

MAC Preliminary Report

6th year

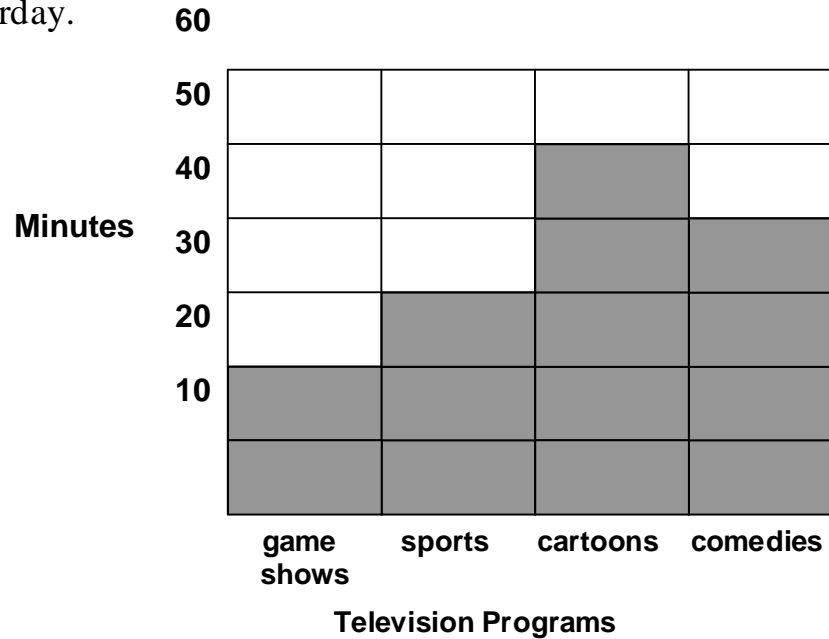
A Look at the Data for 2005

Setting Cut Score Levels - The Process

Look at the task and rubric

- What are the Core Ideas addressed in this task?
- What is the minimum work a student would need to show to demonstrate meeting those Core Ideas or mathematical demands?
- What is the ramp for this task?

Terrie loves television. This graph shows how much she watches on Saturday.



1. Which is Terrie's favorite kind of program?

2. How many minutes of sports does Terrie watch?

3. How much longer does she spend watching comedies than game shows?

4. How much time, in all, does Terrie watch television on Saturday?

Show how you figured this out.

Mathematical Demands

- Read and interpret a bar graph
- Understand scale/ think about groups/relationship to multiplication and bases for proportional reasoning at later grades
- Comparison subtraction
- Find the total
- Work with units of time/ convert between minutes and hours
- Document their process with a number sentence or explanation

Examine rubric, thinking about core ideas and using professional judgment.

Television Time	Rubric	
<p>The core elements of performance required by this task are: ¥ to look at a graph and determine what it shows about the questions</p> <p>Based on these, credit for specific aspects of performance should be assigned as follows</p>	points	section points
1. Gives correct answer: cartoons	1	1
2. Gives correct answer: 30 minutes	1	1
3. Gives correct answer: 20 minutes	1	1
4. Gives correct answer: 2 hours 20 minutes or 140 minutes Gives correct explanation such as: $20 + 30 + 50 + 40 = 140$ or I added them all together (with the correct answer)	1 1	 2
Total Points		5

Establishing Tentative Cut Levels

- Set the boundary levels for each task individually
- Total the points for each performance level
- Read Whole Papers around the totals

Does this paper meet the overall performance description?

Does this paper meet the levels for most of the tasks?

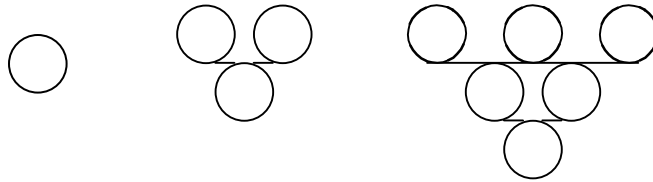
Trends in the Data

- Cognitive Demands of using a table designed by someone else
- Spatial Visualization/Issues of Scale
- 8th Grade/ Algebra Issues

Notes from Fostering Algebraic Thinking

In the course of working on a problem, students may neglect to connect the representations back to the original problem context. A representation of a word problem, whether by graph, diagram, table, or equation, can become a context unto itself, and students can draw conclusions there that have little to do with the original problems.

