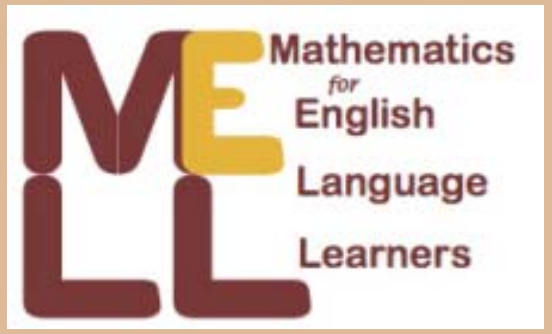


MELL Conference 2008

San Marcos, TX

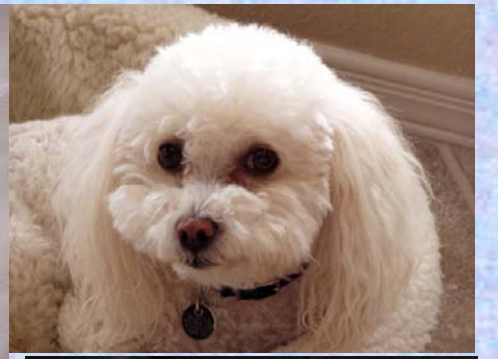
July 31-August 2, 2008

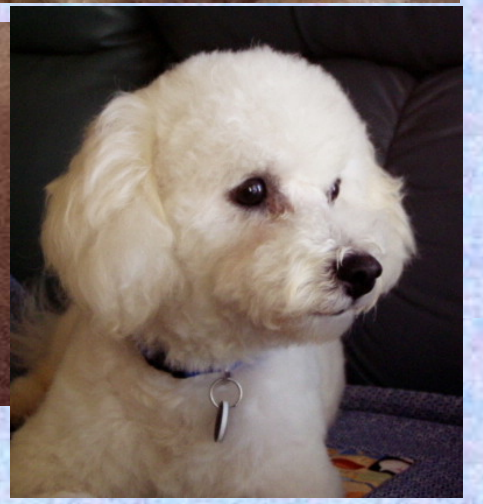
"But This Kid Doesn't Speak English!"

Presented by
Deborah Svedman, NBCT, M.Ed.

About Deborah Svedman:

- 28 years teaching experience in El Paso
- Master's in Bilingual Education
- National Board Certified Teacher in math
- Certified in Texas for secondary math, general elementary, and bilingual/ESL
- Taught all levels: 1st grade – graduate school
- I despise boring, pointless in-service, too
- I have four rescued dogs*



Agenda

5 minutes – Introduction, background, agenda

15 minutes – Language Acquisition Theory (brief)

40 minutes – How do I modify? What do I modify?

120 minutes – Strategies for teaching specific concepts:

- Fractions and fractional concepts
- Order of operations
- (15 minutes – break)
- Variables and exponents
- Probability
- Collecting like terms

30 minutes – Other research on ELLs – non academic issues, parental involvement

15 minutes – Closure and Q&A

Language Acquisition Theory: **Explaining BICS and CALP**

Classroom teachers need to understand the difference between social language and academic language acquisition. Here is a simple description of BICS and CALP by Judie Haynes, as theorized by language acquisition expert Jim Cummins:

Basic Interpersonal Communication Skills (BICS)

- These are the language skills needed in social situations, the day-to-day language needed to interact socially with other people.
- English language learners (ELLs) employ BIC skills when they are on the playground, in the lunch room, on the school bus, at parties, playing sports and talking on the telephone.
- Social interactions are usually context embedded. They occur in a meaningful social context.*

Basic Interpersonal Communication Skills (BICS)

- They are not very demanding cognitively. The language required is not specialized.
- These language skills usually develop within six months to two years after arrival in the U.S.
- Problems arise when teachers and administrators think that a child is proficient in a language when they demonstrate good social English.*

Cognitive Academic Language Proficiency (CALP)

