THE OHIO STATE UNIVERSITY

Mathematics Teaching Institute: Day 4

Sponsored by Ohio Department of Education

Time	Activity
By 9:00	Sign in
9:00	13 Rules (“Why?” and “Why not?”) & Nix the Tricks
10:30	Creating and adapting tasks
12:00	Lunch
12:45	Geometry
2:30	Problem Posing with Children’s Literature

Block 1: 13 Rules & Nix the Tricks

Consider the “Rule” that your group received.

- Why has it happened? What is the possible effect (why does it “expire?)?
- How can you prepare to respond if a student in your class believes this “rule”?
- What could you do to prevent the confusion?

Nix the Tricks:

Pull up the pdf. Which “trick” maps onto your “rule”? Is there one? Or do you find an elementary grades K-3-relevant “trick” that isn’t one of a one of the “13 Rules”

Which "why" mathematical questions have we answered? Which do we have yet?

- What should we do with them?

Mathematics Teaching Institute
July 27-31, 2015

Block 2: Adapting Tasks

Post your task on a piece of chart paper. We'll come back to these after our next activities.

The Candy Bar Problem

Chris has 13 candy bars. She wants to share them among 8 children. How many candy bars will each child get if each child gets the same amount of candy and all of the candy bars are used?

You do **not** know how to complete operations with fractions (+, -, x, /).

You **do** know what fractions are and how to write some of them.

Work with a partner to solve the problem at least two different ways.

Represent your solving strategies on chart paper.

What is a rich problem?

http://mathforum.org/~claire/richproblems/WhatisRich.html

- The problem offers multiple entry points over a range of readiness levels, allowing most students to be successful.
- The problem is approachable through a variety of learning styles — visual/spatial, analytical, kinesthetic, etc.
- The problem invites multiple solution strategies.
- The problem invites multiple representations: manipulatives, tables/lists, diagrams, graphs, math models (equations).
- The problem can be used to introduce new skills and concepts and give meaning to them.
- The problem involves meaningful math content — rich in concepts and connections and providing a foundation for future mathematics.
- The problem invites higher order thinking.
- The problem facilitates the development of mathematical language and discourse.
- The problem is presented in a context that is interesting and engaging to students and that allows them to make use of prior knowledge and experiences.
- The problem offers opportunities for collaboration.
- The problem provides opportunity for practice with important skills and procedures.
- The problem has potential for reflections, extensions, and further questions.

Rich Task

Consider the task you posted on a Post-It note. Is it a rich task?

- Yes: as written on the post-it, it meets the conditions of a rich task
- Maybe: it could be with a minor change or more specification
- No: but here's why it's a valuable task
- No: but here's how it could become a rich task.

Justify to your colleagues.

Do you agree or disagree? Why?

Start with a task you would consider using in Week One of your school year.

-Adapt the task for the students in your respective classroom by removing constraints and overly guiding step-by-step instructions.

-- Make it a RICHER problem or even a RICH problem!

-What do you feel students will do when they encounter your adapted task?

-Be prepared to share your original and adapted-task with your table groups. This is a collaborative process!

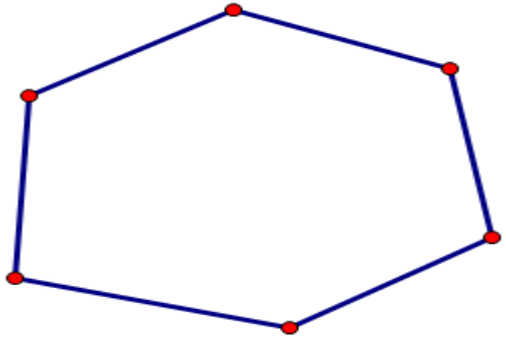
"What is the most cognitively challenging mathematics task you've had students do?"
- Compare to your adapted task

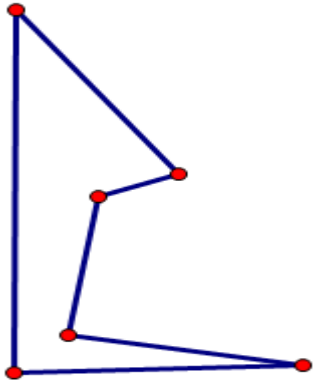
Lunch: Bon Apetit!

Block 3: Geometry: Polygons

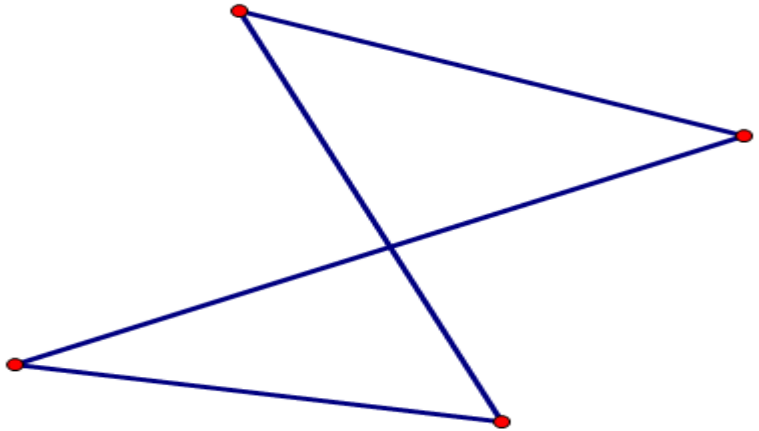
What Is a Polygon?