Does too much scaffolding remove the sense-making?



1 crystal

3 crystals

6 crystals

Pattern #1

#2

#3

#4

- Draw earring Pattern #4 next to Pattern #3.
- How many crystals will there be in earring Pattern #5? _____

Show how you figured thi

This table shows how many crystals are needed for each pair of earrings.

Pattern #	1	2	3	4	5	
Number of crystals	2	6	12			



The local nature club is carrying out a survey of the number of ducklings in each family of ducks in the lake.

Here are the results of their survey:

4, 7, 6, 5, 8, 7, 5, 4, 10, 4, 9, 6, 5, 4, 4, 5, 9, 8, 4

1. Write the results of the survey in the table. The first box has been completed for you.

Number of ducklings in a family	4	5	6	7	8	9	10
Number of families	6						

2. Find the median number of ducklings in a family. _____ ducklings

Show your work.

Kate makes teddy bears.

Each bear needs

¥ 2 eyes

¥ 1 nose

¥ 3 buttons

1. Fill in the missing numbers in this table.

Number of teddy bears	Number of eyes	Number of noses	Number of buttons
1	2	1	3
2	4		6
5		5	15
10	20	10	
	24		

Encourage Action Research on Diagram Use

- Lemonade Problem with Middle Grades Professional Development Group
- Try problems with & without tables in class

Promote Diagram Literacy

- Have students discuss purpose of the table
- What are the important features of the table
- Make their own tables
- Try to think about tables without labels, what is purpose?
- Give students opportunities to make their own tables and describe their usefulness to solving the problem

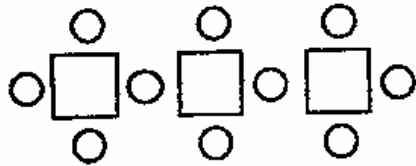
(Promoting the Use of Diagrams as Tools for Thinking, NCTM 2001 Yearbook)

Ideally, we want students to make their own representations of problems. Good judgment needs to be developed, “Because each representational format has varying limitations or strengths in different contexts, it is beneficial to have the choice of which presentations to employ and the knowledge needed to make such a choice. (Lloyd & Wilson 1998) (Driscoll)

Spatial Visualization/ Issues of Scale

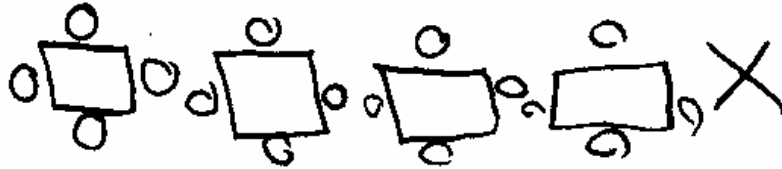
- Ability to see, identify & discriminate on visual patterns
- Research on relevance to higher mathematics
- Flips, Turns, Rotations - relevancy to today's technology
- Accuracy & Scale

Visual Patterns -4th grade



3 squares
10 circles

1. Draw a diagram to show Jack's pattern using 4 squares.

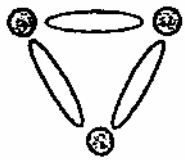


Jack makes a table to show the number of circles he needs to make patterns using different numbers of squares.