- CALP refers to formal academic learning. This includes listening, speaking, reading, and writing about subject area content material.
- This level of language learning is essential for students to succeed in school. Students need time and support to become proficient in academic areas.*

Cognitive Academic Language Proficiency (CALP)

- This usually takes from five to seven years. Recent research (Thomas & Collier, 1995) has shown that if a child has no prior schooling or has no support in native language development, it may take seven to ten years for ELLs to catch up to their peers.
- Academic language acquisition isn't just the understanding of content area vocabulary. It includes skills such as comparing, classifying, synthesizing, evaluating, and inferring.*

Cognitive Academic Language Proficiency (CALP)

- Academic language tasks are context reduced. Information is read from a textbook or presented by the teacher. As a student gets older the context of academic tasks becomes more and more reduced.
- The language also becomes more cognitively demanding. New ideas, concepts and language are presented to the students at the same time. *

Common Underlying Proficiency

- Jim Cummins also advances the theory that there is a common underlying proficiency (CUP) between two languages. Skills, ideas and concepts students learn in their first language will be transferred to the second language.*

So…how does all this translate into the classroom, and what do I do?*

“SHOW, DON’T TELL”

- Demonstrate, illustrate, act out
- ***Involve students*** as much as possible –
  - Use them as examples
  - Use their names, their favorite things
  - Have them demonstrate with you
  - Ask them to stand up, move around, etc
- Give them a reason for learning the math or for doing a particular task (such as lowest terms)*

“SHOW, DON’T TELL”

- Keep for reference in binder, notes
- Give 8-10 examples
- Simple to complex, sequencing
- Use positive, whole numbers first, then incorporate negatives, variables, and/or fractions (as applied to your level of instruction)
- Avoid using 0 and 1 and 2^2 (at first)
- BE PATIENT, please!*

“SHOW, DON’T TELL”

- ***Write it down*** – overhead, board, etc.
- Students need to see the spelling because many common words are pronounced the same or sound the same to ELLs. Observe:

right – write **why – *y*** **to – two – too**

do – due **size – sides** **cheat – sheet**

chair – share **choose – shoes** **find - fine**

sheet of paper – chile pepper*

Simplified Definition Examples: Textbook vs. Modified

- **Variable** – A quantity capable of assuming any of a set of values, or a symbol representing such a quantity.
- **Variable** – **a letter that represents a number**
- **Ratio** – A relationship between two quantities, normally expressed as the quotient of one divided by the other.
- **Ratio** – **compare two numbers***

Simplified Definition Examples:

- **Percent** – a way of expressing ratios in terms of whole numbers. A ratio or fraction is converted to a percentage by multiplying by 100 and appending a "percent sign" %.
- **Percent** – **a number compared to 100**
- **Domain – all values of x**
- **Range – all values of y**

✓ ***Goal is for comprehension and simplicity first, accuracy and specifics second. ****

Simplified Definitions:

- ***Practice making your own simplified definitions.*** ***"Proportion"***
- **Try to use 6 common words or less**
- **Get only the main idea ("Tell me in one sentence what the movie is about."**
- **You can build upon basics to become more specific once students have the main idea***

Mnemonics

- “I can’t find PEMDAS in the dictionary!”
- ***Only use if students know all the words well, the words are simple or common and make sense, and only if it’s short enough to remember easily.***
- “Man Very Early Made Jars Stand Up Nearly Perfectly” and “Richard Of York Gave Battle In Vain” - ***huh?****

Memory Assistance

- “Odd” numbers – Odd is ONE syllable and THREE letters: **1, 3**, 5, 7, 9
- “Even” numbers – Even is TWO syllables and FOUR letters: **2, 4,** 6, 8, 10
- Coordinate points (x,y), domain and range – alphabetical order
- M&Ms – mean, median, mode*

Necessary TAKS vocabulary:

Shown below	Above	Widest
Narrowest	Twice	Product
Shift up/down	Shaded	Entire
Following	*How long	At Least
Reach	Choose	Trend
Replacement	Solution set	A few
Most of the _____	Some of the ___	No more than

*Distance *and* time

(Selected by first-year ELL high school 9th and 10th graders from released TAKS tests 2004-2006.)*

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*Distance *and* time **(terms found in math dictionary)**

(Selected by first-year ELL high school 9th and 10th graders from released TAKS tests 2004-2006.)*

Cognates & Translations

- "What is ***endrino?***"
- In English it's "sloe." ***Great. What's that?***
- Translations work only if the student knows the meaning in the native language.
- Same with cognates: incipient, *incipiente*
- Be careful with false cognates:

carpeta ≠ carpet éxito ≠ exit restar ≠ rest*

Vocabulary Development

- Select one or two key words
- Ask questions to get attention, relate to ordinary life, relate to other useful words
- Speculate meanings or ask “If this means that, how do you say ____?”
- Build on knowledge of Spanish or first language, if applicable or practical
- Demonstrate/illustrate word
- Reinforce many, many times during the lesson (orally, written) and for days afterward*

Cultural Differences in the Math Classroom

- Use of decimal vs. comma in large numbers or on calculator
- Physical writing of certain digits – seven, nine, one - old habits die hard! What are you willing to accept?
- Performing long division, solving equations in a different manner or format
- “beans and potatoes” – similarities*

Calculator Usage & Shortcuts

- Use the calculator for tedious tasks such as operations with fractions, lowest terms, dividing. Remember, they may not have a good foundation, but are capable of learning higher math with help. (Uriel)
- Be patient with students – they will discover shortcuts on their own once they understand the concept.*

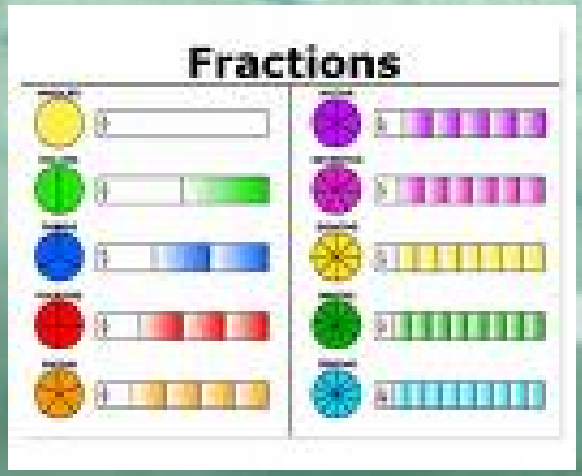
Analogy Defined

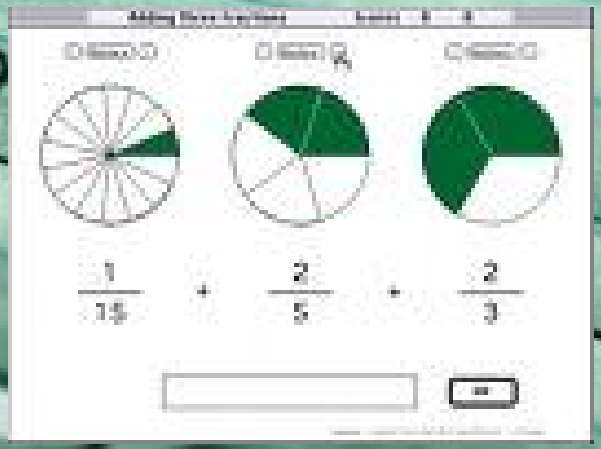
- Drawing a comparison in order to show a similarity in some respect
- Similarity in some respects between things that are otherwise dissimilar
- “I want proof!” Geometry ‘n’ judges*

