To get Math, you must achieve conceptualization; it is a mind-set

Lecture No.A1: Erstwhile, recognize the "perspective," the big picture.

"Mathematics is the most powerful tool we have. It controls our world. We can use it to put men on the moon. We use it to calculate how much insulin a diabetic should take. **It is hard to get right**." [Houston, *How To Think Like A Mathematician*, 2009]

"The highest form of pure thought is in Mathematics." - Plato

Common Core Standards: X-REF1

Lecture No.A1: Erstwhile, recognize the "perspective," the big picture.

'Mathematics is an applied science,...the study of patterns and relationships." [Rutherford et.al. *Science of all Americans*, 1990]

Math is required study for students PK-12, as we must develop students' intellects. "In the absence of adequately developed intellect, learning a new concepts, inevitably results in misunderstanding." [Bell, *The Nature of Science and Science teaching*, 2008].

Our approach ushers' students organically through the scaffolding within Math, building off concepts discovered through the experiences to be had. NOTE: We are all endowed equally, with the one thing you will need, your imagination. All you need to do is notice the patterns, next use it to solve.

AGENDA/Learning Goals: No.A1: Get the "perspective," the big picture.

Learning Objectives: (Students will study and learn the following)

Intended audience: Mature audiences (gr 8 and up)

1 **MINDSET**: In order to complete an exercise in math, you **must first be of a clear and open mind. The activities** surrounding problem solving and the revelations such **activities produce are what you will need to complete the** problem.

Question: What is the one thing we all have, that one thing we must bring into each problem, the key to the answer?

Answer: Your IMAGINATION. We need it to sort things out..

2 **ROLES**: My role as instructor is best thought of as a proctor, ideally, where you, the student conducts the investigations.

3 But first, we must consider the **nuance** within mathematics.

Such as the symbology within Mathematics, and how to read math, element present, how to process the information.

But First: No.A1: Pre-Test PoP-3 (need two of the three to advance)

Problem 1	Problem 2	Problem 3

SCORE: You want to get at least two of the
three PoP-3 (Problems of the Day). **HONOR**

Answer Key: Pre-Test (PoP-3)

No.1 Read then sign (The instructions said, "read then sign," it did not say to solve).

Read Instructions careful and follow them judiciously. Be literal with Math.

No.2 B (We read from the left margin to the right).

Okay! What went wrong here?

No.3 See diagram Should read -4 through zero to +4.

Think planting a + 4-foot pole: Vertically, it has 4 feet above ground, but it is - 2 feet deep

If you **MISSED TWO** or **MORE**, you might want to consider Studying the foundational skill setting you up for this skill. **Revisit this lecture again.**

Exploratory Stage: (Got to get your hands dirty!) Student-centered

Experiment 1: Speed-accuracy test (1) Create Form A test, a list of ten triple-digit by two-digit

multiplication problems. (2) Duplicate the same ten questions, for Form B test, but list them in reverse order, what was

ten is now one, etc. (3) Take the form A test using a timer to record time. Make sure is it quite and without distractions.

(4) Now, take the form B test, again timed, but this time use heads-on or make sure background has music loud

enough to hear. (5) Finally, score bot tests. Then compare/ both scores, noting the differences in results and conditions.

SUPPLIES: (A1 Experiment 1)

1. Paper and pen/pencil
2. Music maker
3. Stop-watch/timer

Experiment 2: Computational test (1) Create an expression using five non-repeating single-

digit numbers. Used random operators between each digit of the four operators (+), (-), (x), and (/). (2) Using the same

numbers, scramble the operators, to have none repeating the same position. (3) Calculate the values for the first and

second expressions. For (4)&(5) repeat no.1 & 2 but insert (at-will) a pair of parathesis. Then, (6) Calculate both values.

SUPPLIES: (A1 Experiment 2)

1. Paper and pen/pencil
2. Calculator (okay)

Intervention Stage: (Terms Introduction phase) Teacher-centered

See **A1 Perspectives** lecture notes. Click the links to pull up the details.

