

# GEOMETRY TASKS THAT DEVELOP STUDENT PROBLEM SOLVERS

Grades 3 - 5  
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Jim Vidak, County Superintendent of Schools

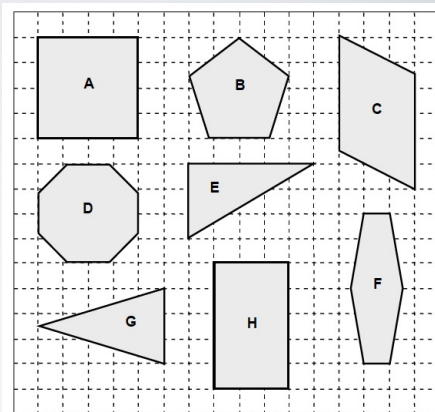
## GOALS

- Share and discuss ideas for promoting student problem solving
- Explore the CCSSM standards and ideas from the Geometry progression through hands-on activities and discussion

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## INTRO ACTIVITY

- Get into groups of the same shape.
- Name your shape.
- What other names could your shape have?
- Count the number of lines of symmetry.







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## FOUR CORNERS

1. Shapes with at least one line of symmetry and no parallel sides.
2. Shapes with at least one line of symmetry with parallel sides.
3. Shapes with parallel sides with no lines of symmetry.
4. All other shapes.

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## PROBLEM SOLVING

What is problem solving?  
How do you promote problem solving in your classroom?

## PROBLEM SOLVING

- Problem solving is a goal of learning mathematics and also a major part of doing so. It should not be an isolated part of the curriculum, but should involve all content standards.
- Students are problem solving when the task is novel to them and the answer is not immediately known. Several solution pathways exist and students apply and adjust their strategies as they solve.

## STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

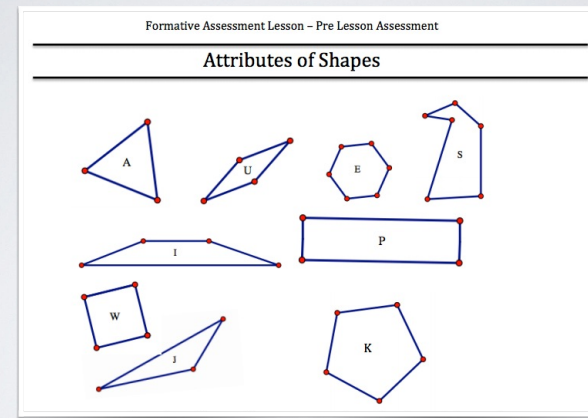


## EXERCISES VS. PROBLEMS

- Exercises - A question that you know how to resolve immediately, whether you get it right or not depends on how you apply specific techniques
- Problems - Demand much more thought and resourcefulness before the right approach is found, you need to puzzle out which techniques to use

The Art and Craft of Problem Solving, Paul Zeitz

## ATTRIBUTES OF SHAPES



<http://teresaemmert.weebly.com/elementary-formative-assessment-lessons.html>

## SHAPE SORT

- Use your shape cards to create groups of shapes that share a defining attribute.
- Name each of your groups.
- Make connections between groups whenever you can.

## GOALS FOR ELEMENTARY GEOMETRY

- Geometric shapes, their components, their properties, and their categorization based on those properties
- Composing and decomposing geometric shapes
- Spatial relations and spatial structuring

K - 6 Geometry, Progressions for the Common Core State Standards in Mathematics (draft), The Common Core Standards Writing Team, 23 June 2012

## LEVELS OF GEOMETRIC THINKING

**Visual/Syncretic** - Students recognize shapes, e.g., a rectangle “looks like a door.”

**Descriptive** - Students perceive properties of shapes, e.g., a rectangle has four sides, all its sides are straight, opposite sides have equal length.

**Analytic** - Students characterize shapes by their properties, e.g., a rectangle has opposite sides of equal length and four right angles.

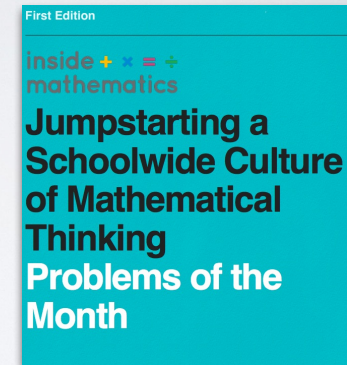
**Abstract** - Students understand that a rectangle is a parallelogram because it has all of the properties of parallelograms.

K - 6 Geometry, Progressions for the Common Core State Standards in Mathematics (draft), The Common Core Standards Writing Team, 23 June 2012

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## A CULTURE OF MATHEMATICAL THINKING

“Problem solving is the cornerstone of doing mathematics. A problem that you can solve in less than a day is usually a problem that is similar to one that you have solved before. But in real life, a problem is a situation that confronts you and you don’t have an idea of where to even start. If we want our students to be problem solvers and mathematically powerful, we must model perseverance and challenge students with non-routine problems.”



Jumpstarting a Schoolwide Culture of Mathematical Thinking, Inside Mathematics, Desiree Pointer Mace, David Foster, Audrey Poppers, The Noyce Foundation

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## THE SHAPE OF THINGS

- At your table group, have each person select one problem to work on Level A - E.
- Work on your problem individually.

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## THE SHAPE OF THINGS

- After everyone has finished, discuss:
  - What was your problem about? How did you solve it?
  - How do you think these problems can be used in a classroom and across a school site?

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## REFLECTION

- How will you promote and support student problem solving in your class?
- What did you learn that furthered your knowledge of the CCSSM geometry standards?

  
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## COMMON CORE CONNECT

<http://ccss.tcoe.org/>



The screenshot shows the homepage of the Common Core Connect website. At the top, it features the Tulare County Office of Education logo and the text "Common Core Connect". Below the header is a search bar and a navigation menu with links for Home, PBL, ELA, ELD, Math, Soc Studies, STEM, Tech, Super Sites, and Community. The main content area includes a quote from Charlene Stringham, Assistant Superintendent of Instructional Services, praising the TCOE Educational Resource Services team. There are also announcements for a 2014-2015 Literacy Speaker Series, Mathematics Speakers, and a new Eclipse Curriculum Manager system. At the bottom, there are links to popular resource collections like ELA Learning Progressions, ELA Standard Bookmarks, Continuum for CCSS Math, and ELA Anchor Standards.

  
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Have a great afternoon!

## Thank you!

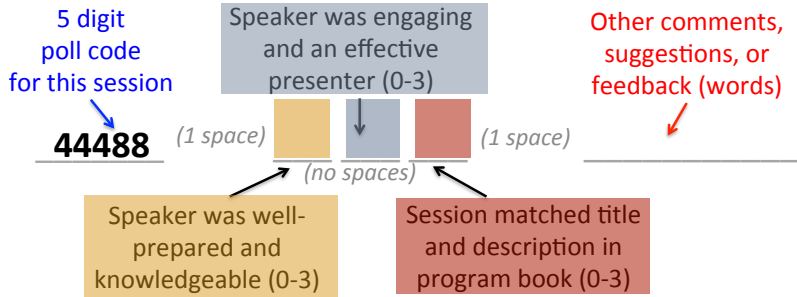
Your feedback is appreciated.

Text: 37607

Poll Code: 44358

Strongly Disagree 0	Disagree 1	Agree 2	Strongly Agree 3
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Send your text message to this Phone Number: 37607



Example: 38102 323 Great session!

Non-Example: 38102 3 2 3 Great session!

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