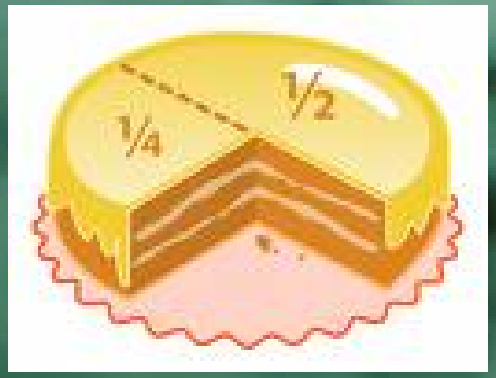
Analogies in Math

- Students can better understand an abstract concept if it is paralleled to or related with a familiar, concrete concept
- You need to think about the mathematical concept and how it operates, then find an ordinary procedure that is similar in how it operates. It's not always easy or obvious, but practice helps the process. *

Now down to specifics…





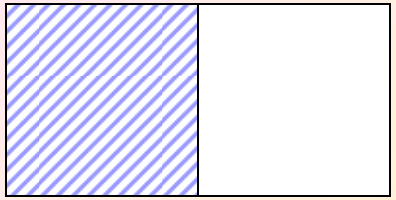


Fraction Definitions

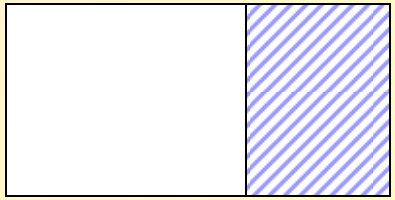
- A fraction is **a part of a whole**
- (define proper and improper later)
- ***A fraction indicates division***
- Numerator is **how many parts you have** (from number, número)
- Denominator is ***what it is*** (like denote, denomination, name, nombre)*

Fractional Concepts

When initially discussing fractions, it is imperative for students to understand that ***the whole is divided into EQUAL parts.***



One of two equal parts is ½.

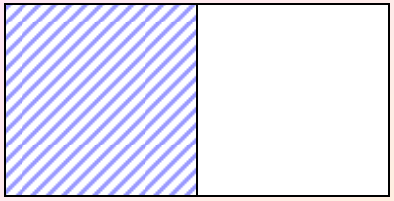


One of two unequal parts is NOT 1/2!*

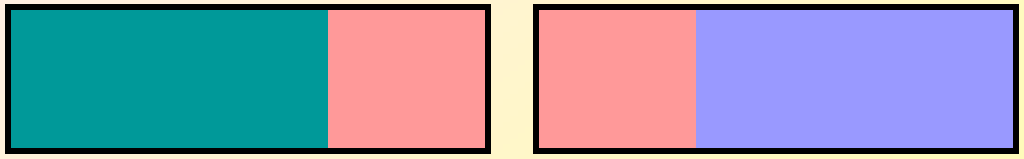
Fractional Concepts

A fraction indicates division:

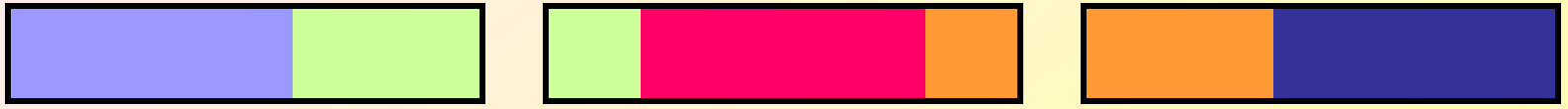
½ is one divided into two equal parts. Each part is ½ of one whole:



2/3 is two divided into three equal parts. Each part is 2/3 of one whole:



3/5 is three divided into five equal parts. Each part is 3/5 of one:



*

Equivalent Fractions

- Three critical concepts students must understand (background, prior knowledge)
- Any number times 1 is that same number
- Any number divided by 1 is the same number
- When the numerator and denominator of a fraction are the same, the value is 1 whole.
- 3/3 = 1, 5/5 = 1, 87/87 = 1, *a*/*a* = 1, -6.29/-6.29 = 1 Mario/Mario = 1*