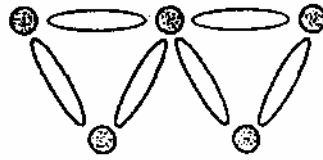
Number of squares	1	2	3	4	5
Number of circles	4	7	10	13	17

2. How many circles does Jack need to make a pattern using 4 squares?

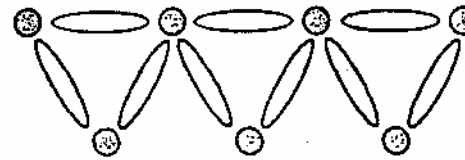
Visual Patterns - 5th grade



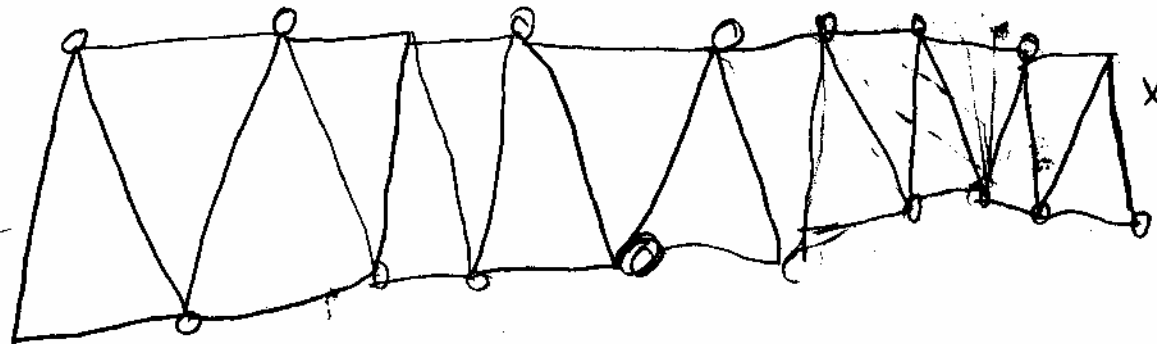
1 triángulo



2 triángulos

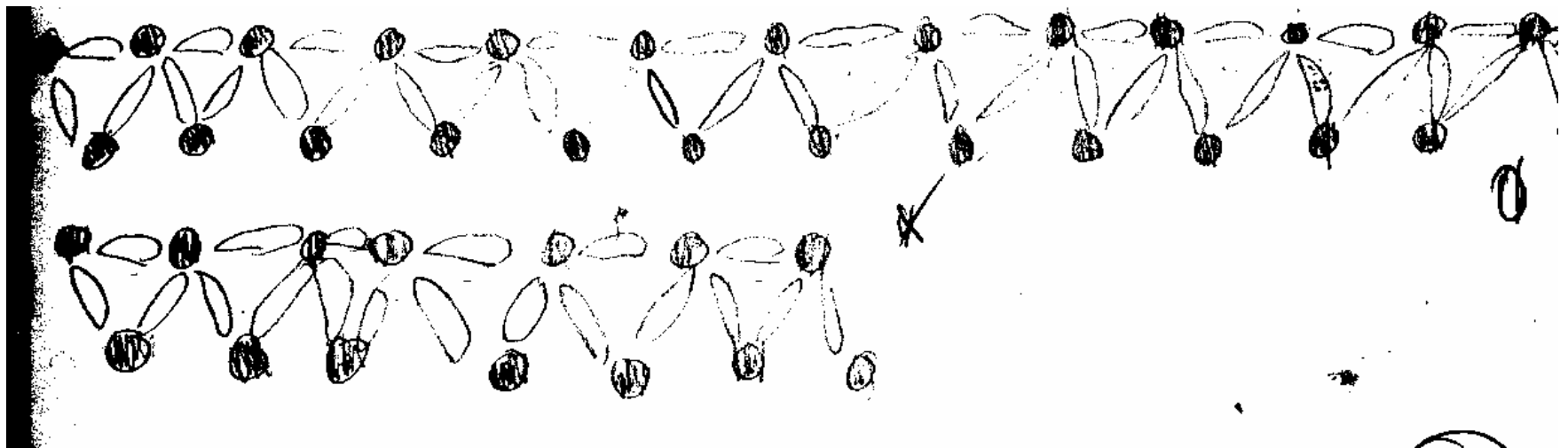


3 triángulos

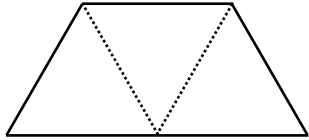


Visual Patterns - 5th grade

Inefficiency of Drawing and Counting Strategies

