

Understanding Mathematics

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A decorative graphic at the bottom of the slide consisting of a light blue wavy shape above a solid black horizontal bar, and a white area with fine diagonal hatching below the black bar.



UbD Prayer

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Dear God, we thank You for this wonderful day as we gather together as one community with one common goal.

May our prior knowledge be activated so that we will be able to recognize the truth in our preconceived ideas which would draw us closer to the things that You want us to accomplish.

Keep us motivated to further discover what You will for us through the inspiration of Your Word which we know will lead us to Your Kingdom.

Give us enduring understanding on our role as educators in the formation of the children entrusted to our care.

Send Your Holy Spirit to enlighten our minds and hearts to seek Christian solutions to the various essential questions we may have in our profession and in our personal life.

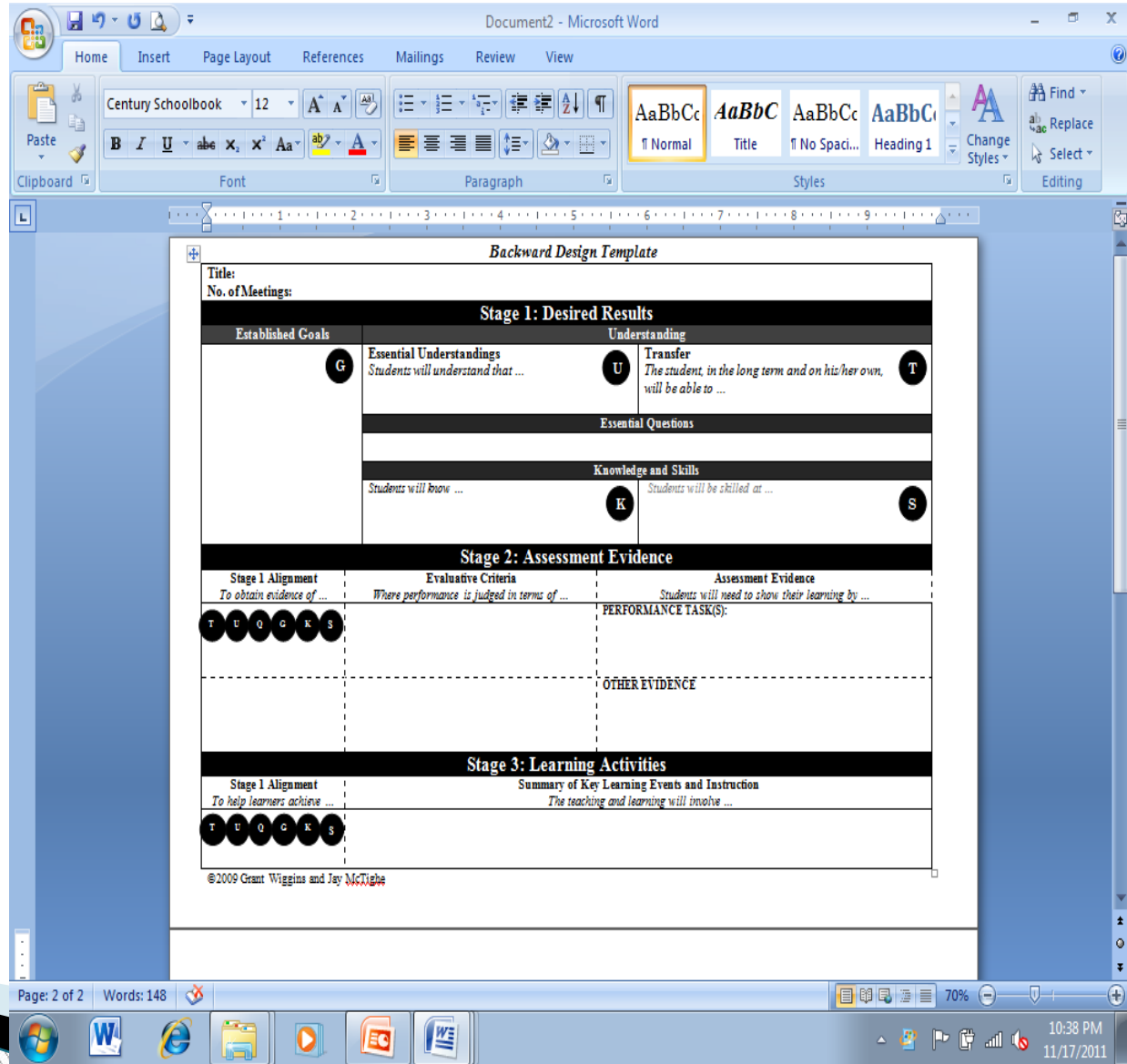
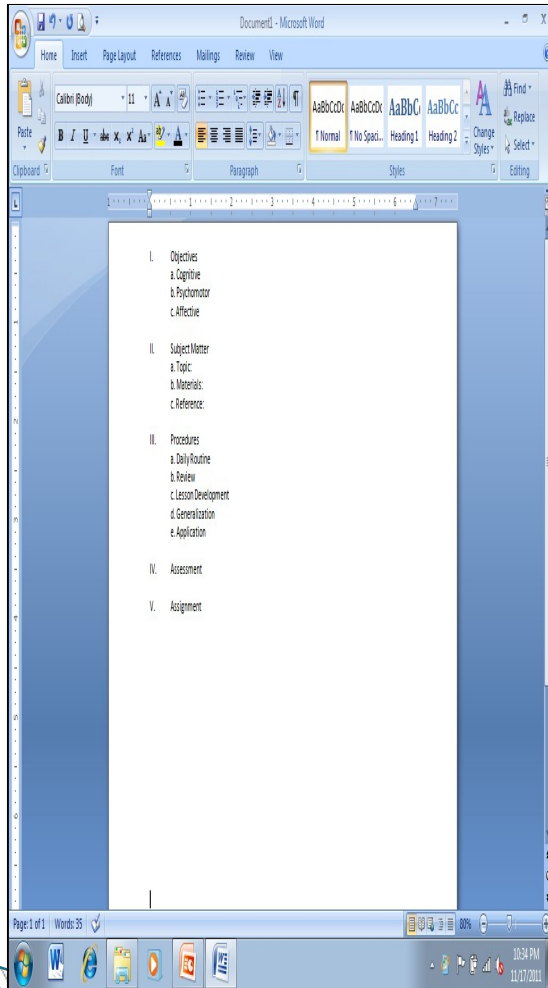
May we be able to acquire new knowledge with Your grace and make meaning of them so that we will be able to transfer to others the learnings that You teach us day by day.

Finally, may we have a good grasp of all the lessons that You give to us so that we will not have difficulty in performing our tasks of building Your Kingdom here on earth as we share these to our students, our families and our community.

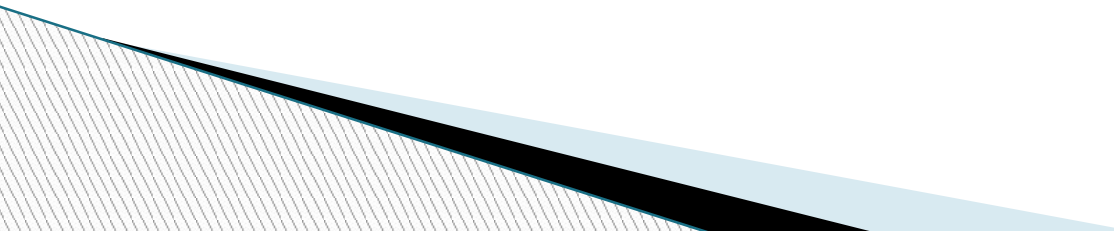
All these we ask in the Name of Our Lord Jesus Christ.

Amen.

How about these?



