on a separate day) discuss how to write a related multiplication sentence and how it relates to a division sentence. Introduce terms for the numbers in multiplication problems: factors (the numbers you multiply – OIDM p.53) and product (the answer (OIDM p. 108). Point out that the product signifies the total number of counters. What is the product? 21 Point out the factors. Provide several sample problems and ask learners to point to the factors and product. Which factor represents the number of groups? 3Which factor represents the number in each group? 7Write *dividend, divisor, quotient*, and *remainder* on the board. Model solving 521 ÷ 3 using a division bracket. (173 R2) Introduce the term: Remainder OIDM p. 116. As you say each word listed on the board, identify its counterpart in the division problem. Have students chorally repeat each word after you say it. Model solving another division problem with a remainder using a bracket. Have volunteers approach the board to identify each component of the problem. Students can either point to the component as they say the word aloud, or they can point to it after you say the word.* **Opening Chant:** Dividend, divisor, quotient, remainder

 Dividend, divisor, quotient, remainder* **Activity 1 (Number Heads) -** Break students into small groups. Write a two-digit number on the board and assign each group a different divisor. Have students find the quotient and then write a word problem that represents their division sentence. Ask each student to practice presenting their word problem to their group so everyone involved understands how to explain their division sentence. Call out a student number. The students with the number called take turns to share their division sentence and word problems with the class.
* **Activity 2:** Students work alone or in pairs to create a poster about division.
* **Activity 3:** Students write ten numbers from 10–99 on index cards and ten numbers from 10,000–99,999 on separate index cards. Students place their cards face down in two piles, two-digit numbers in one pile and five-digit numbers in the other pile. Choose a card from each pile. Students write and solve the division problem with the two-digit number as the divisor and the five-digit number as the dividend. Have students repeat until all cards are chosen.
* **Materials**: counters, index cards, markers, chart paper, dictionaries, math picture dictionaries
* **Strategies:** #33 Number Heads, #N 10 Vocabulary Introduction,# N1 Adapting Oral Language to Increase Comprehension, Modeling, Exit Ticket, Journal Reflection, Four Corners

**Differentiation:** * **Level 1:** Ask simple questions that elicit one-word answers or allow the student to respond with a gesture, such as: Which number is the remainder? Point to the dividend. Do we add or subtract this number?
* **Level 1.5:** Ask questions that elicit answers in the form of simple phrases or short sentences, such as: What equation can we use to solve the problem? What do we need to do next?
* **Level 2.0:** Ask questions that require more complex answers, such as: Explain how you know that this is the correct answer. What do we do if ...? What steps do we need take to solve the problem?

**Assessments:** * **Journal Entry:**

Division is useful when……Division is represented by …..* **Four Corners:** Create four large signs labeled A, B, C, and D. Post one of the signs in each corner of your classroom. Prepare in advance at least 5 multiple-choice problems about division. Display the first problem on the Promethean Board. Ask students to go to the corner they believe to have the correct answer. When all students have taken their corners, reveal the correct answer to the question. Ask students who chose the correct answer to explain why they selected that answer. Show the next problems, one question at a time.
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| **Lesson 7** | **Title:** **Powers and Exponents****Language objective(s):** Students will be able to discuss how exponents and multiplication are related.**Content Objective(s):** Students will understand the concept of using exponents to represent repeated multiplication.Students will be able to write and evaluate numerical expressions involving whole number exponents. **Description:** **Intro/Opening:** Provide clear instruction on the meaning of exponents. Explicitly describe the exponent as indicating the number of factors of the base. To reinforce the meaning of the exponent, initially encourage the student to write exponential expressions in expanded form before calculating (e.g., 103 = 10 x 10 x 10 =1000).Provide the student with sets of matching cards. One set of cards should contain numbers in standard notation. The other set contains the corresponding numbers written in using exponents. Mix the cards up and have the student match a standard notation card to the correct exponential notation card.Provide opportunities for the student to observe that the number of zeros in a power of 10, written in standard notation, is equal to the exponent when written in exponential notation (e.g., 10,000 has four zeros, so the power of 10 is four which is 104 in exponential form).* **Activity 1:** To engage the students in the concept of exponential multiplying, show the video clip [The Kings' Dessert - or how to make 16,000 honey strings in two minutes](https://www.youtube.com/watch?v=pCLYieehzGs" \t "_blank). The clip demonstrates how doubling strings of honey in 14 turns will yield 16,348 strings (skip the ads and the first minute of the video clip.)
* **Activity 2:** Read the story [One Grain of Rice](http://www.worldcat.org/oclc/34318920%22%20%5Ct%20%22_blank%27) by Demi. In the story, a raja promises to give a village girl a reward of one grain of rice, and then doubles the amount every day for a month. If the book is not available, you can show the video clip of the story: <https://www.youtube.com/watch?v=P3t_9g-7oQ8&list=PLHeQOWCLfms4sehPBVTuxc9-4yaU24Pf2> .
* **Activity 3 (Frayer Model):** Students work alone or in pairs to develop "Frayer" vocabulary models for the terms exponent, base, and power.
* **Activity 4 (Number Heads):** Students will work in small groups to solve together several problems with exponents and powers. The students collaborate to ensure that everyone in the group can answer the questions. The teacher will then ask for an answer by calling out a number. The students with the number called take turns to answer.