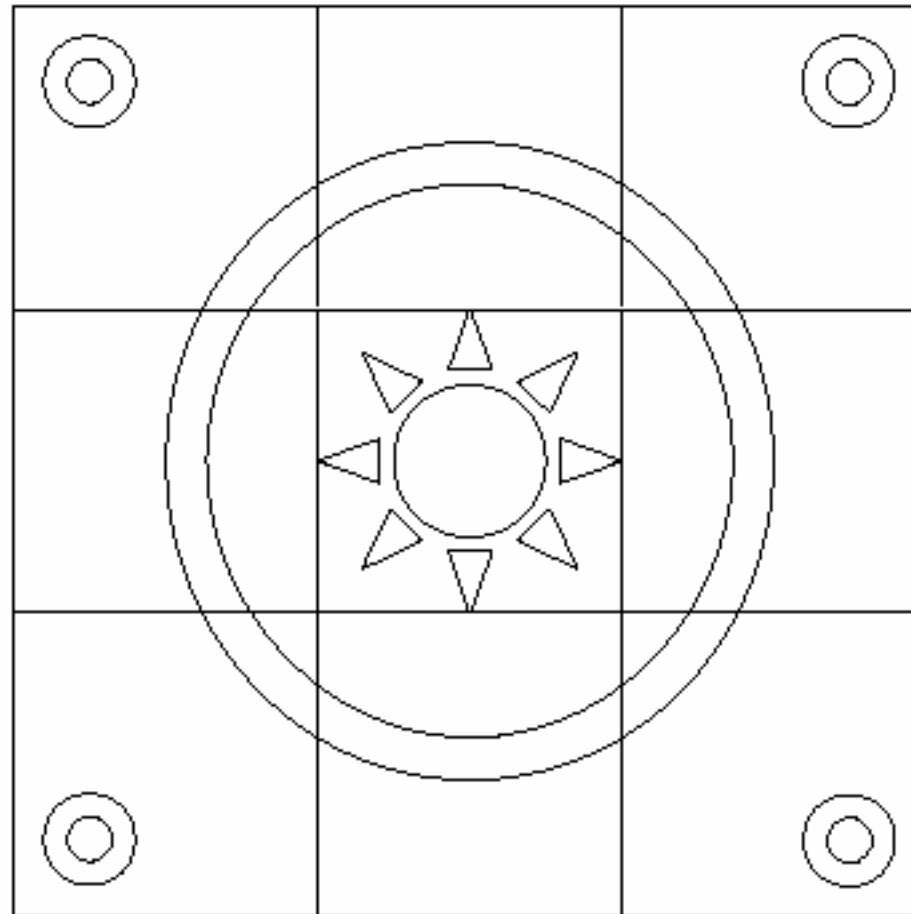


Attributes of Shapes - 7th grade



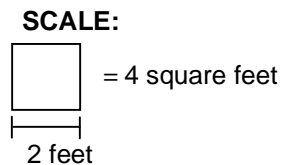
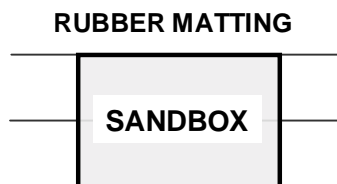
Statement	Trapezoid	Second shape
It is a quadrilateral		
It has just one pair of parallel sides		
It has two pairs of parallel sides		
It has three equal sides		
It has two pairs of equal sides		
It has one line of symmetry		
It has two lines of symmetry		

Flips, Turns, Rotations - 3rd grade



Issues of scale- 6th grade

Here is a scale drawing of the sandbox.

