There Are Math Ones, Too?

Region One
Edinburg, TX
July 20, 2011

Welcome!

- Walk around room…
- Look at the icons on the chart paper
- On the chart paper, write the first thing that comes to mind about the image
  - Can be math related
  - Can be life related
  - Can be anything related


CC


Wednesday
4
Mail
Calendar
Photos
Camera
Settings
Clock
Weather
Stocks
App Store
Cydia
Installer
WinterBoard
Calculator
Notes
Reading
Facebook
iTunes
Maps
Contacts
YouTube
iShoot Lite
Terminal
PenguinLife
SMS


8:46 PM
Camera
Messages
SMS And MMS
Contacts
Calendar
Browser
VZ Navigator
Visual Voice Mail
Media
Clock
Escape key
Menu key
BlackBerry

What to expect…

- Clear understanding of:
  - Purpose of icons
  - Benefits in the classroom
  - How to introduce & implement Math Icons

Background

- Designed by Melanie Montgomery
- Disconnect between test scores & understanding
- Prompts/Tools that elicit deeper thinking, analytical skills, overarching concepts while solving problems/equations
- Modification of instruction without deviating from core

Background

- Exceed standards
- Create life-long math learners
- Make Math Exciting
- Dual-coding research
- Picture Superiority

Picture Superiority Effect

- People learn better from pictorial stimulation

Facial recognition

- Mental notes + distinguishes features
- Does not require thought
- It just happens

Dual-Coding

- Picture + Words
- Strength – pictures accompanied with words
- Words represent overarching & repeating concepts

The BRAIN!

- Right Hemisphere
  - Good at grasping the whole
- Left Hemisphere
  - Good at breaking down complicated patterns

Mapping the Mind by Rita Carter

Neurons

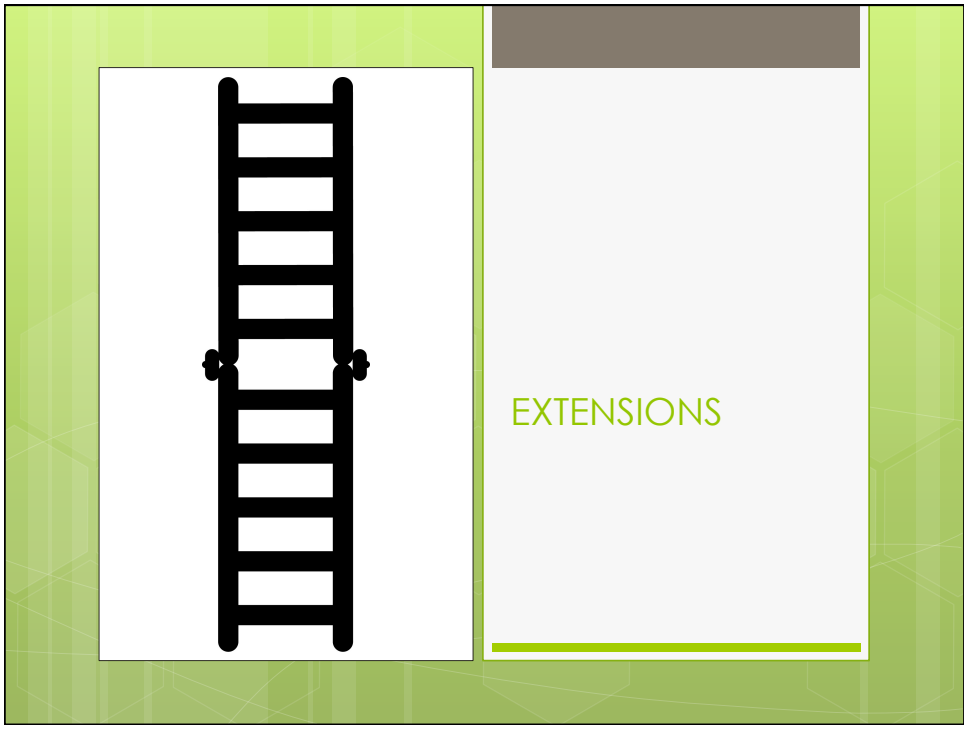
- "Catch" information
- Specific information with surrounding sensory information
- Same info – different sensory
- Pictures do the talking

Top-Down Processing

- Big Idea → Break down into details
- Higher-order thinking skills
- Application/Background knowledge → Creation of meaning

No Wrong Way!