**Materials:** matching cards,number cubes,dictionaries, math picture dictionaries, Frayer model template, One Grain of Rice story**Strategies:** #33 Number Heads, #N5 Language Frames, #N 10 Vocabulary Introduction, # N1 Adapting Oral Language to Increase Comprehension, Frayer Model, Discussion, Matching Strategy, Exit Ticket **Differentiation:** **Level 1:** Students identify the base and the exponent in different examples by pointing to the correct number. **Level 1.5:** Provide the following sentence frames for support: The exponent is \_\_\_\_\_\_. The base is \_\_\_\_. **Level 2.0:** Students roll two number cubes to create a power using one number as the base and the other as the exponent. Have students write the power on a piece of paper and then rewrite the power with the numbers’ places reversed. For example, 43 and 34. Say, *Predict which power will have a greater value.* Have students write each power as a product and evaluate the values. Discuss and compare the values of each power. Ask, *Did you guess correctly?* *Which power is a greater value?***Assessments:** **Exit Ticket:** To assess students' understanding of the concept, have them respond to the prompts below.* What is the base in 45? What is the exponent?
* How can 26 be written by using repeated multiplication?
* What is the value of 34?
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| **Lesson 8** | **Title:** **The Order of Operations****Language objective(s):** Students will be able to explain orally and in writing when and why order matters.**Content Objective(s):** Students will use the order of operations to evaluate expressions.**Description:** * **Intro/Opening:**

Display a word web and write order in the center. Discuss with students the different meanings and uses of order and record them in the word web. For example, ordering in a restaurant, calling a classroom or courtroom to order, putting things in order, or following orders. Display a second word web and use it to discuss meanings and uses of operation. Be sure to include the math meaning of operation. Model solving an expression that requires multiple operations. Then say, Doing the operations in the right order gives me a correct answer.Write the term "Order of Operations" on the board. Ask students what they know about applying order of operations to expressions. For example, they might recall that they first should multiply and divide in order from left to right, and then add and subtract in order from left to right.* **Opening Chant:**