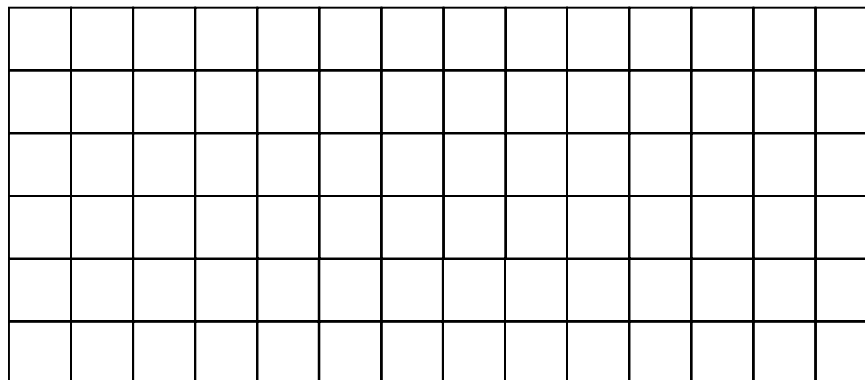
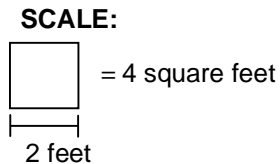


1. Find the area of the sandbox and the area of the rubber border.

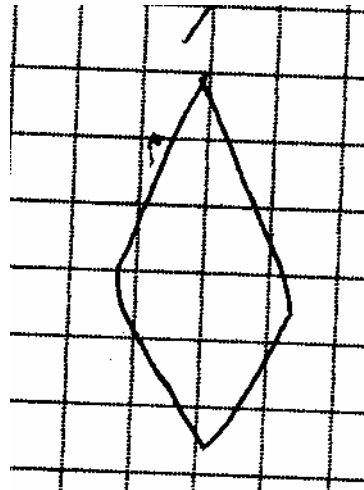
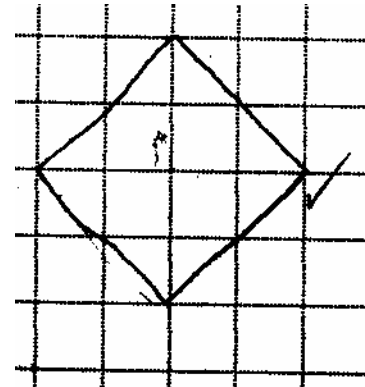
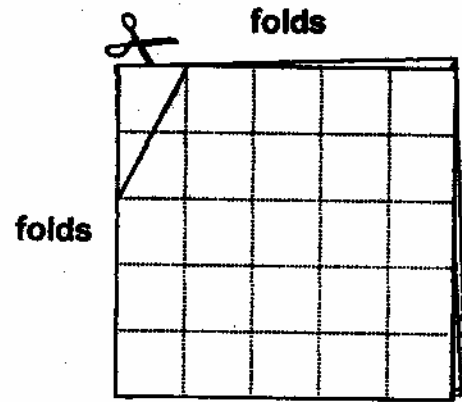
Sandbox area: _____ square feet Matting area: _____ square feet

More children are using the playground, so the committee decides to double the area of the sandbox.