A1 – 1: [Mindset](#)

A1 – 2   [My Role, Instructor](#)

A1 – 3: [Perspectives](#)

Your Role - Mindset: We will need it in order to tap your imagination

To learn is to acquire knowledge. You cannot fake having knowledge for very long. Slow down, you can get this. Hit "FLOW" and cruise through the work. Watch the ambiance, it can help or hurt. But worst of them all is STRESS. Manage your time. And get as much sleep as humanly possible.

Come class time, you need to bring your A-game and Game Face. Think with pencil and paper too. But if you want to learn something new, try teaching someone, then work to filling their gaps, fine-tuning yours.

You don't lose if you get **knocked down;** you lose if you **stay down.**

Muhammad Ali
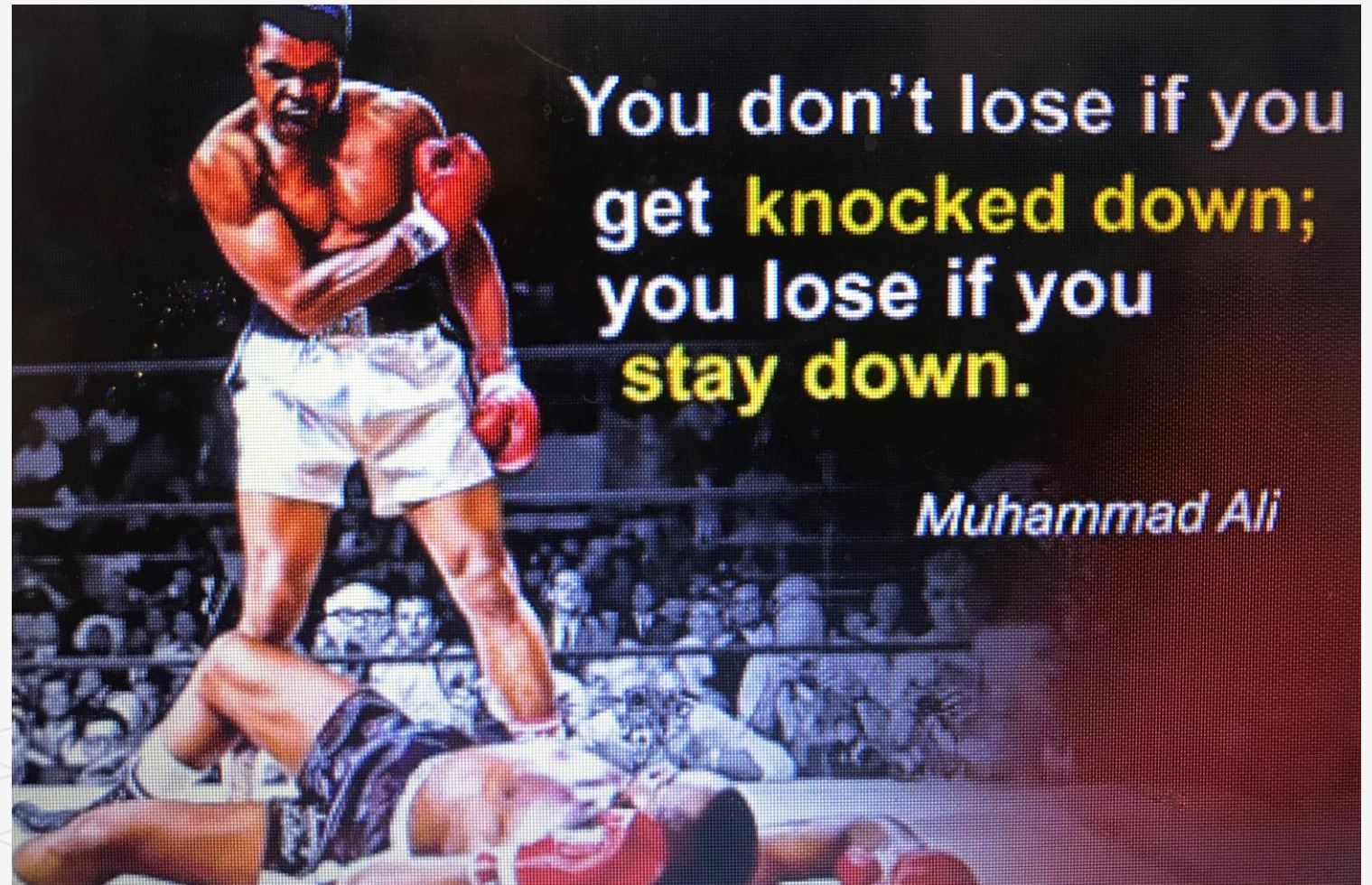
My Role: As teacher, I desire to be but your proctor