I've been first and I've been last,Either way I keep the order with *PEMDAS*.First it's *parentheses*, then it's exponents,Multiply, divide, add, subtract, yeah you know this. (x2)Link to the song: <https://www.flocabulary.com/pemdas/>**Activity 1 (Anticipation Guide):** Students will decide what they believe to be true/false before the lesson, and then reevaluate their answers at the end of the class.Read each statement. Decide whether you Agree (A) or Disagree (D) with the statement. Write A or D in the first column OR if you are not sure whether you agree or disagree, write NS (Not Sure).**\_\_\_\_\_1)** According to the order of operations, you should first perform any calculations inside parentheses.**\_\_\_\_\_2)** According to the order of operations, multiplication is always before division. **\_\_\_\_\_3)** According to the order of operations, division should be done before subtraction.**\_\_\_\_\_4)** According to the order of operations, addition should be done before subtraction.**\_\_\_\_\_5)** According to the order of operations, exponents should be done before parentheses.**\_\_\_\_\_6)** 35 + (12 - 8) x 9 = 71**\_\_\_\_\_7)** 23 + 3 x 2 = 22**Activity 2:** Divide the class into 3 groups to explore the expression 3 + 7 × 4 + 6.One group will find the value of the expression by working from right to left.The second will work from left to right.The third group will multiply first, then add. Have one volunteer from each group work the problem in the order they were told on the board showing step-by-step computations. Have students discuss why each group arrived at a different answer. Discuss the correct answer and how to apply the correct order of operations to find the answer. Students should understand that order is important. Talk about real-life tasks in which order is important, such as getting dressed for school-socks must go on before shoes.**Activity 3:** Ask students to make a grocery list of 5 items, such as “Eggs $1.50 dozen” and “Bread $2 loaf.” Then have each student write two expressions for the items on their list such as (2 × 1.50) and (3 × 2). Ask partners to find the values of the expressions. The values represent the total cost. Partners should write how many of the items were bought. 2 dozen eggs and 3 loaves of bread cost $9.00.**Materials:** newspaper advertisements and grocery circulars, cups, water, anticipation guide, opening chant lyrics and song, dictionaries, math picture dictionaries, word webs**Strategies:** # 2 Anticipation Guide, #N4 Chants and Songs, #N5 Language Frames, #N 10 Vocabulary Introduction, # N1 Adapting Oral Language to Increase Comprehension, #11 Quick Write, 3-2-1**Differentiation:** **Level 1:** Write the following list: *1. Get a cup. 2. Pour water. 3. Drink.* Say, *This is the right order.* Rewrite the list as: 2. Pour water. 1. Get a cup. 3. Drink. Say, *This is the wrong order.* Demonstrate each list using water and a cup. Then list the order of operations on the board and solve a problem from the lesson. First solve by following the order of operations correctly. Say, *This answer is correct.* Then follow the order incorrectly to solve, point to the answer, and say, *The order was incorrect. Our answer is wrong.***Level 1.5:** List the following operations on a large piece of paper: *addition, subtraction, multiplication, division.* Write a single operation expression on the board. Have students identify the operation using thesentence frame, The operation is \_\_\_\_. Have students evaluate the expression. Write a multipleoperation expression on the board. Have students identify the operations using the sentence frame,The operations are \_\_\_\_ and \_\_\_\_. Have students identify the order to perform the operations andevaluate the expression.**Level 2.0:** Provide several multi-operation expressions and solutions for student pairs. Make some of the solutions correct and others incorrect. Have pairs use the order of operations to determine which expressions were evaluated correctly. For those expressions that were not evaluated correctly, have pairs determine the correct order for evaluating the expression and solve for the correct answer.**Assessments:** * **Quickwrite** Have students write a response to the prompts below.

*Explain how you would evaluate the expression 98 - (6 × 3).* *How could you change this expression so that it is correct to subtract before multiplying?* *Will the answer be the same if you subtract first?* * **3-2-1 Activity:**  Students consider what they have learned by responding to the following prompt at the end of the lesson: 3) things they learned from your lesson; 2) things they want to know more about; and 1) questions they have
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| **Lesson 9** | **Title:** Writing Verbal Phrases as Numerical Expressions**Language objective(s):** * Students will write and interpret verbal phrases as numerical expressions.
* Students will explain how to compare numerical expressions without calculating them.

**Content Objective(s):** * Students will use numbers and operation symbols to write verbal phrases as numerical expressions.
* Students will be able to compare a pair of numerical expressions without evaluating them.

**Description:** **Intro/Opening:** Begin the lesson by asking the class to brainstorm KTW (Key Translating Words) with their shoulder partners. Give students 3 minutes to brainstorm, from memory, with a partner and make a list of words or terms that are associated with the 4 main operations (adding, subtracting, multiplying, and dividing) that they learned previously. Record answers on board or anchor chart by making 4 columns for addition, subtraction, multiplication, and division.Model changing an expression that is in words into an expression in numbers. Next, the students will try on their own to translate verbal phrases into numerical expressions and have their shoulder partners critique each others' work when finished.* **Activity 1:** Arrange students into pairs and have them write a word problem that can be translated into an expression. Have each pair read their problem to another pair. The other pair should write and solve the problem. Tell students that they may need to read the problem a few times for understanding and clarity. Rotate pairs so that each pair gets to read and solve a word problem.
* **Activity 2 (Who has? I have!)** Ex: Who has 3 × (4 + 2)? I have - 3 girls each bought a hamburger for $4 and a drink for $2.