Equivalent fractions

- “Same value, different form”
- Demonstrate equivalency with fraction circles, money, measurements, etc
- Multiplication by one: any number multiplied by one is the same number
- Substitute fraction form for one, then multiply. The value is the same because you multiply by one (but in another form)*

Concrete to Abstract

Mario = Mario Mario × 1 = Mario

Mario × **red shirt/red pants** = Mario (in a different outfit)

Mario × **blue shirt/blue pants** = Mario (in a different outfit)

Mario × **green shirt/green pants** = Mario (in a different outfit)

Mario × **1 in fraction form** = Mario (in a different form)*

Concrete to Abstract

½ = ½ ½ × 1 = ½

½ × **2/2** = 2/4 (½ in a different outfit)

½ × **5/5**= 5/10 (½ in a different outfit)

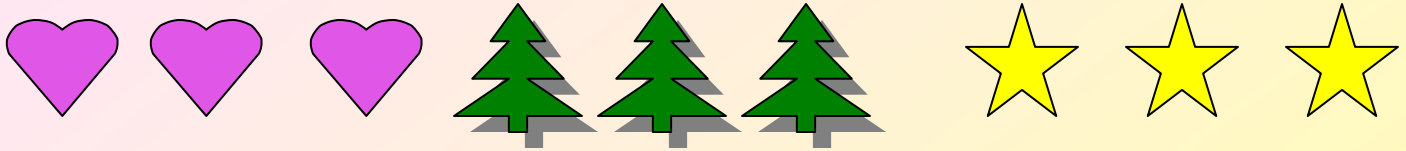
½ × **8/8** = 8/16 (½ in a different outfit)

½ × **1 in fraction form** = ½ (in a different form)*

Fraction Addition & Subtraction

- Demonstrate physically first
- Write using pictures for denominators:

$\frac{1}{} + \frac{3}{} = \frac{4}{}$ $\quad \frac{6}{} - \frac{4}{} = \frac{2}{}$ $\quad \frac{5}{} + \frac{7}{} = \frac{12}{}$



- Write using words for denominators:

$\frac{2}{\text{books}} + \frac{3}{\text{books}} = \frac{5}{\text{books}}$ $\quad \frac{9}{\text{dogs}} - \frac{4}{\text{dogs}} = \frac{5}{\text{dogs}}$ $\quad \frac{6}{\text{cars}} + \frac{1}{\text{car}} = \frac{7}{\text{cars}^*}$

Proper and Improper Fractions

- Build vocabulary first using manners or school rules to demonstrate what is proper and what is not.
- Depending on age group, use the concept of camel races to demonstrate a winning duo vs. a losing one. Use students and names for reference later on. Also relate to money (converting change to dollars).
- Improper fractions are ***not wrong***; they just are not finished and need to be converted to a mixed number.*

Uncommon/Unlike Denominators

 +  =  ???

- The need for common denominators is obvious when students say, “3 dogs and 4 cats are 7 animals” or “5 girls and 2 boys equals 7 persons.”
- When students are told they already make common denominators naturally and automatically, they have more confidence to create them mathematically.*

Uncommon/Unlike Denominators

- Students can write sentences demonstrating like and unlike denominators
- Give them several examples, then ask them to create their own
- They cannot use your examples and simply change the numbers.
- Encourage/require a variety of categories – cars, fruits, colors, school materials, furniture, animals, etc.
- Share with the class, give attention or bonus credit to most diverse, most creative connections.*

Uncommon/Unlike Denominators

Expand to things that don't have an obvious connection:

3 people + 2 chairs = ??

3 people + 2 chairs = 14 legs

Build the vocabulary necessary and show the equivalencies:

3 people = 6 legs; 2 chairs = 8 legs

Now add: 6 legs + 8 legs = 14 legs

Students must realize that the numerators are not always "just added"*

Uncommon/Unlike Denominators

AFTER all this building of background, move to actual fractions (and use simple ones at first):

$\frac{1}{2} + \frac{1}{3} = ?$ What do halves (2) and thirds (3) have in common? Try to get students to think in terms of multiplication tables on their own first; if not, suggest making a list of multiples. Circle the first one in common (6). Can ½ be made into sixths? Can 1/3 be made into sixths? What do halves and thirds have in common? Sixths!*

Fraction Addition & Subtraction

2/3 + 3/5 is like 2 apples + 3 oranges.