Objectives

- ▶ To review the basic concepts of the UbD framework;
 - ▶ To help teachers understand the theoretical framework of the Backward Design or the UbD (Understanding by Design); and
 - ▶ To critique and formulate Math Unit Plan based on the UbD framework.
- 



Dr. Worthington: “*We find a CURE*”.

Rogue: “Is it true? They can cure us?”

Prof X: “I believe it is true”.

Storm: “No professor, they can’t cure us. Do you know why? Because there’s nothing to be cured”.

Magneto: “They will forced that CURE on us”.

Dr. Worthington ✱ DepEd

CURE ✱ UbD

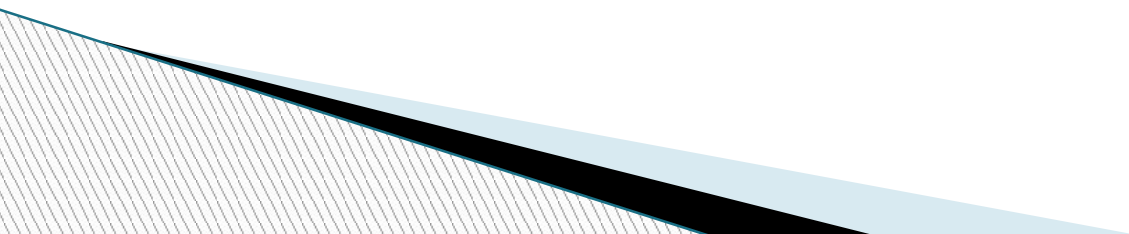
Rogue ✱ Student

Professor X }

Storm

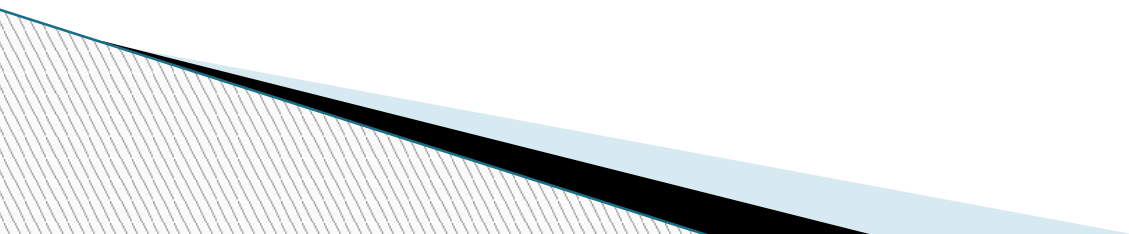
Magneto

teachers



Part 1

Review on the Basic Concepts of the Understanding by Design (UbD) Framework



21st Century Core Skills

▶ Digital Age Literacy

- Basic scientific, mathematical and technological literacies
- Visual and information literacies
- Cultural literacy and global awareness

21st Century Core Skills

- ▶ Inventive Thinking
 - Adaptability/ability to manage complexity
 - Curiosity, creativity, and risk-taking
 - Higher-order thinking and sound reasoning

21st Century Core Skills

- ▶ Effective Communication
 - Teaming, collaboration and interpersonal skills
 - Personal and social responsibility
 - Interactive communication skills

21st Century Core Skills

- ▶ Higher Productivity
 - Ability to prioritize, plan and manage for results
 - Effective use of real-world tools
 - Ability to create relevant, high-quality products

What is the new design of the curriculum?

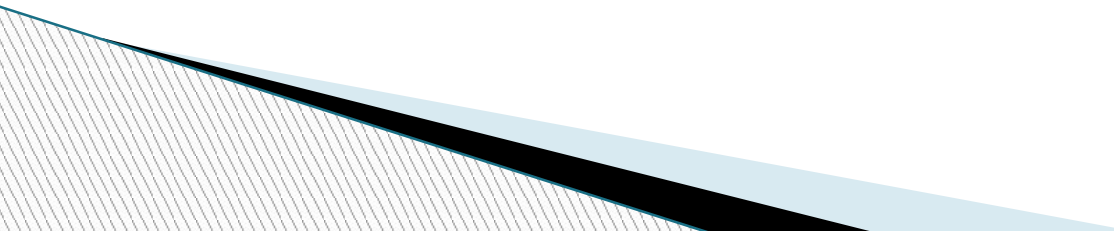
▶ Backward Design

◦ Understanding by Design (UbD)

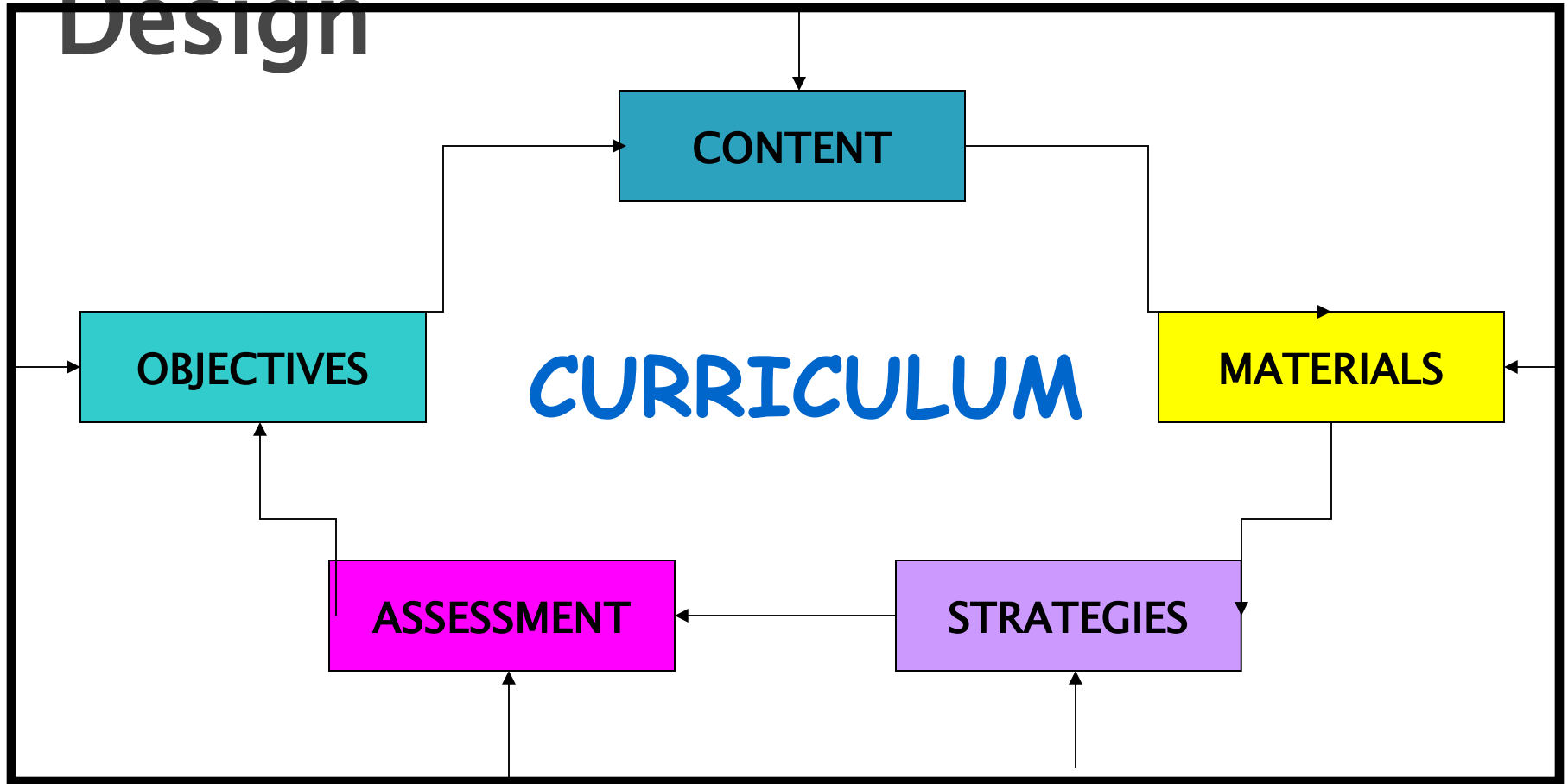
愬 is a framework for designing curriculum units, performance assessments, and instruction that lead your students to deep understanding of the content you teach.