- "Icon Language" already embedded in your teaching
- Any order
- Many meanings



EXTENSIONS

- Where did _____ originate?
- How much further can we take ___?
- What comes before ____? After ____?
- What is the purpose behind _____?
- How does additional data influence _____?
- What conclusions can be drawn from?
- What extensions can be used to enrich or remediate?

Break Out Session

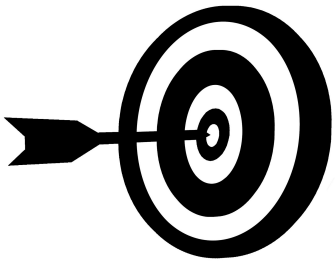
- PAIRS
- Pick a topic/concept
- What topics/concepts are taught before this that build into it?
- What topics/concepts are taught after this that this one builds into?

Example

- Simplifying Fractions
- Before: Divisibility Rules
- After: Equivalent Fractions

Discussion

- How do the before, now, after concepts relate with regard to taking the next step, or taking the concept one step further?



PROOFS

PROOFS

- How do you know?
- Does ____ make sense?
- What evidence is there to support ____?
- How are the questions and answers related?
- Why don't we arrive at the correct answer when we ___?
- How do we check _____?
- What properties/rules support ___?
- Justify, Prove, Check

Break Out Session

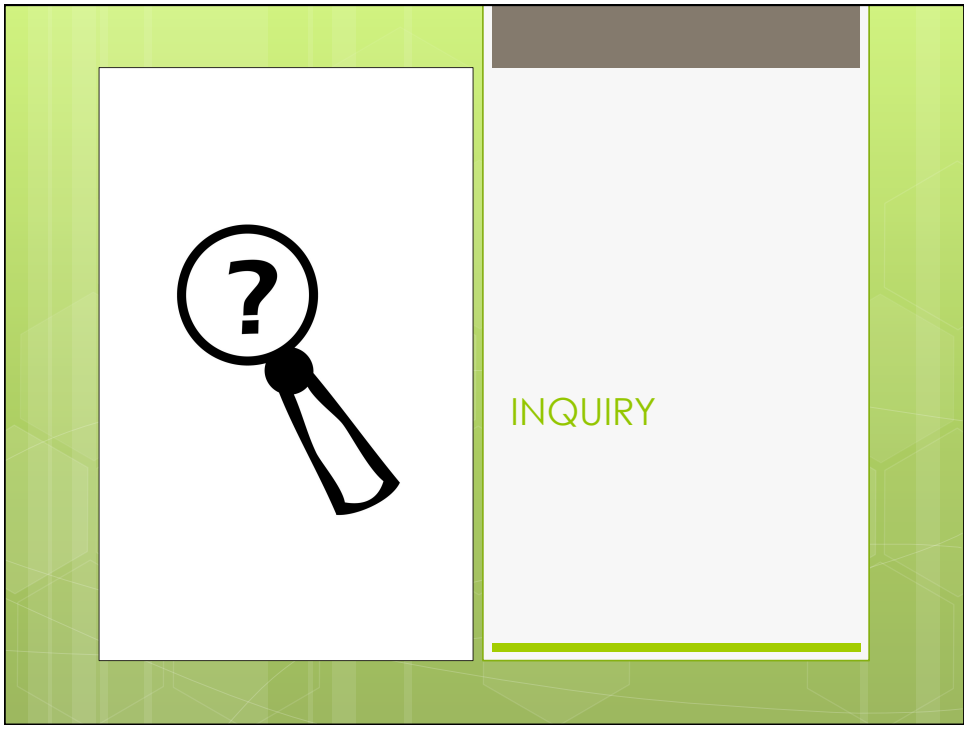
- MULTI-LEVEL GROUPS
- What methods are used in your grade level/classroom to "check your work" or prove that an answer is correct?