They cannot be combined because they are not the same. What do they have in common? They are fruits!

This becomes the unmathematical trigger to help students. *

Order of operations

Order of operations

- Start with simple 2-operation expression:

  2 + 3 x 4

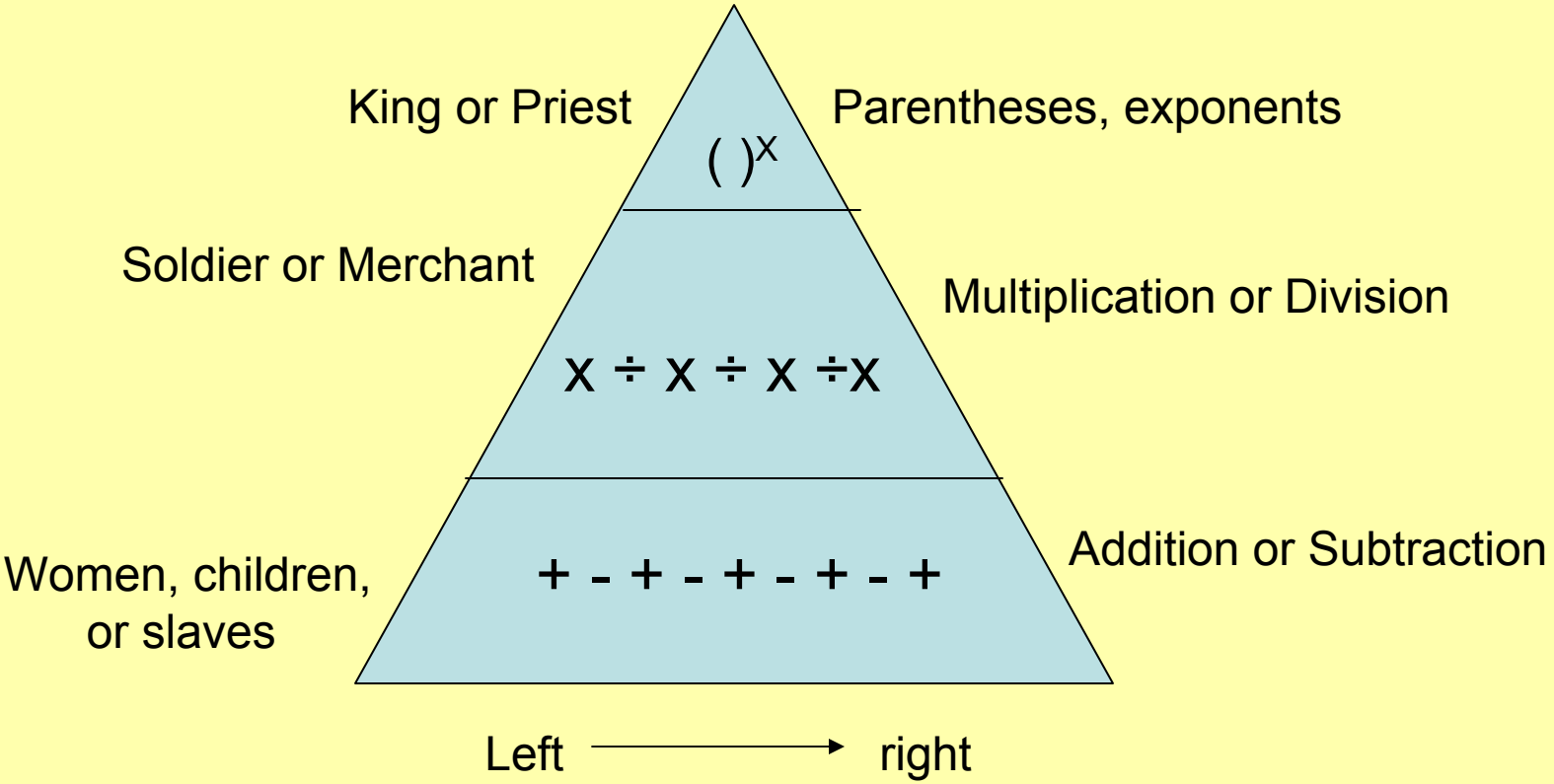
- What is the value? 20? 14? Which is correct, or are they both right?
- Discuss why there needs to be an agreement on the order of operations
- Relate to other needs for agreement, such as traffic laws or playground rules.*