Is this a polygon? … Is this?





Is this a polygon?



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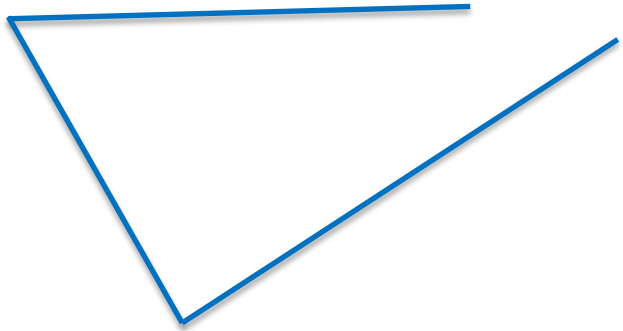

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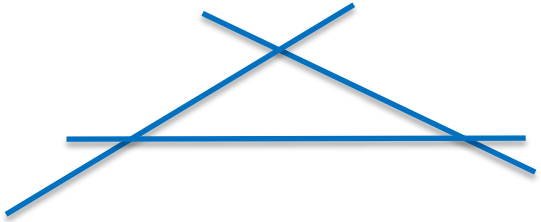

Is this a polygon?

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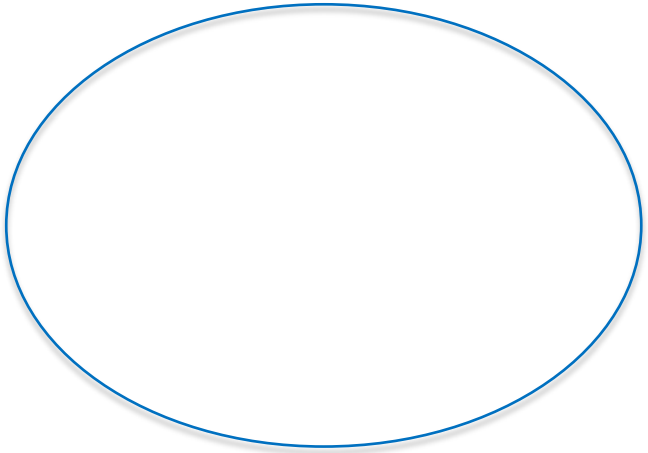
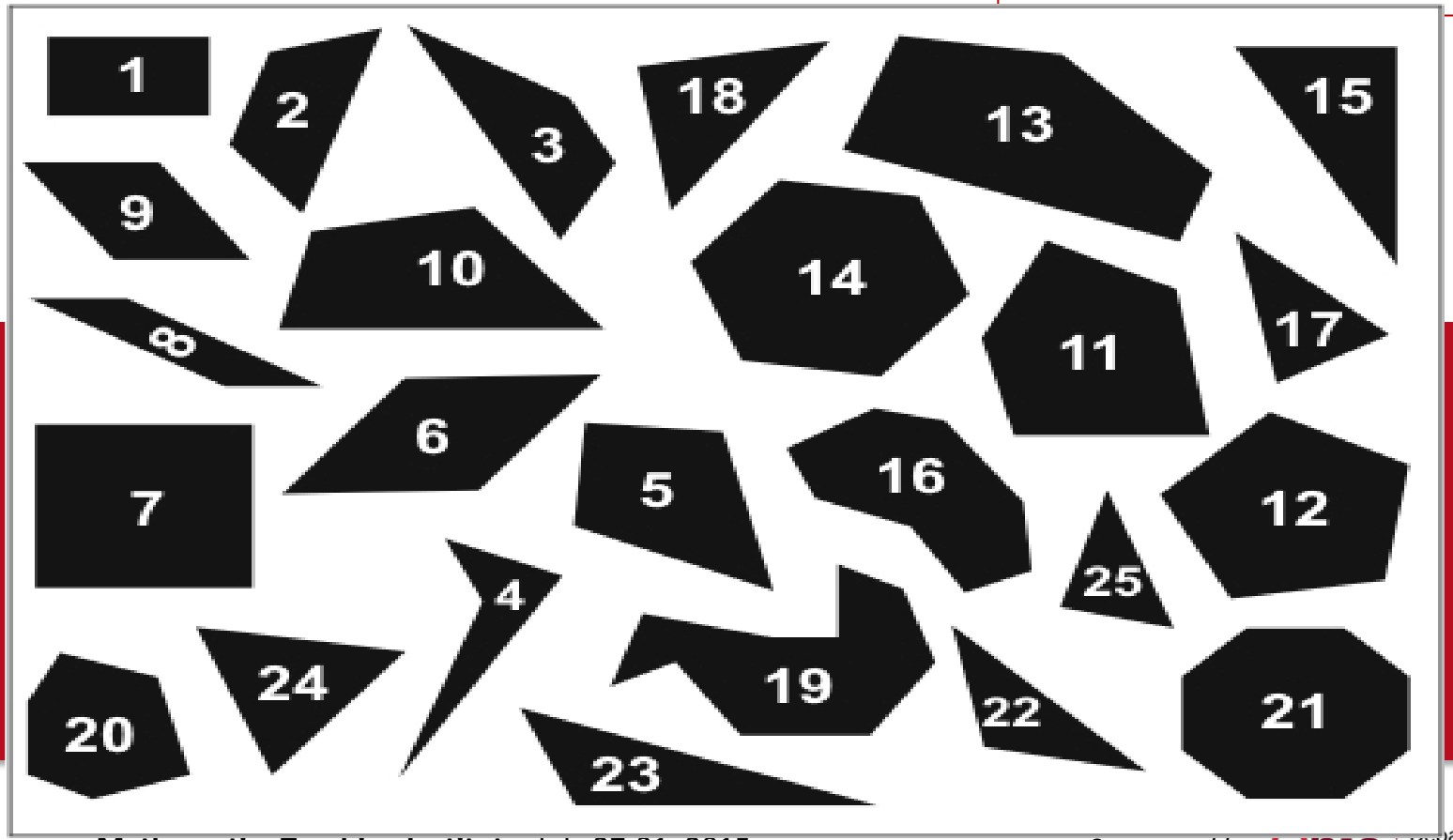