Example

- Primary – students might add to prove a subtraction problem is correct
- Secondary – students may use a property or theorem to prove a step or solution

Discussion

- How can you use the proofs icon to encourage students to show their work?
- Understand the "why" behind a problem/ concept?
- How can various methods of "proving" work be a tool for differentiation?



- What does ____assume?
- Why does ___ work this way?
- Will ____work in all situations?
- What other ways are there to arrive at?
- What am I solving for?
- What is the question asking?

INQUIRY

Break Out Session

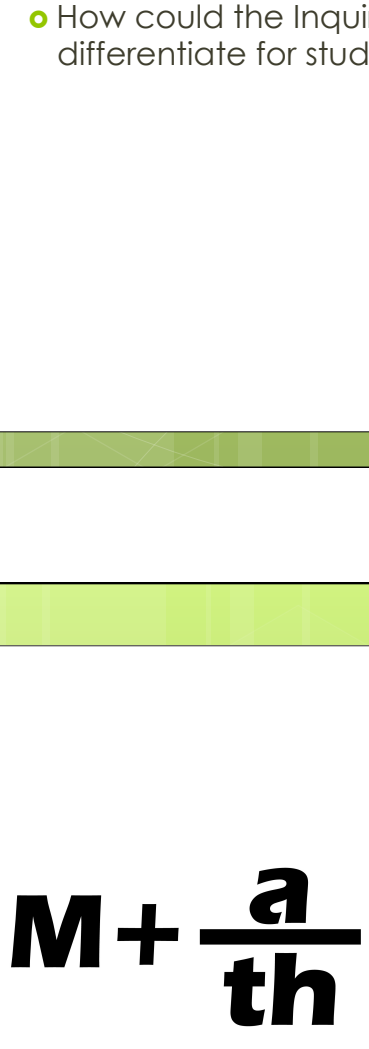
- GRADE LEVEL GROUPS/SUBJECT GROUPS
- What are some very literal ways you can use the Inquiry icon?
- What are some theoretical ways we can use the Inquiry icon?

Example

- 35•11
- Mental Math trick
- Will this mental math trick work for all numbers multiplied by 11?

Discussion

- How could the Inquiry icon help us differentiate for students in our classroom?



EXPRESSIONS

EXPRESSIONS

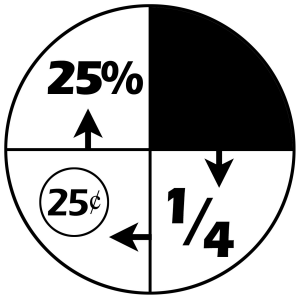
- Can you give ____ a nickname?
- How else can you represent this value?
- What does the term ___ assume?
- Why might a person use ___ to represent ___?
- How is your data being expressed?

Break Out Session

- MULTI-LEVEL GROUPS
- How many different ways can you think of to express:
  - A number?
  - An equation?

Example

- Numbers – standard form, scientific notation, exponents
- Equations – standard form, slope-intercept form,



CONVERSION

CONVERSION

- How can I change ____ to a different format?
- What do I do to express ____ differently?
- Can I convert ___ to another form?

Break Out Session

- MULTI-LEVEL GROUPS
- What are the common things that we convert?
- What methods of converting (using the same icon overarching concept) are used to differentiate instruction or practice?