愬 expands on "six facets of understanding", which includes students being able to explain, interpret, apply, have perspective, empathize, and have self-knowledge about a given topic.

– Grant Wiggins and Jay McTighe

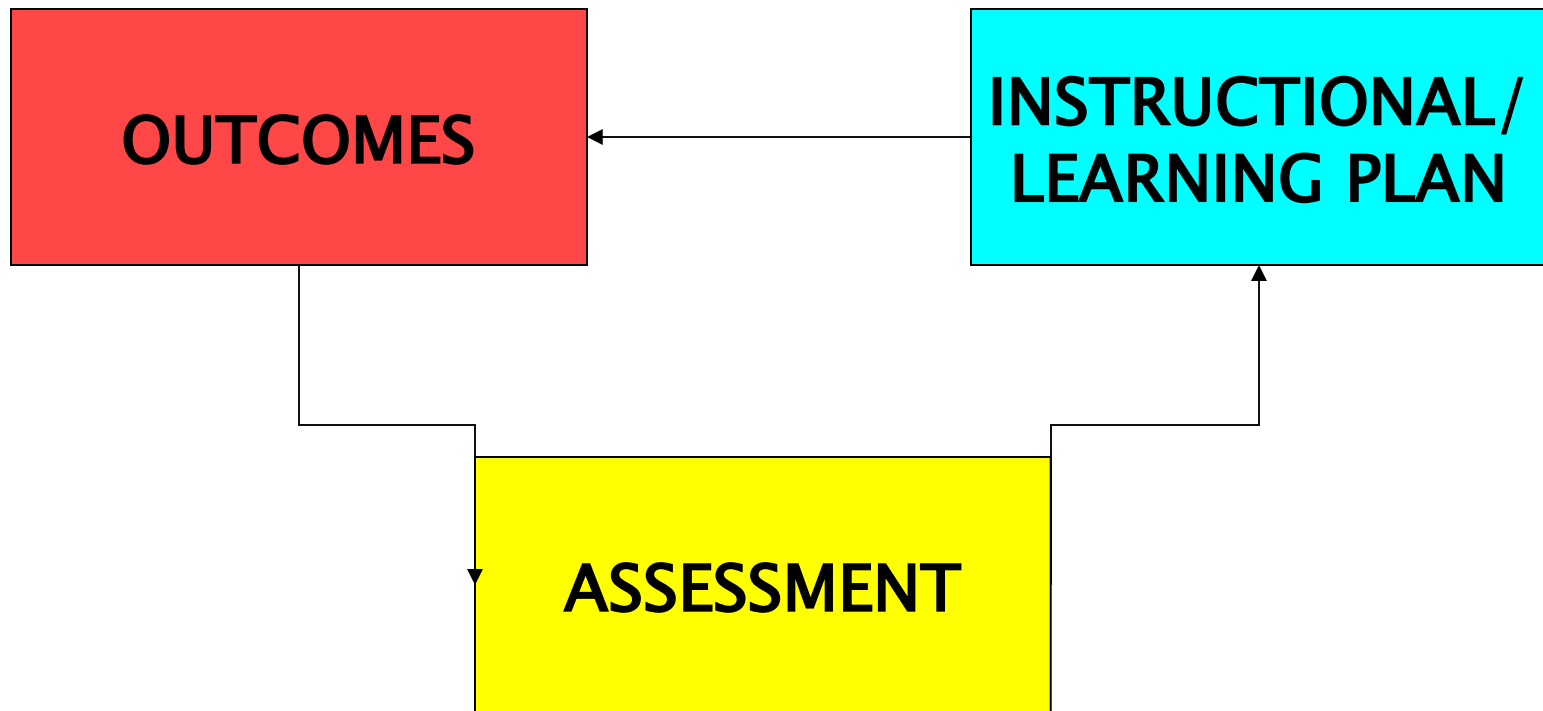


Conventional Curriculum Design

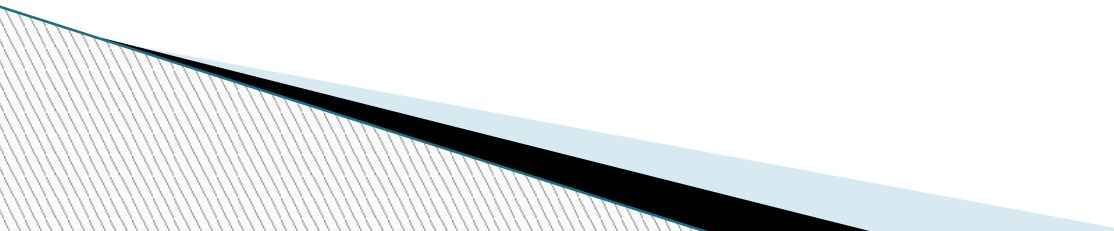


FEEDBACK

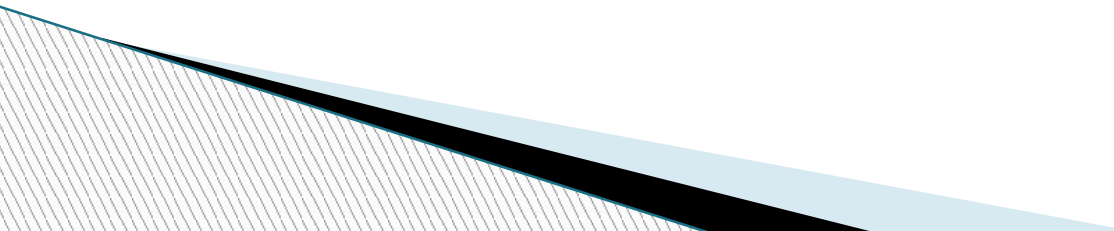
Backward Design (Understanding by Design – UbD)



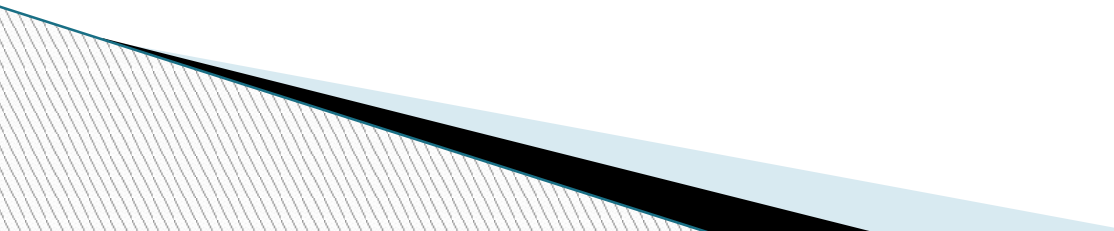
Results/Desired Outcomes

- ▶ Defines what students should be able to know and do at the end of the program, course, or unit of study.
 - ▶ Generally expressed in terms of overall goals and specifically defined in terms of content and performance standards.
- 

Assessment

- ▶ It defines acceptable evidence of student's attainment of desired results.
 - ▶ It determines authentic performance tasks that the student is expected to do to demonstrate the desired understandings.
 - ▶ It defines the criteria against which the student's performances or products shall be judged.
- 

Instructional/Learning Plan and Activities

- ▶ The learning activities are aligned with the standards and are designed to promote attainment of desired results.
 - ▶ They include instructional resources, both digital and non-digital that students will need to perform the activities and produce the products and performances.
- 

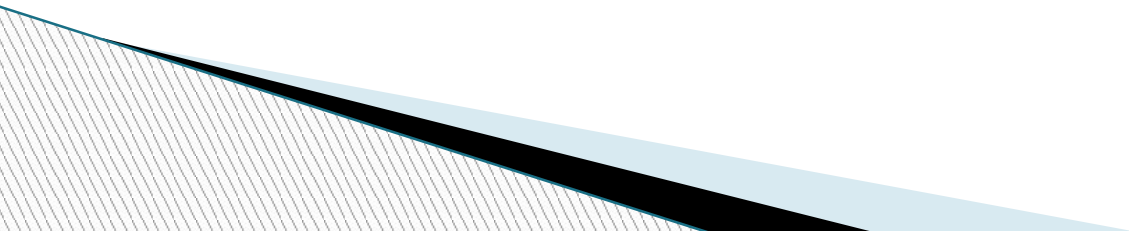
Based from the two frameworks, can you already spot the difference?