a polygon is a closed plane figure that is bounded by a finite chain of non-colinear straight line segments that do not cross each other.

Sorting Polygons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23

Look through the student work.

What do the correct reveal? What do they not?

What do the incorrect responses reveal? What do they not?

- Number of sides
- Regular and non-regular
- Convexity and non-convexity
- Symmetry and non-symmetry
- Equiangular and non-equiangular
- Equilateral and non-equilateral

Consider the following definitions of convex polygons proposed by a group of students during a class session.

A polygon is convex if

Student A: All diagonals of the polygon lie in its interior.
Student B: None of the lines that contain the sides of the polygon pass through its interior.
Student C: Every interior angle is less than 180°.
Student D: The exterior angle sum of the polygon is larger than 360 degrees.
Student E: There exists at least one line segment which connects two points in the interior of figure falls outside the polygon.

- **Which of the definitions listed above would effectively distinguish convex from non-convex polygons?**
- **Would the converse of each statement be true as well?**
- **Can each statement be written in an "if and only if" form?**

A textbook defines parallelogram in the following manner:

"A quadrilateral is a parallelogram if and only if it has two pairs of parallel sides."

(1) What does "if and only if" in the above definition mean?

(2) What would be a better definition?

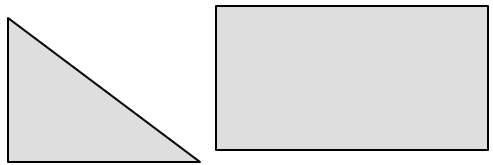
a. A quadrilateral is a parallelogram if and only if it has two pairs of parallel sides

b. A quadrilateral is a parallelogram if and only if its diagonals bisect each other.

(3) what's the consequences of each definition?

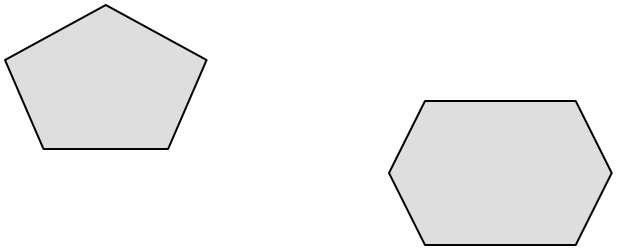
Basic Shapes

What are (or could be) the names of these shapes? (consider all possibilities)



What about a:

- 7-sided shape?
- 8-sided shape?
- 9-sided shape?
- 10-sided shape?



Shape Names

Triangle	Rectangle	Pentagon	Hexagon
San jiao xing,	Si bian xing,	Wu bian xing,	Liu bian xing
(Three angle shape)	(Four sided shape)	(Five sided shape)	(Six-sided shape) etc.
Ucgen	dortgen	besgen	altigen
Three side	four side	five side	six side

Create a Geometry Talk aligned to the grade your group is assigned.

Planning with Children's Literature

Refer to the Mathematical Practices and Teaching Practices

Select one or more books and plan an integrated activity.