Because learning is a personal affair, the experiences that leads to one's own understanding must also be personal, relegating my role, ideally to but a mere proctor, verifying objectively the student's mastery.

Given time constraints, my efforts are trained on presenting students with those obstacles, problems in syncopation, such that the experiences leads to grasping the math concept.

The two domains at play:

1 The **Lesson plans** > **3 stage - Learning Cycle**

1: Exploratory stage - builds the personal awareness to the phenom. 2: Intervention stage – terms are connected to these experiences. 3: Discovery stage students apply to other similar problems.

2 The **AIM** being developing **Logical Power of minds**.

Through activities, discussions, experiments and exercises, stretch the range of the student investigator's ability to use their Rational Powers.

I will show you where to look, but it is you that have to find what you are looking for.
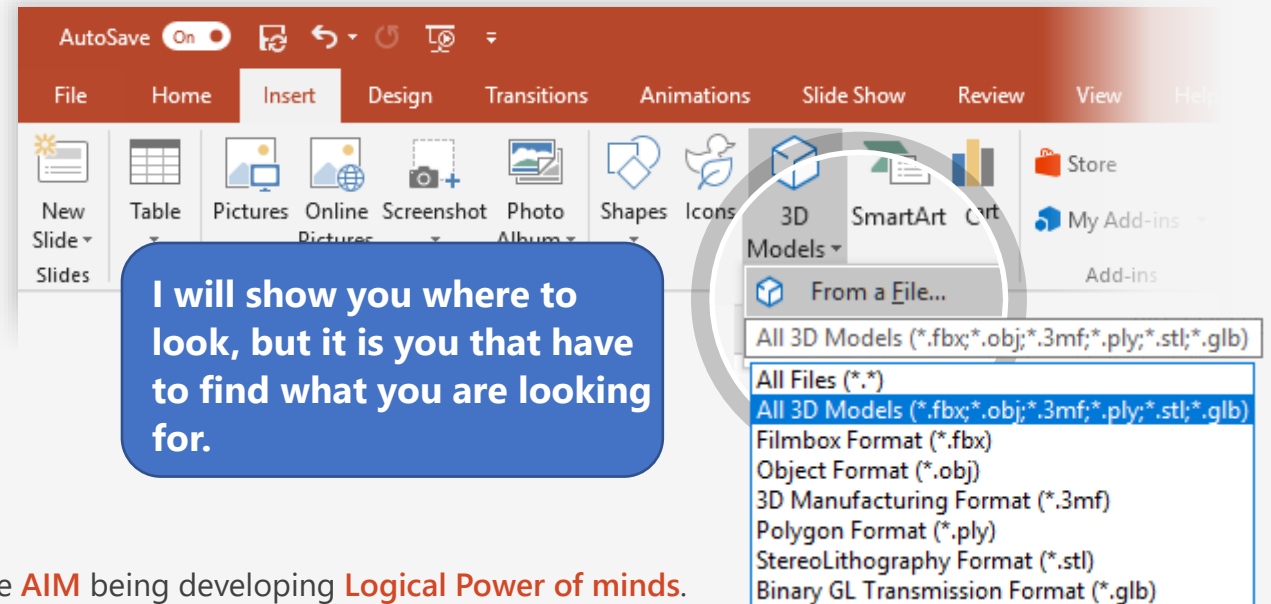
Nuance: To get Math, there are some things you should know

Your **Perspective** colors your experiences, because it has s great influence on thoughts and thus our understanding.