The screenshot shows a PowerPoint slide titled "Conventional Curriculum Design". The diagram is a flowchart with "CURRICULUM" in the center. It is surrounded by several interconnected boxes: "CONTENT" at the top, "OBJECTIVES" on the left, "MATERIALS" on the right, "ASSESSMENT" at the bottom left, and "STRATEGIES" at the bottom right. A large "FEEDBACK" box is positioned at the very bottom, with arrows pointing upwards towards the other components. The slide is part of a presentation with 19 slides visible in the outline on the left.

The screenshot shows a PowerPoint slide titled "Backward Design (Understanding by Design - UbD)". The diagram is a flowchart with "ASSESSMENT" in a yellow box at the bottom. Two boxes at the top, "OUTCOMES" (red) and "INSTRUCTIONAL/LEARNING PLAN" (cyan), have arrows pointing down to "ASSESSMENT". There are also arrows pointing from "OUTCOMES" and "INSTRUCTIONAL/LEARNING PLAN" to each other. The slide is part of a presentation with 19 slides visible in the outline on the left.

What are Essential Questions?

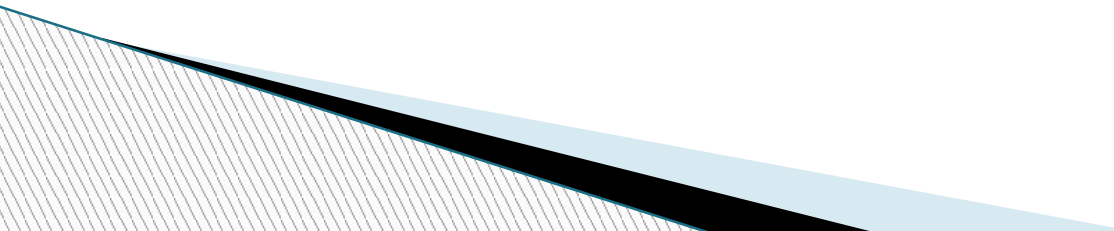
- ▶ These are open-ended, provocative questions that spark thinking and further inquiry into the essential meanings and understandings.



What is Enduring Understanding?

- ▶ This is the big idea at the heart of the discipline.

A student who has an understanding of a current event should be able to do the following:

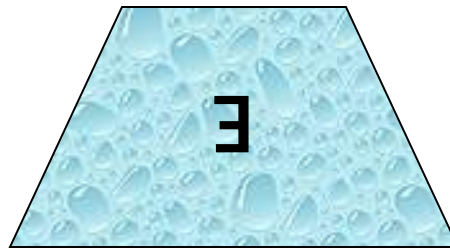
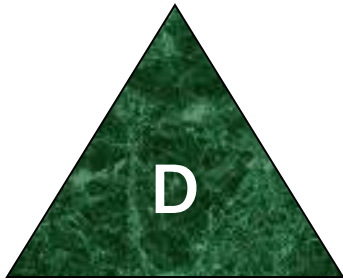
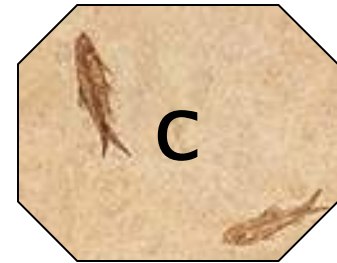
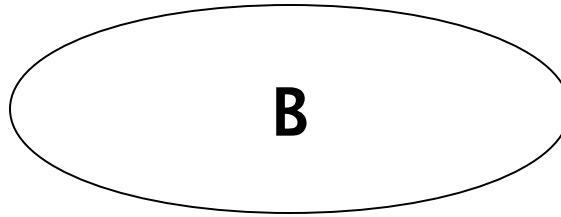
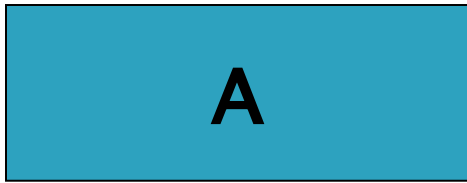
- ▶ Explain the event
 - ▶ Interpret it
 - ▶ Apply it
 - ▶ Give his/her own perspective about the event
 - ▶ Show empathy with the people who figure in the event
 - ▶ Reveal self-knowledge about the event
- 

What is the role of APK?

- ▶ Individual's unique perceptions, learned beliefs, and prior learning experiences provide a “filter” for learning new information and interpreting “reality”.

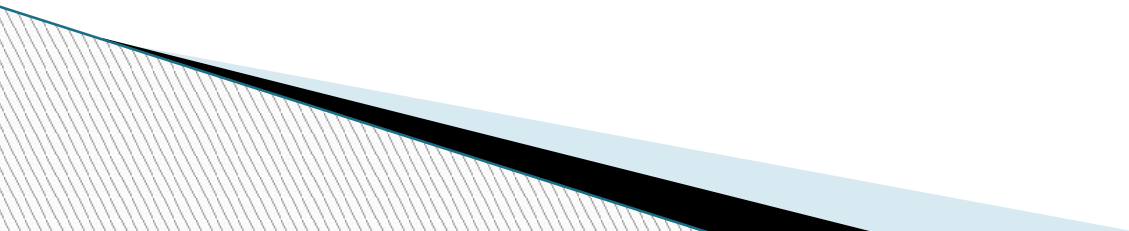
Math 3: Polygons

- ▶ Is an oblong a polygon?
- ▶ Which of the following figure is an oblong?