**Materials:** dictionaries, math picture dictionaries, game cards, anchor charts**Strategies:** #32 I Have… Who has?, #N 10 Vocabulary Introduction,# N1 Adapting Oral Language to Increase Comprehension, Modeling, Exit Ticket**Differentiation:** **Level 1:** Ask entering students simple questions that elicit one-word answers: What do we do first? Do we add or subtract? Which number do we divide?**Level 1.5:** Ask questions that elicit simple phrases or short sentences: Which operations do we use to solve the problem? Which operation comes first and which comes second?**Level 2.0:** Ask questions that require more complex answers: Why do we use that operation? How can we check our answer?**Assessments:** * **Hand Signals** will be used throughout the lesson to rate or indicate students’ understanding of content. Students can show anywhere from five fingers to signal maximum understanding to one finger to signal minimal understanding. This strategy requires engagement by all students and allows the teacher to check for understanding within a large group.
* **Exit Ticket:** To assess students’ understanding of the concept, write the following problem on the board. Collect their responses as they leave the classroom.

*There are h horses on a field. One half of them are moved to another farm. Write an algebraic expression to solve the problem. Evaluate the expression if h = 100.*  |

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| **Lesson 10** | **Title:** Solving Word Problems**Language objective(s):** * Students will be able to communicate and discuss the steps necessary when solving word problems.
* Students will be able to explain how writing equations can help solve multi-step problems.

**Content Objective(s):** * Students will be able to solve real-world problems involving operations with whole numbers.
* Students will solve multi-step word problems using more than one operation.

**Description:** * **Intro/Opening:**

Teacher will frontload/ pre-teach new vocabulary using visuals and demonstrations in sentences. Before the lesson, write *equation* and its Spanish cognate, *ecuación*. Introduce the word, and provide a math example. Utilize other translation tools (such as dictionaries or picture dictionaries) for non-Spanish speaking ELLs. Also, explain that *per* means “each” in many word problems, and discuss multiple meanings for the word *change.* Before assigning this lesson’s word problems, create the following word webs for signal words/phrases students will encounter. In a *Division* web include *divide equally among, divide equally between, divide* *into equal groups,* and *divide evenly among.* (Point out these pairs of synonyms among the phrases: *among/between and equally/evenly).*In a Multiplication web include *times as many*. In an Addition web include *all, everyone, altogether,* and *total.* Discuss the webs, and then post them for students to reference as they work.Explain multiple meanings for the word *step.* First, slowly take a step forward. As you move, pointtoward the floor and say, "*I walk one step."* Take several more steps and say, "*I walk more steps."* Then draw stairs on the board. Point to each horizontal line and say, "*This is a step."* Finally, tell students that a step is also one part of a process. Pantomime washing your hands andidentify each step as you do so. For example, say, *First step: wet my hands. Next step: rub in soap. Last step: rinse my hands.** **Opening Song:** Math Rocks! Look for Clues: <https://www.youtube.com/watch?v=d2Vq6wwJTDc>
* **Activity 1 (Thinking Maps) :** Students will work in pairs (or in small groups) to create Flow Maps for each multi-step word problem. Students will use the word wall, classroom notes, picture dictionaries, and anchor charts for vocabulary support.
* **Activity 2:** Each student selects a recipe from the recipe cards, chooses an ingredient, and makes a table to show how many or how much of that ingredient will be needed to feed their class, grade, or school. Students will need to refer to the number of servings the recipe makes.
* **Activity 3:** Level I students create flashcards for each basic operation. Level 1.5 students make a Frayer model for each operation and level 2.0 students solve an interactive math crossword puzzle
* **Activity 4 (Carrousel) -** Post 8 different word problems around the room. Divide the class into 8 small groups. Have the groups rotate from paper to paper, adding their answers to the chart paper.