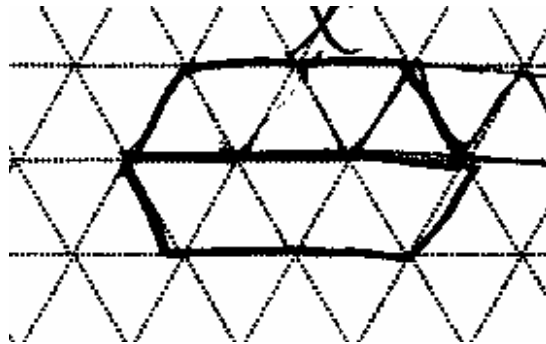
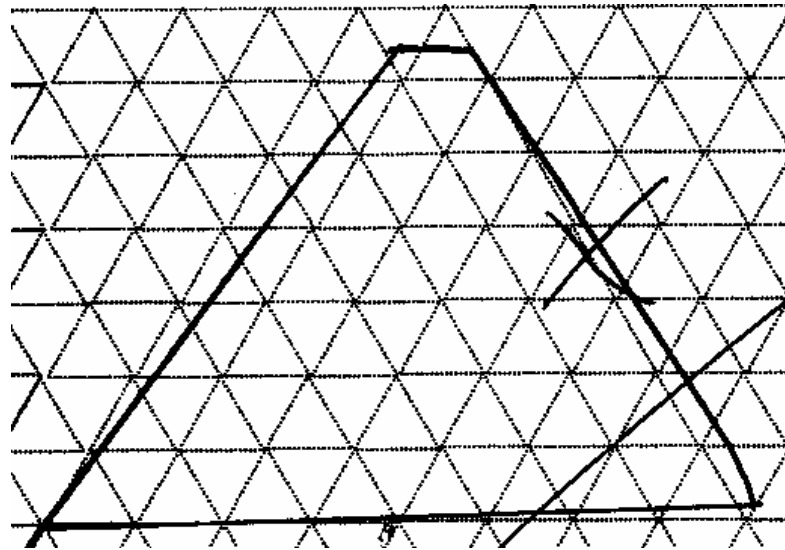
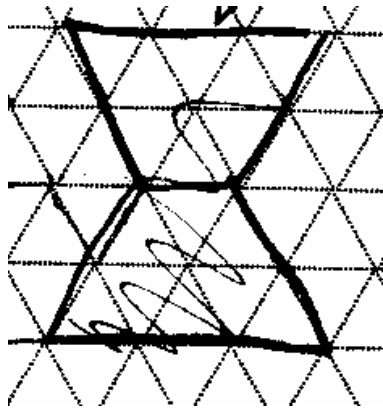
2. Design a new rectangular sandbox that has double the area of the original sandbox. On the grid below, make a scale drawing of the new sandbox and the surrounding rubber matting.