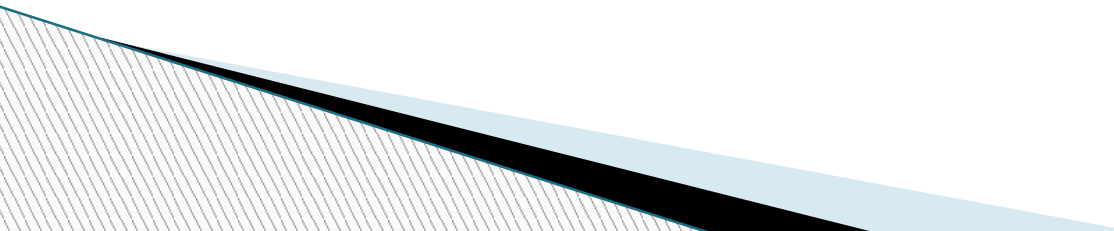


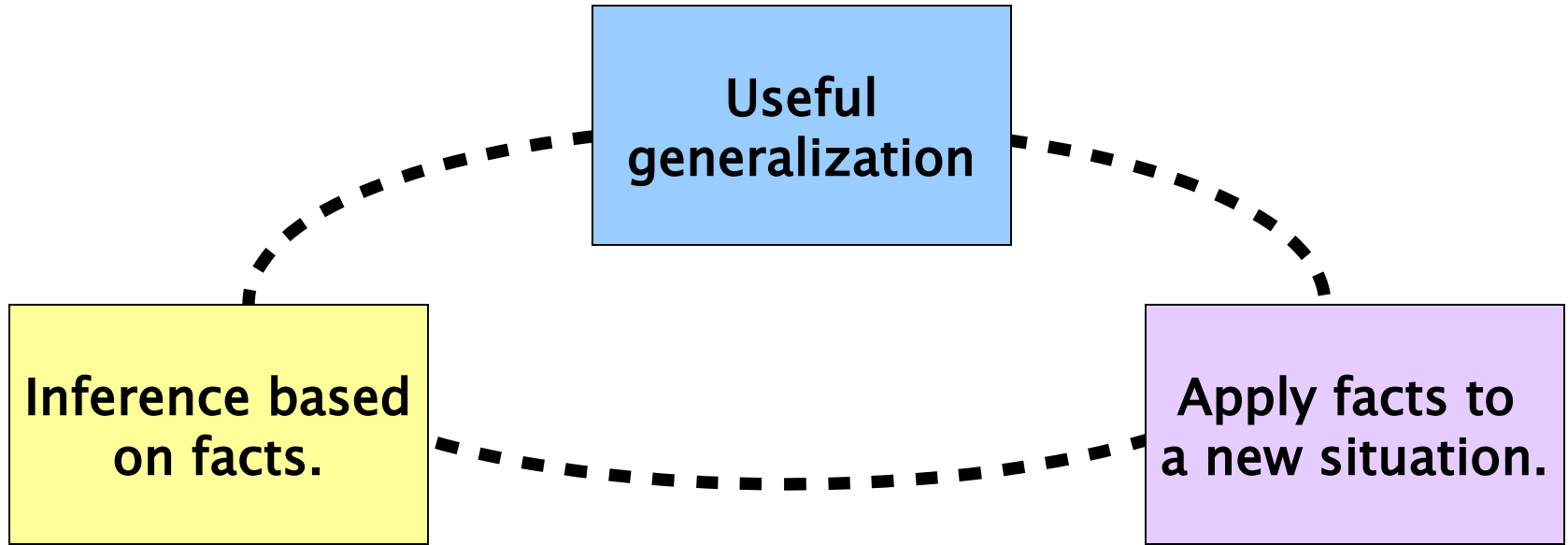
Definition of an Oblong

- ▶ Deviated from a square, circle or sphere elongated in one dimension.



What is the role of motivation?

- ▶ Leads to increased effort and energy
 - ▶ Increases initiation of, and persistence in, activities
 - ▶ Enhances cognitive processing
 - ▶ Determines what consequences are reinforcing
 - ▶ Leads to improved performance.
- 

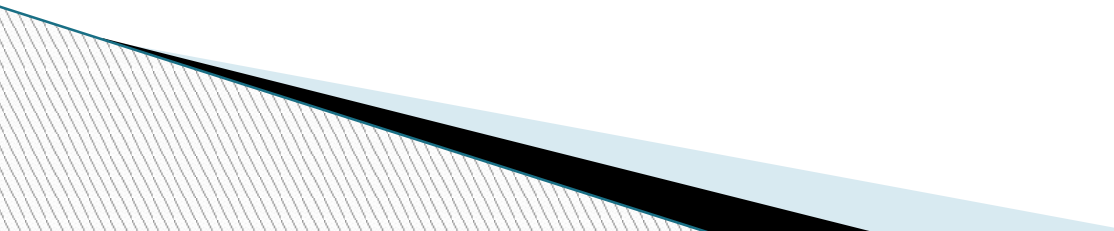


UNDERSTANDING

How will you know if you are already forming the BIG IDEA?

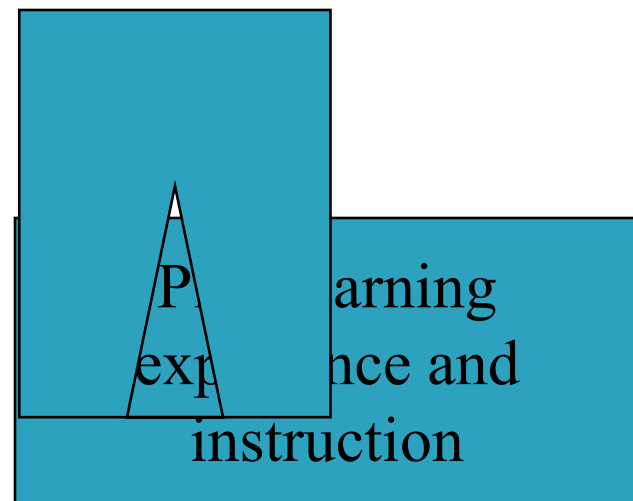
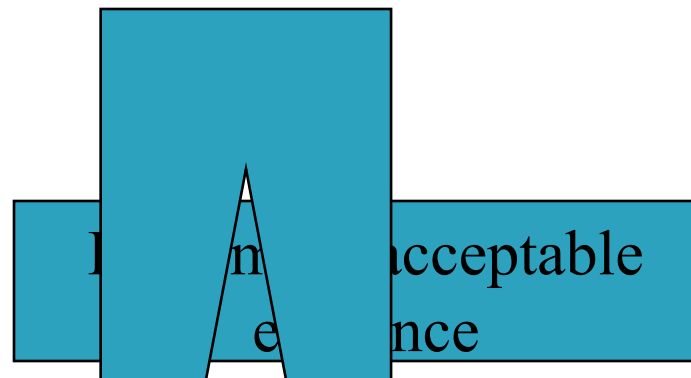
- ▶ If you will be able to answer the question...

SO WHAT!?!



A BACKWARD DESIGN MODEL

Identify desired results



The Big Ideas

ENDURING UNDERSTANDING



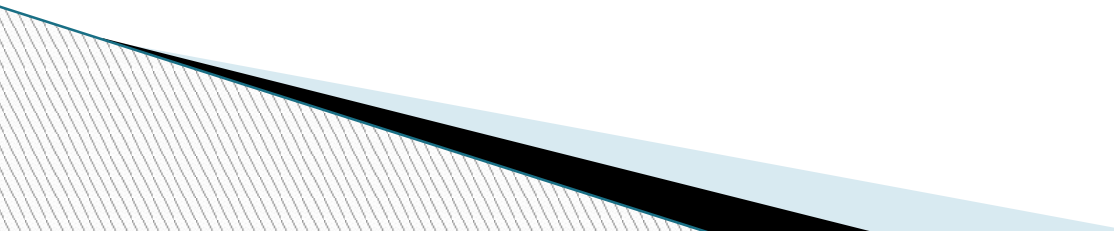
An “understanding” is enduring if it –

- ▶ is the moral of the story of the unit – an important inference the learner is helped to draw
- ▶ is transferable to other lessons, subjects, context
- ▶ is usually not obvious, may be counter-intuitive – and therefore prone to misunderstanding
- ▶ is an insight, not a truism
- ▶ is a specific generalization, a full sentence proposition “the students will understand that”

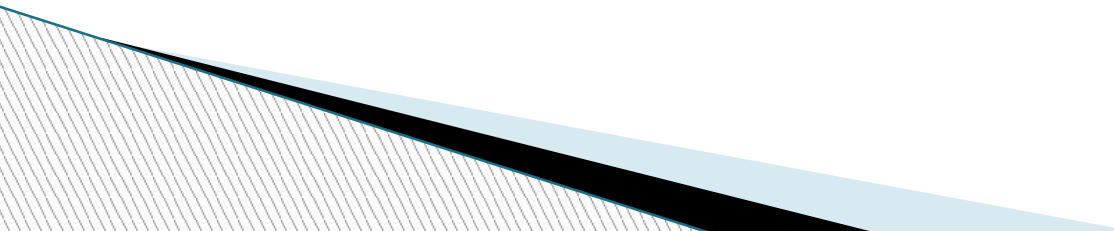
Big Ideas may be expressed in the form of QUESTIONS