**Materials:** recipe cards, graphic organizers, anchor carts, math picture dictionaries, math crossword puzzle, chart paper, Frayer model activity sheet, dictionaries, math picture dictionaries, word webs, index cards, flashcards**Strategies:** , #N4 Chants and Songs, #N 10 Vocabulary Introduction, # N1 Adapting Oral Language to Increase Comprehension, # 3 Carrousel, Frayer Model, Thinking Maps, Exit Ticket**Differentiation:** **Level 1:** Students create flashcards for each basic operation and write the mathematical symbols, the words in English and the native language, and examples of how each operation can be used in a problem. Students will use index cards and classroom notes to create the flashcards. **Level 1.5:** Make a Frayer model for each operation using classroom notes, a Frayer model activity sheet, math dictionaries, and markers.**Level 2.0:** Students solve an interactive crossword puzzle about the four operations with whole numbers using the word wall, Math Goodies website, and classroom notes. <http://www.mathgoodies.com/puzzles/crosswords/inumber-theory1.htm>**Assessments:** The teacher will use checklist to formally observe the students and check the level of understanding of the math concept. At the end of the lesson students summarize or paraphrase important math concepts learned today. This can be done orally, visually, or in writing as an exit ticket. |

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| **Lesson 11** | **Title:** Standard vs. Metric**Language objective(s)/WIDA descriptors addressed:** 1. **Students will listen and write about units of measurements.**
2. **Language forms and conventions:** Language example. (See examples.)**Vocabulary Usage:** Initial social vocabulary for the school and classroom objects and places

**Content Objective(s), topic, and/or genre:** 1. Students will learn how to identify different units of measurement.
2. Students wil learn how to convert between different forms of measurement

**Description:** * **Intro/Opening:** Measurement Pre-Test
* Class Brainstorm on words related to Measurement using a Circle Map
* Students watch Brainpop.com video on Metric Units and Customary Units.
* Class discussion on the difference between Metric and Customary units. Students discuss which countries use Metric and customary thru discussing the units of measurement in their country.
* Students will classify units of measurement into metric and customary categories. <http://www.mathatube.com/converting-between-customary-and-metric-units-chart.html>
* Class discussion on classifying units of measurement for distance, weight and volume.
* **Strategies:** Thinking maps Circle and Tree Map

**Differentiation:** Include suggestions for differentiation. May include differentiation by language level as shown below. **Level 1:** How you differentiate for this level **Level 1.5:** How you differentiate for this level **Level 2.O:** How you differentiate for this level **Assessments:** * Ticket out the door. Quickwrite.
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| **Lesson 12** | **Title:** Tools for measurement**Language objective(s)/WIDA descriptors addressed:** 1. **Students will discuss different units to measurement**
2. **Students will listen and discuss about tools for units of measurement.**

**Content Objective(s), topic, and/or genre:** 1. Students will learn how to convert units of measurement.
2. Students will learn about tools for measurement.

**Description:** * **Intro/Opening:** Four corners modified. Each student receives a unit of measurement. Students must decide and stand by a sign for metric or customary.
* Teacher provides students with copy of conversion chart. <http://www.mathatube.com/units-metric-customery.html>
* Teacher will show students pictures of a ruler, yardstick, tape measure, scale, measuring cups. Students will identify what each tool is used measure.
* Students can practice unit of conversion with teacher provided questions.

**Strategies:** Four Corners **Differentiation:** Include suggestions for differentiation. May include differentiation by language level as shown below. **Level 1:** How you differentiate for this level **Level 1.5:** How you differentiate for this level **Level 2.O:** How you differentiate for this level **Assessments:** * Ticket out the door, Probing, quick write.
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| **Lesson 13** | **Title:** How far did we travel? **Language objective(s)/WIDA descriptors addressed:** 1. **Students will discuss different units to measure distance**

**Content Objective(s), topic, and/or genre:** 1. Students will learn how to identify units of measurement for distance

**Description:** * **Intro/Opening:** TPR – Ask students to show with their fingers and arms what they think an inch, foot and yard distances look like.
* Ask students to think about what they think the distance from the Earth to the moon and the distance from the classroom to the cafeteria.
* Students will use a Venn Diagram and discuss which units are appropriate for each one separately and together.
* Students can be placed in groups based on ability. Each group will receive a ruler. The groups must measure random items and show the conversion in inches, feet and meters.