Having the proper **Context** is always essential to understanding the nature of the problem, particularly, if you are called to resolve that problem.

By keeping in mind **the Objective of Math,** you see big picture, which will direct you and guide you when problem-solving.

There are **nuances** at play in plain-view, we must master these, improving time/results.
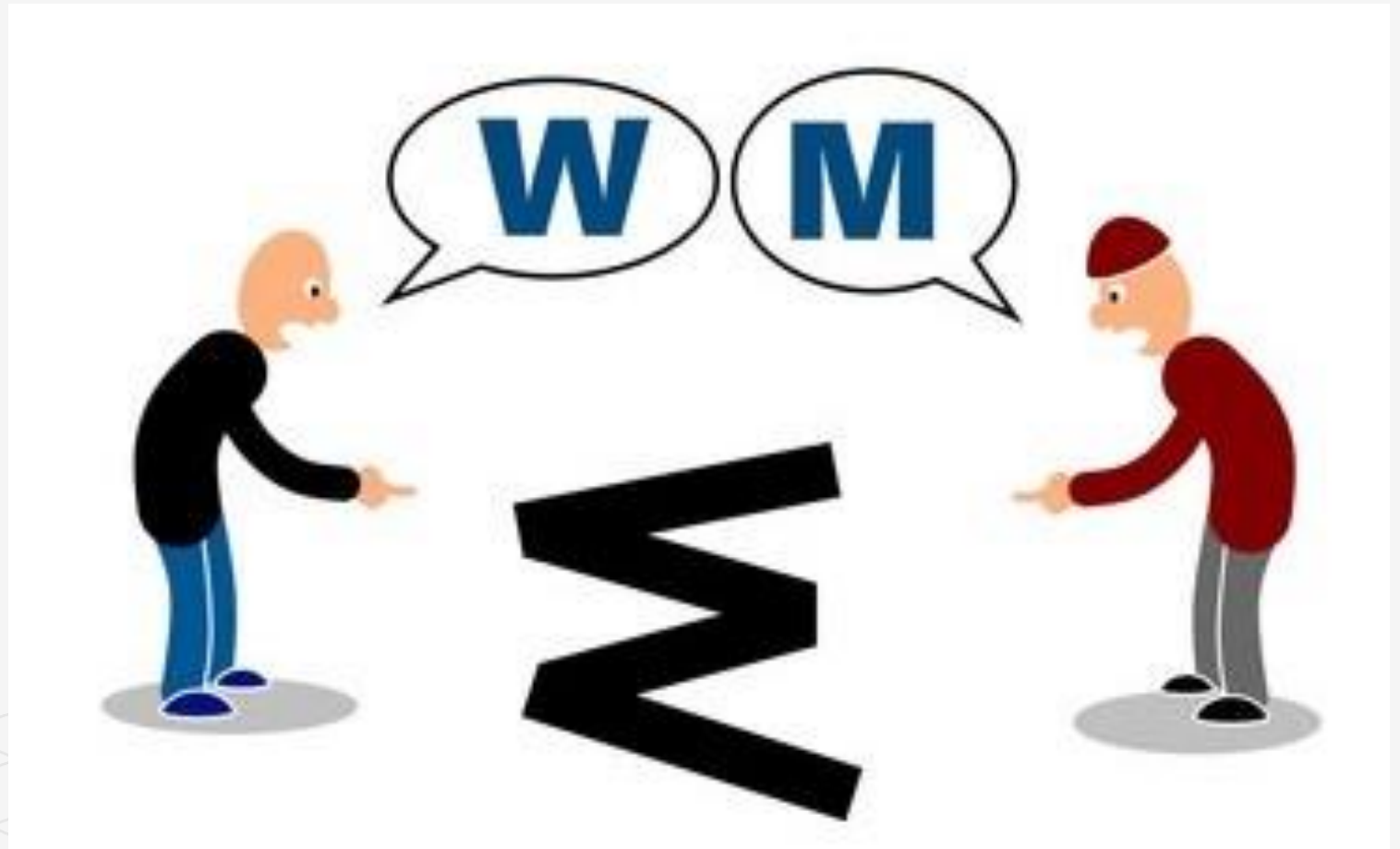
Discovery Stage: (Try your hands at the following)