We call these

ESSENTIAL QUESTIONS

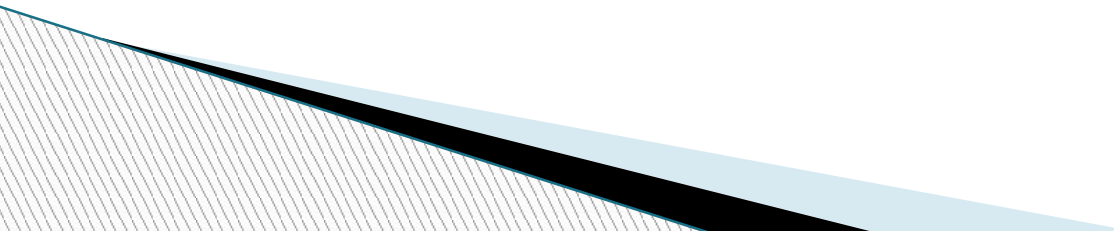


Knowledge and Skills

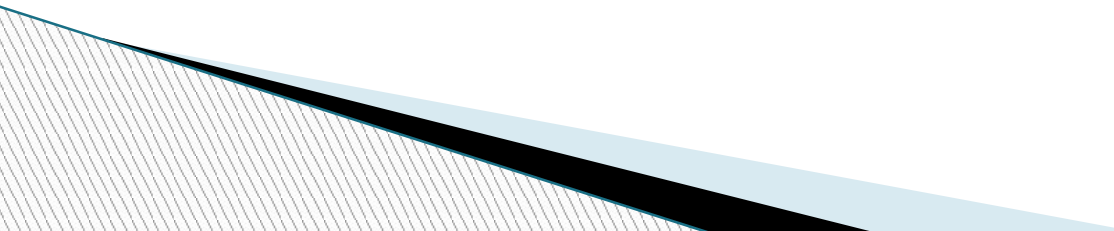
- ▶ states what students should know and be able to do as a result of the unit
 - ▶ reflects both the targeted knowledge and skill and the enabling knowledge and skill implied in the understanding-related goals.
- 

Stage 1 Desired Results include:

- ▶ Established goals
 - key learning competencies
 - key program / course objectives
 - ▶ Long-term transfer goals
 - At the end of the unit, the students should be able, on their own, to

(answers to “why?” and “what can you do with this?” questions)
- 

Stage 1 Desired Results include:

- ▶ Essential questions
 - to be continually explored
 - ▶ Enduring understanding
 - ▶ Enabling knowledge and skills
 - what students should know and be able to do as a result of the unit
 - the targeted enabling knowledge and skills implied in the long-term transfer goals, EU and EQ
- 

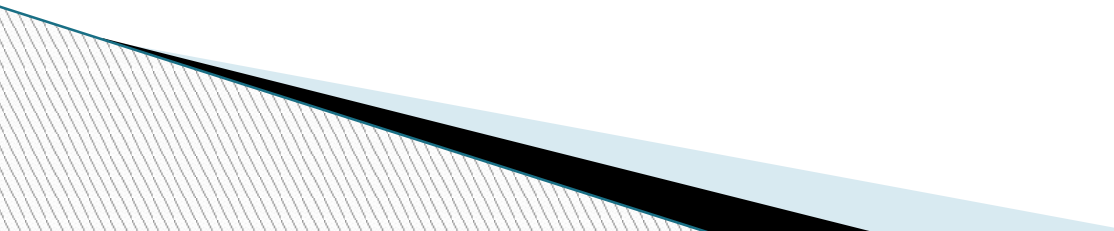
Stage 2: Valid Evidence

If . . .

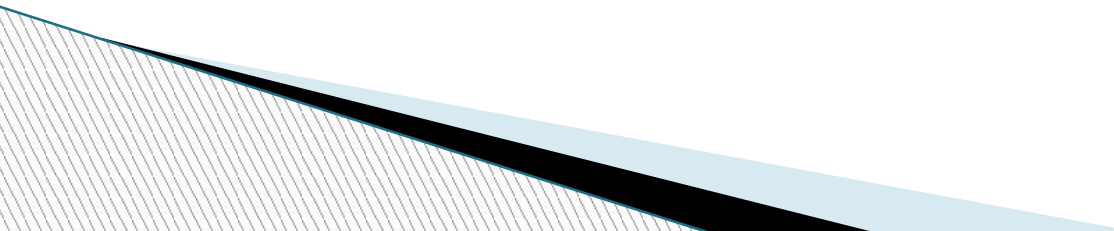
That is the goal

Then . . .

What is our evidence that it has been reached

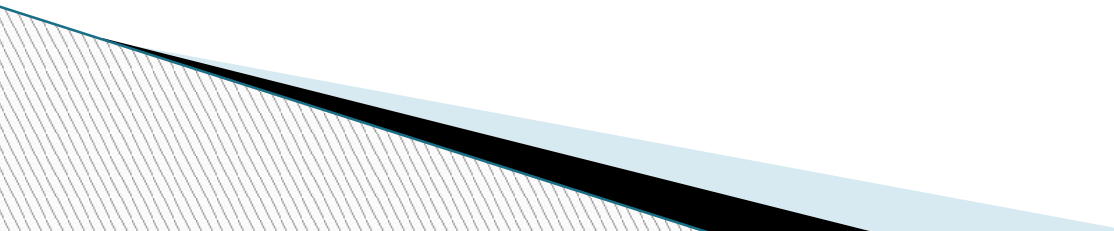


Stage 3: Learning Plan

- ▶ **can be helpful thought though in terms of WHERETO:**
 - **Where** is the lesson's objectives headed?
 - **Hook** the students with engaging work
 - **Equip** for understanding, experience and explore the big ideas
 - **Rethink** options, revise ideas and work
 - **Evaluate** your work and adjust as needed
 - **Tailor** the work to reflect students' needs, interest, styles
 - **Organize** the work flow to maximize in-depth required by the goals, not the teaching approach that is most comfortable for or familiar to the teacher
- 

Part 2

Sample Math UbD Plan



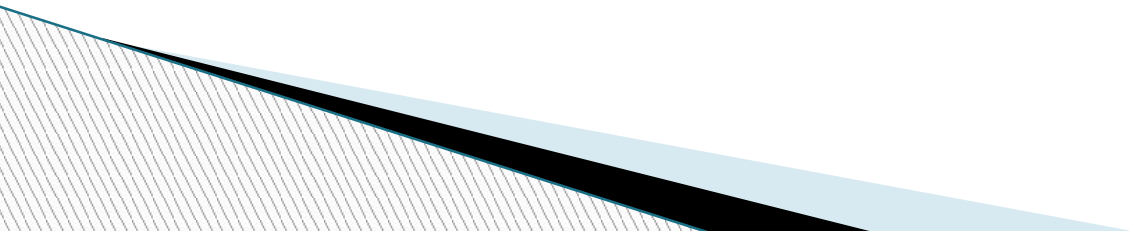
Stage 1

Stage 2

Stage 3

Part 3

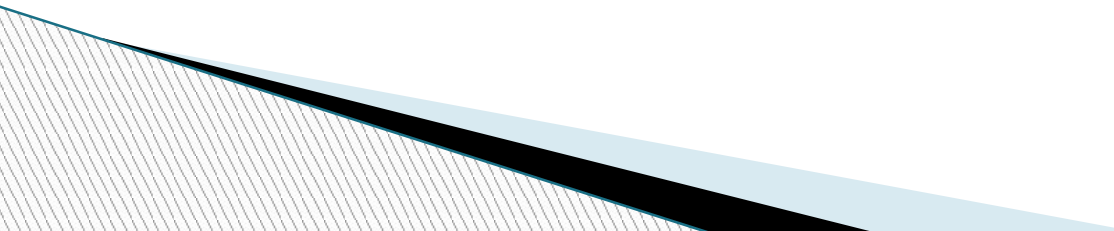
Focus on Transfer Task



Stage 2: Transfer task(s)

- ▶ provide evidence of understanding because we have to see if the learners can apply and adapt their learning to various problems, situations and context
- ▶ should be as faithful as possible to real-world context, demands, messiness, audience and purposes
- ▶ should be written in GRASPS format to make assessment tasks more authentic and engaging
- ▶ must be assessed using valid criteria and indicators, reflective of not only quality performance but related to the desired results of Stage 1
- ▶ reflects the 6 facets of understanding: explanation, interpretation, application, ...