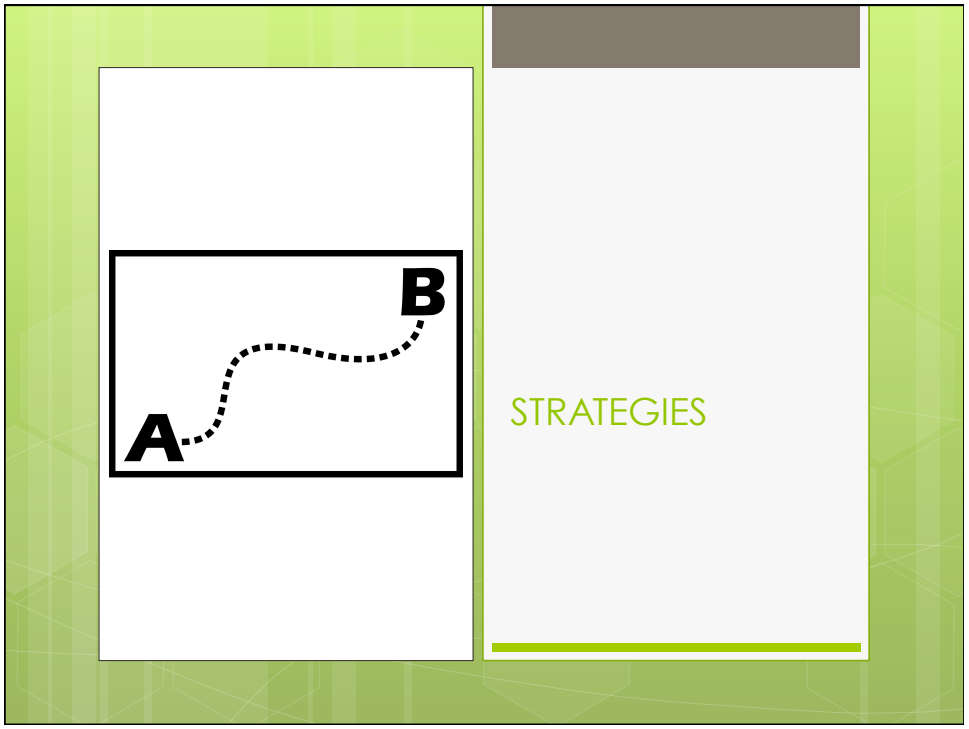
Example

- Fractions → Decimals → Percents

Discussion

- What differences do you see between Expressions and Conversion? Similarities?

- Expressions – noun, pronoun…
- Conversion – verb; it's a process



STRATEGIES

- What steps do we need to take to solve _____?
- Which information is relevant? Irrelevant?
- Have we solved other problems like this one? How did we approach those problems?
- Can we apply simpler problem strategies to help solve this problem?
- What plan will we use to solve this problem?

Break Out Session

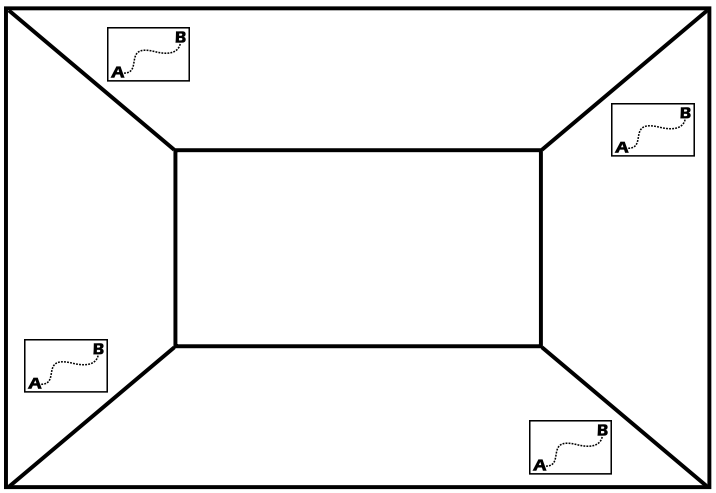
- GRADE LEVEL GROUPS
- Choose a topic
- What strategies do you use to teach your topic?

Example

- Prime Factorizations
- Factor Box

Discussion

- When differentiating concept instruction, how do you incorporate the explanation of different strategies that lead to the same result?