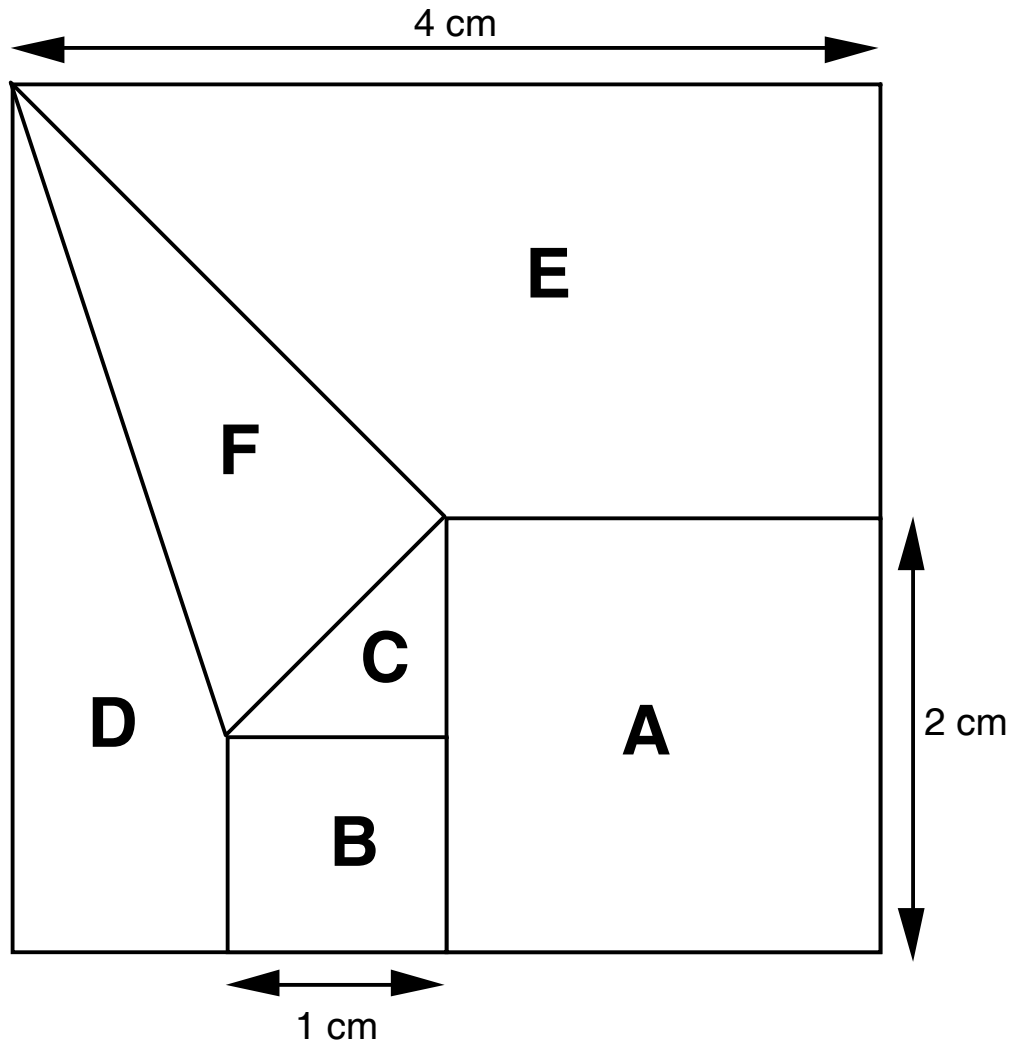
Issues of scale - 5th grade



Issues of scale - 7th grade

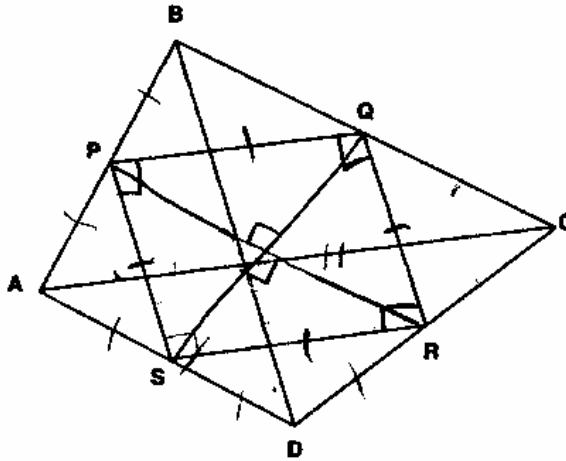


Decomposing Shapes- 8th grade



Decomposing Shapes - Geometry

ABCD is a quadrilateral. The points P, Q, R, S are the midpoints of the sides of the quadrilateral.



1. Write two correct statements about the lines PQ and AC.

• they are both straight lines x

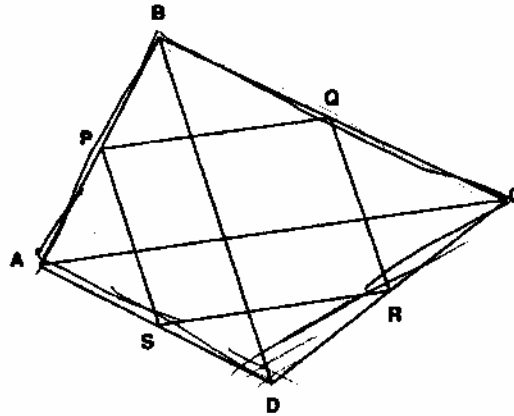
• they both = 180 (def of a line) x

2. What can you say about the quadrilateral PQRS? Explain your reasoning carefully.

that PQRS = 360 x

Decomposing Shapes - Geometry

ABCD is a quadrilateral. The points P, Q, R, S are the midpoints of the sides of the quadrilateral