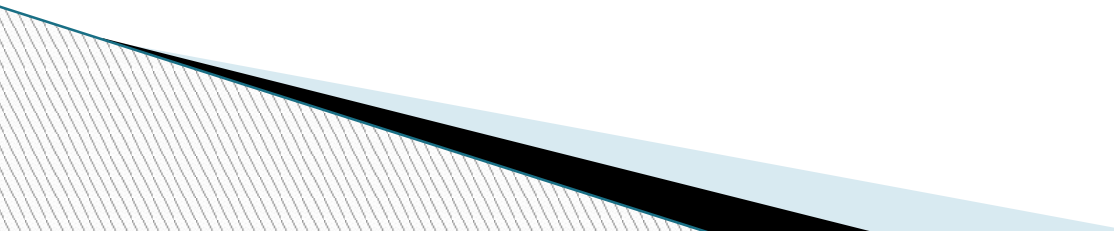
Applying prior learning to a / an

- ▶ novel and increasingly new and unfamiliar-looking task
 - ▶ increasingly challenging context and situation in terms of purpose, audience, dilemmas, etc.
 - ▶ in context, fuzzy and messy but REAL
 - ▶ often, no black and white solutions
 - ▶ no prompts nor scaffolding. What do you do? When do you do it?
- 

It should be AUTHENTIC –

- ▶ real problems, not simple exercises
- ▶ real questions with no easy or obvious answers, not leading questions

It should be A CHOICE FROM A REPERTOIRE –

- ▶ a task requiring multiple skills and an array of knowledge
 - ▶ the focus is on STRATEGY – Can the student wisely choose from all available knowledge
 - ▶ A more difficult activity does not necessarily mean it is a “bigger idea”
- 

Workshop

- ▶ Stages 1 and 2

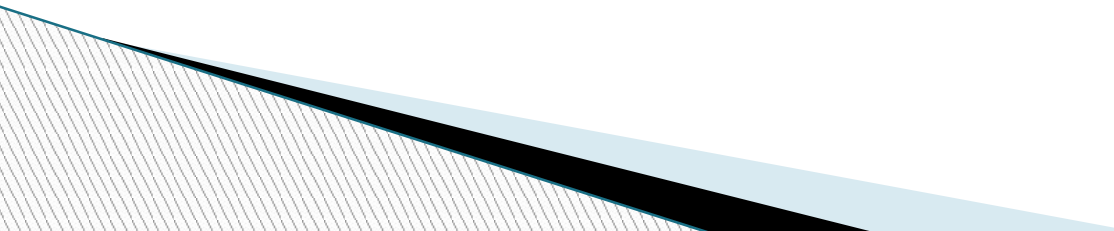
Part 4: Having an EAR

- ▶ Mathematics is perhaps the most difficult subject as perceived by the students. To be able to help students understand Mathematics, one should have an EAR...

engaging

activities &

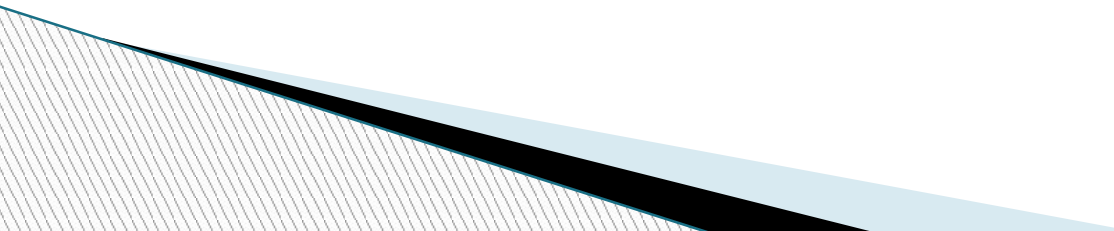
realias



Numbo

- ▶ Choose a number from 1 to 24.
- ▶ Write these numbers on the numbo card.

This game can be used as a springboard in teaching probability.



ZPE (Zero or Perfect Exam)

- ▶ A Test of Speed and Accuracy
- ▶ Example: Which of the following equations have a negative slope? (in 15 sec)

a. $x - y = 11$

f. $2(7x - y) = 14$

b. $2x - 8 = -3y$

g. $-3(11y - 4) = 10x$

c. $-3 - 4x = -5y$

h. $3(4 - 2y) = 7x + y$

d. $6x - 7y = 8y + 9x$

i. $9(3 - x) = 6y - 3x$

e. $4y - 3(x - 2y) = 0$

j. $11x - 2y + 3 = 0$

Finger Math

- ▶ Find the product in each item in not more than 10 seconds per item.
 - a. 1257×9
 - b. 23456×9
 - c. 135789×9
 - d. 1234578×9

Magic Math

Find the product in each item without using the long method:

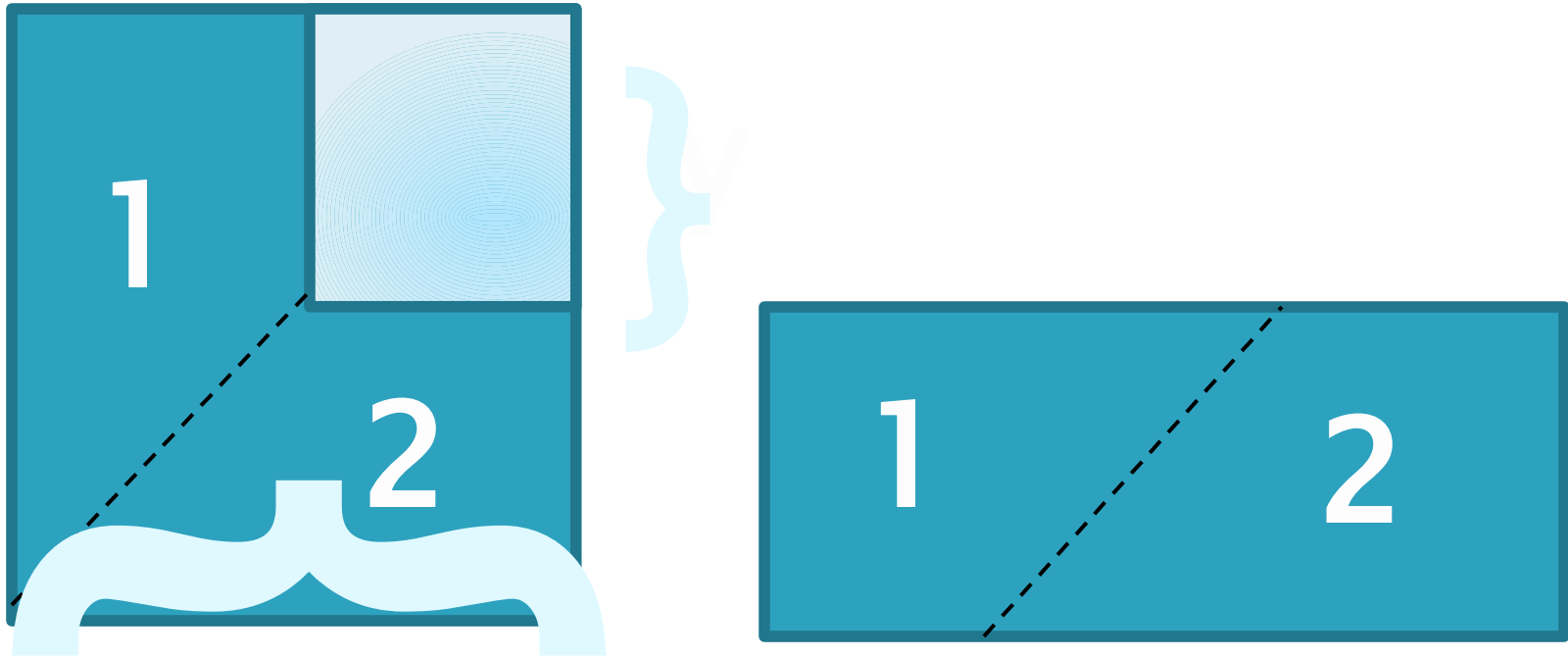
a. 93×96

b. 94×98

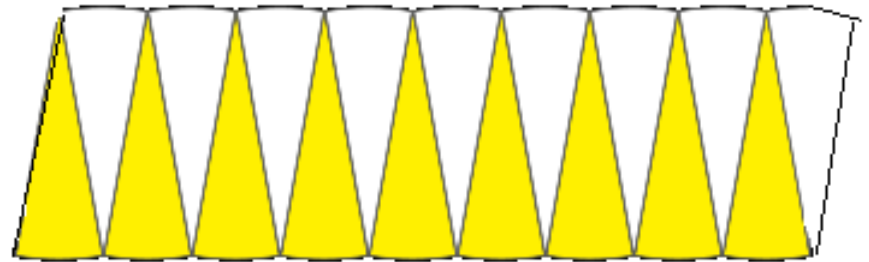
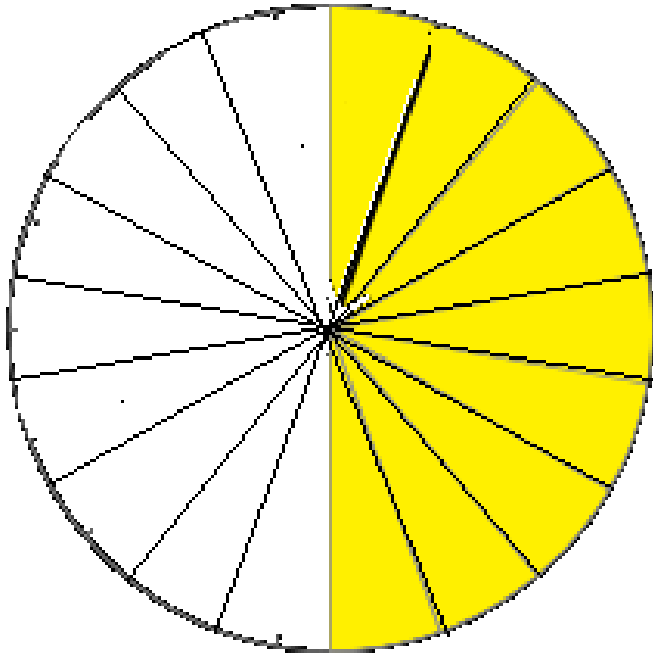
c. 92×99

d. 95×97

Algebra Tiles



Circlelogram



Himig Sipnayan

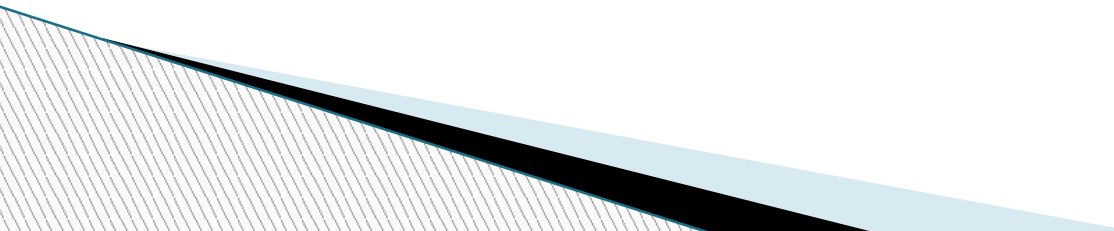
“Algebra Walk”

Look at the x , look at the y

Will these make now my Cartesian alright?

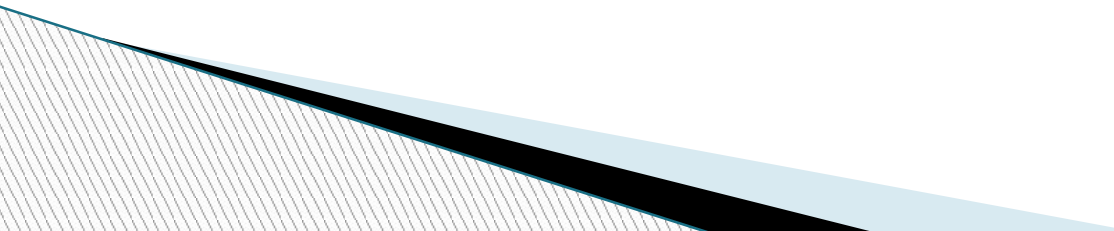
Where can I graph all the points

The points on a table

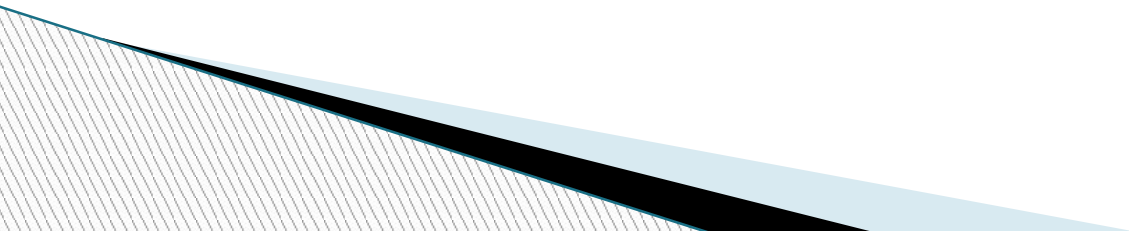


Look at this graph, isn't it clear
Why can't I see the pattern I need?
What do I need to form? (Oh... line)

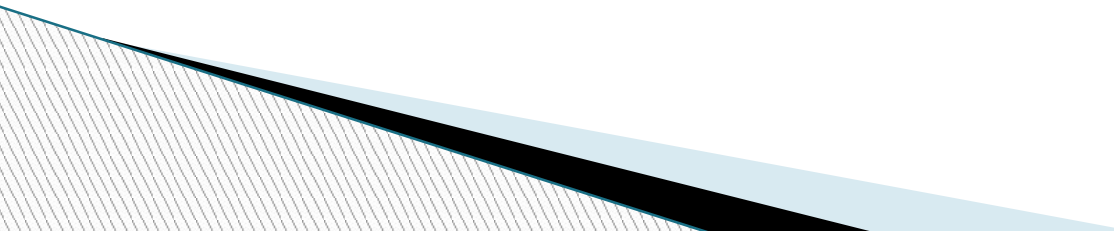
I need an x and I need a y
The change in y over change in x and what,
What do you call that again? (Slope)



Run for the x , rise for the y
But you should see the slope with its sign
Wondering this, wish it would seem
An Algebra Walk



Part 5: Tips

- ▶ Watch TV!
 - ▶ Observe the observer.
 - ▶ Learn to listen and listen to learn.
 - ▶ Benchmark with other schools (but do not ask their starting salary 😊)
 - ▶ Pray... Just like what your students usually do whenever you give them exams.
- 

Parting Words

“No good things will come if you won’t start things better.”

– Rommel S. Quiming