Experiment 3: **Computational test** (1) Create an expression using seven non-repeating single-digit numbers. Between each digit insert randomly one of the four operators (+), (-), (x), and (/). (2) Using same numbers, scramble the operators so none a in repeating positions. (3) Now calculate values for both expressions. For (4)&(5), repeat no.1 & 2, but insert (at-will) a pair of parathesis. Then finally, for (6) calculate values both expressions.

SUPPLIES: (A1 Experiment 3)

1. Paper and pen/pencil
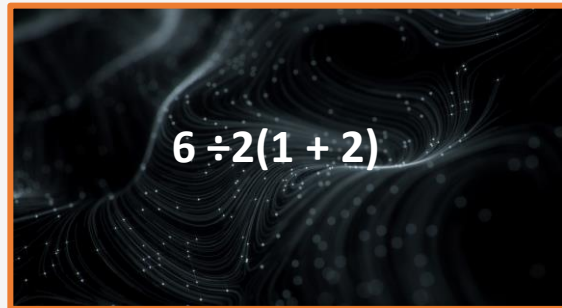2. Calculator (okay)

Experiment 4: **Computational test** (1) Create an expression using five non-repeating single-digit numbers. Between each digit insert randomly one of the four operators (+), (-), (x), and (/). Add a square exponent on the value immediate to left of the first (-). Group the two digits straddling that first (-). (2) reuse same numbers, same conditions, only difference being the need to scramble the operators, to prevent repeating the same positions. (3) Calculate the values for both expressions.

SUPPLIES: (A1 Experiment 4)

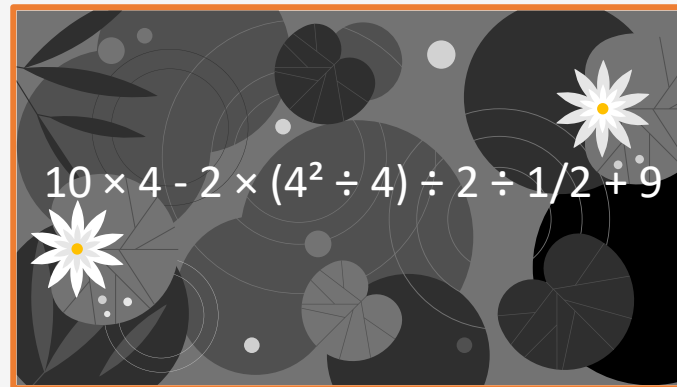1. Paper and pen/pencil
2. Calculator (okay)

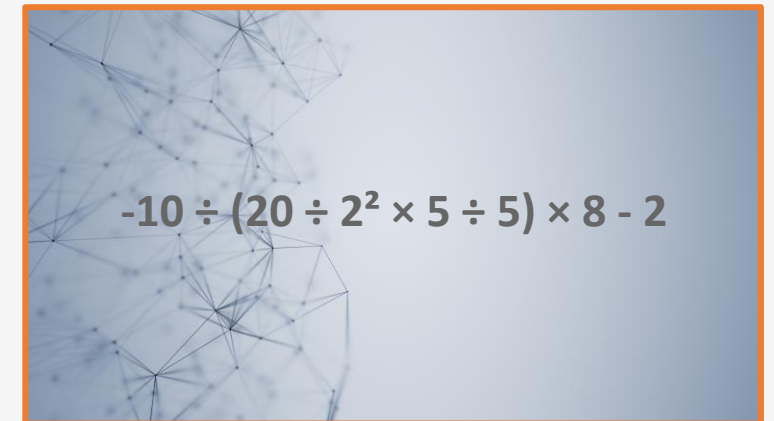# Finally: No.A1: Post-Test PoP-3 (need three of the three to advance)

Problem 1

Problem 2

Problem 3

$6 \div 2(1 + 2)$

$10 \times 4 - 2 \times (4^2 \div 4) \div 2 \div 1/2 + 9$

$-10 \div (20 \div 2^2 \times 5 \div 5) \times 8 - 2$

ANSWER KEY: See next slide.