Order of operations

- Discuss social hierarchy – business (president, manager, worker), school (principal, teacher, student)
- Discuss pyramids of Mexico, ask students for background information
- Draw pyramid, label with king/priest on top, soldier/merchant in middle, peons on bottom; relate complexity of math to location on pyramid*

Order of Operations

- Explain:



Order of operations

- Discuss who goes first, or who is most important; relate to what operation is done first. Draw symbols of operations on the pyramid.
- If the same level, who goes first (we read from left to right, so go from left to right).
- Practice with simple expressions first, gradually increase in complexity.*

Variables

- Relate to previous learning (1st grade):

  $2 + \square = 5$ **What goes in the box?**

- Then later on (4th grade)

  $2 + \_\_ = 5$ **What goes on the line?**

- Now (current level)

  $2 + x = 5$ **What is x equal to?**

Demonstrate using other letters, define as “a letter that represents some number”*

Exponents!

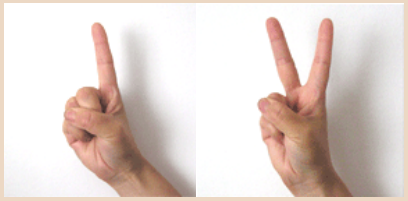
x^3

Exponents

- List common English words that have common abbreviations, such as states, cities and titles. Ask students how to write the same thing in a different form. They will come up with the abbreviation.
- Show same concept in Spanish (Cd., Sr,)
- Write 2·2·2·2·2 and ask how students would abbreviate the math expression
- An exponent is an abbreviation (for multiplication).*

Count Exponents with Fingers:

$4^3 = 4 \cdot 4 \cdot 4 = 64$



Show, don't tell*

$5^2 = 5 \cdot 5 = 25$

$2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$

Exponents in Combination

- Important to show combinations:

$2^3 \times 3^2$	(exponential form)	$4^3 - 2^5$
$2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$	(what it means)	$4 \cdot 4 \cdot 4 - 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
$8 \cdot 9$	(simplify)	$64 - 32$
72	(value)	32^*

Exponential values

$a^m * a^n = a^{(m+n)}$ IS NOT so simple, at first.

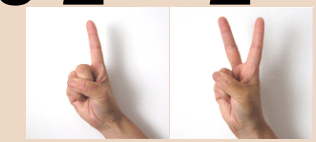
SHOW by example first, and let students tell you the “shortcut” when they figure it out.

Remember, 8-10 examples, please. You can vary them, but wait to do negative exponents. You write, they write.*

Exponents in Combination

- Show the meaning of exponents in parentheses – ***write it out!***

$(2^3)^2$ means $2^3 \cdot 2^3$ or $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$



$8 \cdot 8$ $2^3 \cdot 2^3$

64 2^6

- Then, ***after several examples***, ask students if they notice a shortcut to determine the correct result.*

Explain this to me…

- How much is 2^{-3} ??
- Why?