1. Write two correct statements about the lines PQ and AC.

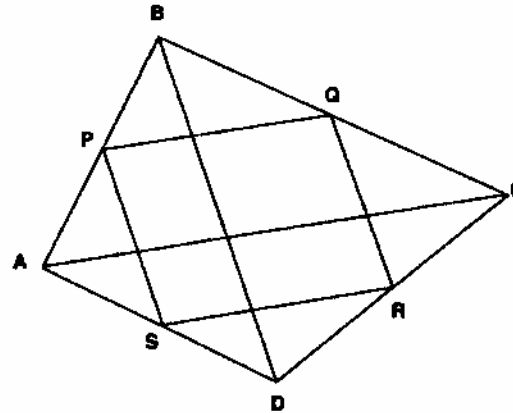
PQ is part of a square. X
AC is part of a trapezoid. X

2. What can you say about the quadrilateral PQRS? Explain your reasoning carefully.

PQRS is a square. X It is a square because it has 4 sides, and they are all equal. X

Decomposing Shapes - Geometry

ABCD is a quadrilateral. The points P, Q, R, S are the midpoints of the sides of the quadrilateral.



1. Write two correct statements about the lines PQ and AC.

\overline{PQ} is $\frac{1}{2}$ of \overline{AC} ✓

$\overline{PQ} \parallel \overline{AC}$ ✓

2. What can you say about the quadrilateral PQRS? Explain your reasoning carefully.

I can say that it looks like the Microsoft Windows logo!!

Van Hiele Levels

- **Level 1 - Visualization**-Student recognizes figures by appearance alone, often comparing them to prototypes. The properties of the figure are not perceived. The students make decisions on perception not reasoning.

Van Hiele Levels

Level 2 Analysis - Students see figures as collections of properties. They can recognize and name properties of geometric figures, but they do not see relationships between these properties.

Level 3 Abstraction

Level 4 Deduction

Level 5 Rigor

Notes from Research

- Progress from one level to the next level is more dependent on educational experience than on age or maturation.
- Research indicates that most students starting a high school geometry course think at the first or second level.
- Teachers and students using the same words but with different meanings, e.g. square

Teacher tries to teach at a level of thought above a student's level?

Generally, the student will not understand the content that is being taught. Usually the student will try to memorize the material and may appear to have mastered it, but the student will not actually understand the material. Students may easily forget material that has been memorized, or be unable to apply it, especially in unfamiliar situations.

Questions with 8th Grade and Algebra?

- Scoring with Algebra Teachers, most felt it was a better match with their curriculum.
- They felt students were weak in the ability to make justifications and wanted help finding problems requiring justification, to put in appropriate places in their curriculum.
- Problem with having additional scoring leaders

Looking at 8th Grade Data

- Some administrators were shocked when looking at the 8th grade scores, when the top students had been pulled off for algebra.
- What do we want the curriculum to look like for middle school before Algebra? What are these students lacking?
- What are the problems and how to we treat the causes rather than the symptoms?

Problem Areas

- Working with percents, using inverse relationships
- Part/whole relationships, number operation
- Proportional reasoning
- Understanding the learner and the mathematics
- **Next steps - talk with neighbors**

Part 2

MAC Tools

Individual Student Reports

Final Report

Tools for Teachers

Individual Student Reports

- Letter can be changed to fit district needs
- Matrix with task and mathematical demands designed to show the positive, what could students do
- Paragraph for needs improvement, only appears for students with a performance level of 1 or 2 (*think about how their needs are different from moving students to mastery*)
- *Scores of 0 treated separately*

Tools For Teachers

Looking for ways to improve the tools for teachers.

- What are other features that might help teachers make sense of student work, misconceptions, and unit planning for next year?
- How can your district make better use of the toolkits?
- What other tools would you like to see developed?

Ideas under Consideration

- Including short pieces of research
- Write protocols for viewing student work, that could be used at subject specific faculty meetings
- Demonstrating alternative solution paths/ teacher flexibility