SCORE: You want to get at least two of the three PoP-3 (Problems of the Day).

HONOR SYSTEM: Why fool self?

Answer Key: Post-Test (PoP-3)

No.1 **Answer = 1** ($6 \div 2(1 + 2) = 6 \div 2(3)$)

No.2 **Answer = 41** ($10 \times 4 - 2 \times (16 \div 4) \div 2 \div 1/2 + 9$), ($10 \times 4 - 8 \div 2 \div 1/2 + 9$), ($10 \times 4 - 8 + 9$), ($40 - 8 + 9$), ($32 + 9$).

No.3 **Answer = -18** ($-10 \div (20 \div 4 \times 5 \div 5) \times 8 - 2$), ($-10 \div (5 \times 5 \div 5) \times 8 - 2$), ($-10 \div (5) \times 8 - 2$), ($-2 \times 8 - 2$), ($-16 - 2$)

> If you **MISSED ONE** or **MORE**, you might want to return to this lesson, and studying it once again. If this make twice, revisit the Foundation skills. **Revisit this lecture again.**

Credit Source: Four Super Hard Order of Operations Problems and How to Solve Them (basic-mathematics.com)

Extensions and Extended Study

http://www.project2061.org/publications/articles/2061/sfaasum.htm   read   **Mathematics is an applied science,.... [Rutherford et.al. Science of all Americans, 1990]**

http://www.project2061.org/publications/articles/2061/sfaasum.htm   read   **Mathematics is an applied science,.... [Rutherford et.al. Science of all Americans, 1990]**

https://eric.ed.gov/?id=EJ781039   read   **Mathematics and the Learning Cycle: How the Brain Works As It Learns Mathematics**

Vocabulary/Definitions

Ambiance: Lighting, background sounds, etc.

Box-N-Wedge: An approach to documenting workouts in math.

Coefficient: The digit(s) in front the variable.

Computational test: A number crunching exercise.

Conceptualization: Understanding what is being contemplated.

Context: An understanding of the big picture, scope or what is contained.

Discovery Stage: Late stage in the Learning Cycle Model.

Exploratory Stage: Early stage in the Learning Cycle Model.

Flow: A state of mind you get into when fully engaged.

Imagination: Your wildest, unconstraint thoughts on a given topic/subject.

Integer: A whole number, in its natural form or opposite value form.

Intervention Stage: Mid-stage in Learning Cycle.

Investigations: Activity(ies) where students meet/discover concepts.

Learning Cycle: A Constructivist model for teaching and learning.

Lesson Plans: Document featuring a lesson and its procedures.

Locus: A set of numbers that satisfy a solution or complete a set.

Logical Power of Mind: Critical thinking, analyzing and solving.

Mathematics: An applied science.

Mindset: The state of mind at the present time, where one's head is.

Nake One(s): The missing digit in front a variable without a digit shown..

Objective of Mathematics: A logical system that provide truth, affirm facts.

PEDMAS: Parenthesis, Exponent, Division, Multiplication, Add, Subtract.

PEMDAS: Parenthesis, Exponent, Multiplication, Division, Add, Subtract.

Perspective: The understanding in command.

Scalar: Same as Coefficient, both are multipliers, as the multiply variables.

Two-Column Proof: A format used to demonstrate solutions step by step.

Variables): These are the alpha-numeric letters) found in math expressions.

Algebraic Expression: Relationship depicted by the terms in a set grouped

The END! Any questions?

Ready for Next Cookie?   Click here: **A2: Or Statements Model**

"Remember your PO, and always do good work."

- Mr. Jackson