Exponents

- Show WHY it works by verifying values with a calculator.
- Review negative exponents (they're fractions, remember?). Now introduce an example using a positive and a negative exponent. SHOW why it works by writing it out, and then verifying with a calculator.
- Do ***how many*** examples??
- ***Who*** decides on shortcuts??*

Probability Defined:

$$p(a) = \frac{\text{Number of Outcomes Favorable to the Occurrence of the Event}}{\text{Total Number of Possible Outcomes}}$$

"You can calculate the chance, or **probability**, that a particular event will happen by finding the ratio of the number of ways the event can occur to the number of possible outcomes. The probability of an event may be written as a fraction, decimal, or percent. When outcomes have an equal chance of occurring, they are **equally likely**. When an outcome is chosen without any preference, the outcome occurs at **random**."

~Any questions?? Probably...*

Probability Defined ***Simply***:

- ***Probability – what you want compared to the total possible*** (introduce like this first, then integrate actual terms of outcome and events later) Remember, you want comprehension over precision at first!
- Relate to weather forecasting – chance for rain? How is it calculated?*

Probability Activities

- Best math concept for hands-on activities!
- Use individual, group, and class results to combine, refine, and post results
- Do a variety of activities: coin toss, M&Ms, roll dice, spinners, compound events, with or without replacement, theoretical vs. experimental, plus create your own.
- “Same value, different form” for interchanging fractions, decimals, and percents.

Probability Activities

- Capitalize on vocabulary reinforcement: odd/even, consonant/vowel, colors, select/choose/pick, etc.
- Use prior knowledge to incorporate skills: divide circles into equal or unequal parts using degrees, translate to fractional parts, then determine probability of selecting.
- Have students create their own probability problems and solve.

Combining Like Terms

- Add, subtract like terms – relate to the word “alike” using two people or items.
- Show with actual items such as rulers, markers, pencils.
- Go to common vocabulary, but not actual items. 3 baseballs + 2 baseballs is….? 7 horses minus 4 horses is…..? And relate to fractions…
- After several (8-10) examples, move to variables: 3x + 2x is….? 7y – 4y is….?*

Combining Like Terms

- Multiple variables and exponents can be described using adjectives: $3x^2 + 2x^2$ is like 3 red pencils plus 2 red pencils. $3x^2 + 2y^2$ is 3 red pencils plus 2 red pens, which cannot be combined.
- Practice writing English sentences as well as numerical expressions.*

Inequalities

- Make a poster showing the signs. Use simple numbers:

Inequality signs

$3 < 8$	3 "is less than" 8
$9 > 5$	9 "is greater than" 5
$6 = 6$	6 "is equal to" 6*

Inequalities

- Ask about activity requirements:
  voting, amusement park ride, movie ratings, or the catch-all, money
- Determine what ages, amounts, or sizes are sufficient, which are insufficient, and write the concept using inequality signs and numbers.
- Write the concept in English using terms for inequalities such as “at least” or “up to.”*

Inequalities vocabulary

LESS THAN: <

Less than

Fewer than

Under

MORE THAN: >

More than

Greater than

Over

LESS THAN or EQUAL TO: ≤

No more than

A maximum of

At most

Up to

MORE THAN or EQUAL TO: ≥

No less than

No fewer than

A minimum of

At least*

The Importance of You, the Teacher, in the Classroom

- “Show, Don’t Tell”
- Use visuals, patterns, and analogies
- Incorporate references to things they already know; word play
- Patience
- High expectations
- Respect, Reward, and Praise*

Non-Academic Issues of ELLs

- Know your students
- Social conversations
- Home visits
- Support within the school setting
- Future planning*

Parental Involvement of ELLs

- Lack of involvement does NOT equal lack of interest
- You must take the initiative
- Are they really welcome?
- Why don’t they come to school?
- What if I can’t communicate with them?
- It’s still “Show, don’t tell”*

Time to Say Good-Bye

- Questions and/or comments??
- More information:
  - Deborah Svedman, NBCT, M.Ed.
  - **dsvedman@elp.rr.com**
  - 1225 Coyote Lane, El Paso, TX 79912
  - (915) 584-7107

Thanks for coming!