**Strategies:** Venn Diagram, Total Physical Response**Differentiation:** Include suggestions for differentiation. May include differentiation by language level as shown below. **Level 1:** Measure each group members feet and shows the conversions **Level 1.5:** Measures each other height and show the conversion **Level 2.O:** Measures each other height and length of the classroom and shows the appropriate conversions. **Assessments:** * Student products.
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| **Assessment Strategies** |
| Assessment is conducted to document success in achieving goals of Can-Do descriptors for these grade levels, using a wide variety of tools from the Guidelines and Resources. These include:Rubrics, portfolios, checklists, exit tickets, quizzes, students summarize the lesson, hand signals, response cards, four corners activity, 3-2-1, anticipation guides, misconception check, journal reflections, four corners activity |
| **Additional Resources** |
| **Textbooks** | *Edge Fundamentals**Oxford Picture Dictionary for the Content Areas*  |
| **Differentiated Instruction** | *Making Content Comprehensible for English Learners: the* [*SIOP*](http://www.cal.org/siop/) *Model*[Carol Tomlinson](http://www.caroltomlinson.com) Differentiation CentralDeKalb Intensive English Strategies Guide |
| **Media Literacy** | Using library resources; viewing video clips, using virtual math manipulatives |
| **Digital Literacy** | FolletShelf Pebble Go OmniMusicWorld Book Online World Almanac Online EdmodoWorld Almanac for Kids Teaching Books.net Enchanted Learning BrainPop Galileo iPad apps on school iPads Discovery Education Streaming Video, Science  |
| **Related Literature**  | Multicultural Library Collection in School LibraryHMH Leveled BooksScholastic Leveled Books[One Grain of Rice](http://www.worldcat.org/oclc/34318920%22%20%5Ct%20%22_blank%27) story by Demi |
| **State Resources** | [Common Core State Standards](http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Curriculum-and-Instruction/Pages/CCGPS.aspx)\*[WIDA Standards and Info](http://archives.gadoe.org/DMGetDocument.aspx/2011-2012%20%20ESOL%20Title%20III%20Resource%20Guide%2008-15-11.pdf?p=6CC6799F8C1371F6965C97B3B852CB4F71335FA993764C90A7BE0EA6181B8D75&Type=D)Tiered System for Vocabulary Instruction: http://www.georgialiteracy.org/Detail/92/vobid--460/ Appendix B – Common Core Standards for ELA/Literacy: Text Exemplars and Sample Performance Tasks http://www.corestandards.org/assets/Appendix\_B.pdf |
| **Web Resources** | WIDA 2012 Amplification of the ELD Standards <http://wida.us/standards/eld.aspx> *Making Content Comprehensible for English Learners*: *The SIOP Model,* by Echvarria, Vogt & Short. 20 Digital Tools for Learning Vocabulary <http://www.learningunlimitedllc.com/2013/02/20-digital-tools-for-vocabulary/> Vocabulary Profiler for Academic Words: <http://www.lextutor.ca/vp/eng/> General Word List (first 2000 words) <http://www.talkenglish.com/Vocabulary/Top-2000-Word-Families.aspx> Academic Word List: <http://www.victoria.ac.nz/lals/resources/academicwordlist/awl-headwords> Library Resources; HMH eBookroomThinking Maps: [www.thinkingmaps.com](http://www.thinkingmaps.com)Place Value Song: <http://mathstory.com/youtubevids/millions.html>Greater Than, Less Than, Equal To (**Comparing Numbers Song):** <https://www.youtube.com/watch?v=4LctQ_30sJ0>Video clip about exponential growth: [The Kings' Dessert - or how to make 16,000 honey strings in two minutes](https://www.youtube.com/watch?v=pCLYieehzGs" \t "_blank). Math Crossword Puzzle: <http://www.mathgoodies.com/puzzles/crosswords/inumber-theory1.htm>One Grain of Rice video: <https://www.youtube.com/watch?v=P3t_9g-7oQ8&list=PLHeQOWCLfms4sehPBVTuxc9-4yaU24Pf2>Order of Operations Song: <https://www.flocabulary.com/pemdas/>Math Rocks! Look for Clues Song: <https://www.youtube.com/watch?v=d2Vq6wwJTDc> |
| **Other Resources**  | *DeKalb Intensive English Strategies Guide*FAST Math Curriculum: [Volume I](http://esl.cmswiki.wikispaces.net/file/view/FM5FAST%2BMath%2BCurriculum%2BVolume%2B1.pdf) [Volume II](http://esl.cmswiki.wikispaces.net/file/view/FM7FAST%2BMath%2BCurriculum%2BVolume%2B3.pdf/191732614/FM7FAST%2BMath%2BCurriculum%2BVolume%2B3.pdf)  [Volume III](http://www.ncela.us/files/uploads/15/V3_1of11.pdf) |