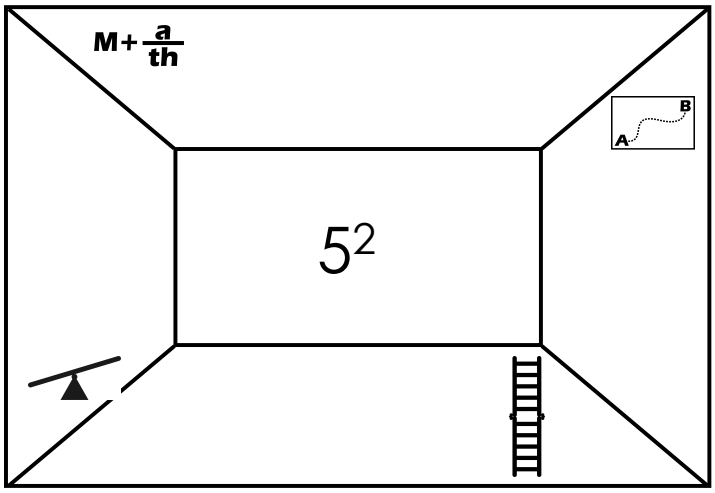
Break Out Session

- GRADE LEVEL GROUPS
- Choose a topic
- What strategies do you use to teach your topic?

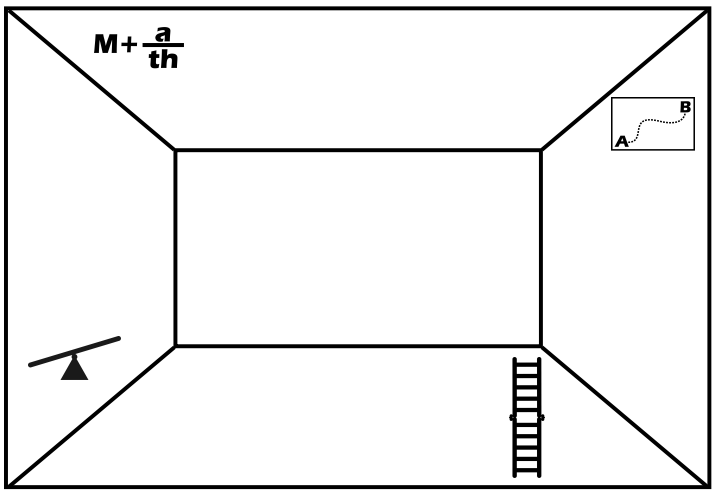
Discussion

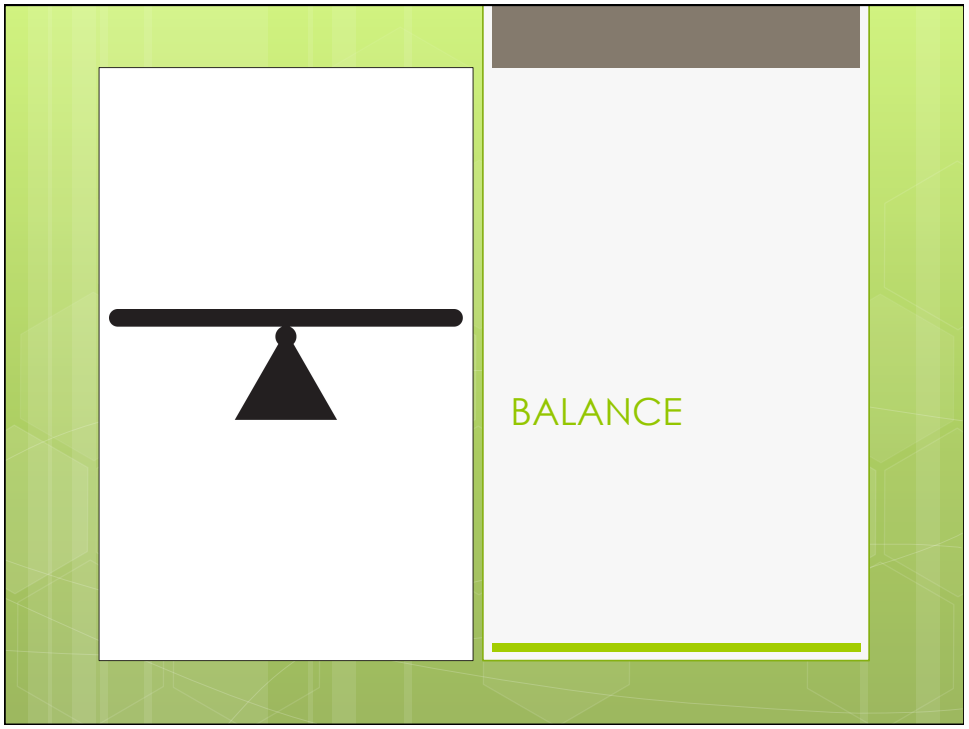
- GRADE LEVEL GROUPS
- Choose a topic
- What strategies do you use to teach your topic?

Inside → Out



Outside → In





BALANCE

- What are the equivalent values?
- What two things are equal?
- Are ___ and ___ worth the same amount?
- How does symmetry manifest itself in ____?
- How many of each would produce balance?
- What do you need to do to keep ___ balanced?
- How are ____ and ____ symmetrical?

Break Out Session

- MULTI-LEVERL GROUPS
- At your grade level, what are some specific examples showing balance between:
  - Two problems?
  - Two values?
  - Two sides of an equation?

Example

- 5 + 4 = 3 + 6 (commutative property)
- x + 5 = 9 (properties of equality)

Discussion

- How can using the balance icon when teaching certain lesson increase the level of understanding to a higher level?
- How can it bridge the understanding from one concept to another?

IMBALANCE

- Which amount is the greatest?
- Which has the least/greatest value?
- Is there a remainder?
- Why are there (2?, 3?, 4?) left over?
- What conclusions to I get when I compare/order ___ and ___?

IMBALANCE

Break Out Session

- MULTI-LEVEL GROUPS
- At your grade level, what are some specific examples showing imbalance between:
  - Two problems?
  - Two values?
  - Two sides of an equation?

Example

- $5 - 4 \neq 4 - 5$

Discussion

- How can using the imbalance icon when teaching certain lesson increase the level of understanding to a higher level?
- How can it bridge the understanding from one concept to another?

APPLICATIONS

APPLICATIONS

- How does ___ relate to the real world?
- Which real-life activities rely on ____?
- Why might in be important/ beneficial to understand?
- Which professions require a working knowledge of _____?
- When will I use ___?
- How can I apply my data to ___?

Break Out Session

- PAIRS
- When are you ever going to use math in real-life?
- Use specific examples, if possible.

Example

- Fractions for baking
- Converting to metric when traveling

Discussion

- When/How will you apply the strategies learned today to your classroom?

Ways to Introduce

- As a whole – All 9 in a week
- As they relate to chronological lessons
- Pairing
- Other ideas?

Task Statements

- **T**hinking **S**kill + **C**ontent+**R**esource+**P**roduct
- T/S – Bloom's Taxonomy
- C – Content with Math Icon
- R – Textbooks, manipulatives, toolbox, etc
- P – Outcome; Project; Assessment, etc

Task Statements

- Students will simplify fractions by converting from one form to the other using the Z-method or properties of equality to complete a worksheet with a partner.
- Students will evaluate and defend different ways to express ( ) percent of a number by solving problems from the textbooks in groups.

Next…

- 10 – 15 minute lesson
- Something you have taught recently
- Favorite lesson to teach
- Teach us the way you teach to your class
- We'll be the students

- All volunteers names in a "hat" – two lessons

Break Out Session

- How would you teach one of the lessons with icons?
- Choose 1-2 icons and plan out the lesson

Textbooks/Lesson Plans

- How do we choose icons from a textbook?
- How do we incorporate the icons into our lesson plans?

Introductions

- 9 volunteers
- Introduce 1 icon each
- Imagine you had to go back and introduce the icon to a
  - Colleague
  - Group of students