Title: Geo-Room Design

Brief Overview:

The teacher will read the book The Berenstein Bears' New Neighbors by Stan and Jan Berenstein. The students will select polygons from the story and construct a picture. The students will write a descriptive paragraph with geometric vocabulary to describe their pictures. The students will identify polygons in their surroundings through a scavenger hunt. The students will design a room using congruent and similar polygons. Using mathematical vocabulary, the students will describe their pictures and share with the class.

Link to Standards:

- **Problem Solving** Students will demonstrate their ability to solve problem in mathematics including problems with open-ended answers and problems which are solved in a cooperative atmosphere.
- **Communication** Students will demonstrate their ability to communicate mathematically. They will read, write, and discuss mathematics with language and signs, symbols, and terms of the discipline.
- **Reasoning** Students will demonstrate their ability to reason mathematically. They will make conjectures, gather evidence, and build arguments.
- **Connections** Students will demonstrate their ability to connect mathematics topics within the discipline and with other disciplines.
- **Geometry and Spatial Sense** Students will describe, model, draw, and classify shapes. They will demonstrate congruency and similarity and apply these concepts to the solution of the real-world problem solving situations.
- **Statistics** Students will demonstrate their ability to collect, organize, and display data and will interpret information obtained from displays. They will write responses based on statistical information.

Grade/Level:

Grade 3

Duration/Length:

4 class sessions will be allocated for this lesson.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Names of different polygons
- Definition and examples of polygons
- Geometric vocabulary should be briefly reviewed (Student Resource Sheet 3)
- Differences and similarities between polygons

Objectives:

Students will:

- work cooperatively in pairs.
- participate in hands-on activities.
- identify the characteristics of different geometric shapes.
- predict how many geometric shapes are in the classroom.
- recognize and appreciate geometry in their world.
- develop spatial sense.
- represent and solve problems using geometric models.
- compare the differences and similarities between geometric figures.
- share ideas and works with peers.

Materials/Resources/Printed Materials:

- Geo-Flex Straws
- Drawing papers
- Crayons, markers
- Pattern Blocks
- Chart paper
- The Berenstein Bears' New Neighbors by Stan and Jan Berenstein
- Student Resources 1-8
- Teacher Resources 1-2

Development/Procedures:

Session 1: The Berenstein Bears' New Neighbors

- Teacher will read the book The Berenstein Bears' New Neighbors by Stan and Jan Berenstein. (Other books with geometric shapes in the illustrations will work too.)
- Discuss the story with the students, focusing on geometric figures in the illustrations.
- The students will create a picture using the geometric figures discussed in the story. (Refer to Student Resource 1.)
- Write a paragraph describing the geometric shapes used in the picture.
- Share with the class what you have drawn and written.

Session 2: "Polygon Scavenger Hunt"

- Each student will predict how many geometric shapes they may find around the classroom. Share the predictions with the class and list them. (Refer to the Student Resource Sheet 2.)
- Observe and identify geometric shapes around the classroom quietly for thirty seconds.
- Share their observations with the rest of the class and make a class chart of types of polygons they have found in the classroom.
- Take the results and construct a pictograph of the types and numbers of geometric shapes found in the class. (Refer to Student Resource Sheet 4.)
- Remind the students to include the title and the key for the graph.
- Discuss how many each symbol will represent in the key.
- Have the students write what shapes they found most frequently in their classroom and why they think it was used most often. (Refer to Student Resource Sheet 5.)

Session 3: Congruent and Similar

- Give pairs of students a bag of Geo-Flex Straws (Refer to Teacher Resource Sheet 1.).
- Allow students to explore the straws if they have never used these before.
- Have the students construct triangles using 3 straws and sort them into groups.
- Students should walk around the room to observe how other pairs of students sorted their shapes.
- Share observations with the rest of the class.
- Discuss the differences and similarities in which the triangles were sorted.
- Select two triangles that are congruent and discuss the characteristics that make them congruent.
- Make a Venn diagram of the characteristics of two triangles that are similar. (Refer to Student Resource Sheet 6.)
- Refer back to the classroom scavenger hunt from the previous session and identify things they found that were congruent and similar.
- Have students make a polygon with the Geo-Flex straws that is congruent with their partner's.
- In their pairs, have one student make a polygon with the Geo-Flex Straws, then the other must try construct a polygon that is congruent. Then switch roles.
- Do the same with similar polygons.

Performance Assessment:

- Read the following prompt to the students (Student Resource Sheet 7):

  Children from Planet Polygon are visiting Earth and have decided to stay with your family. You want to make sure that they feel comfortable while they are staying with you. Your parents are allowing you to decorate your room using geometric shapes. Create a picture using geometric shapes to design how your room will look. In the picture include:

  - at least four different types of shapes (such as triangles, rectangles, trapezoids, pentagons, rhombus, hexagon, squares, etc.),
  - shapes that are congruent,
  - shapes that are similar.

  Then write a description of your room using geometric vocabulary and identify the congruent and similar shapes you used for your design. (Refer back to Student Resource 3 for the vocabulary.)

- Use the Geo-Roomdesign Rubric to evaluate the students' work. Refer to Teacher Resource Sheet 2 for the rubric.

- The students may want to use pattern blocks to trace some shapes they would want to make for their pictures.

- Ask the students to share and read their responses.

- Display the students' works around the classroom.

Extension/Follow Up:

- After the classroom scavenger hunt, the students can do a geometry scavenger hunt in their home. Have the students compare their results from the classroom and home hunt to see if there are any relationships between them and share their findings with the class.

- Students can decorate the shirt on Student Resource Sheet 8 with geometric designs to display in the classroom. The students can also write a paragraph describing their shirt designs.

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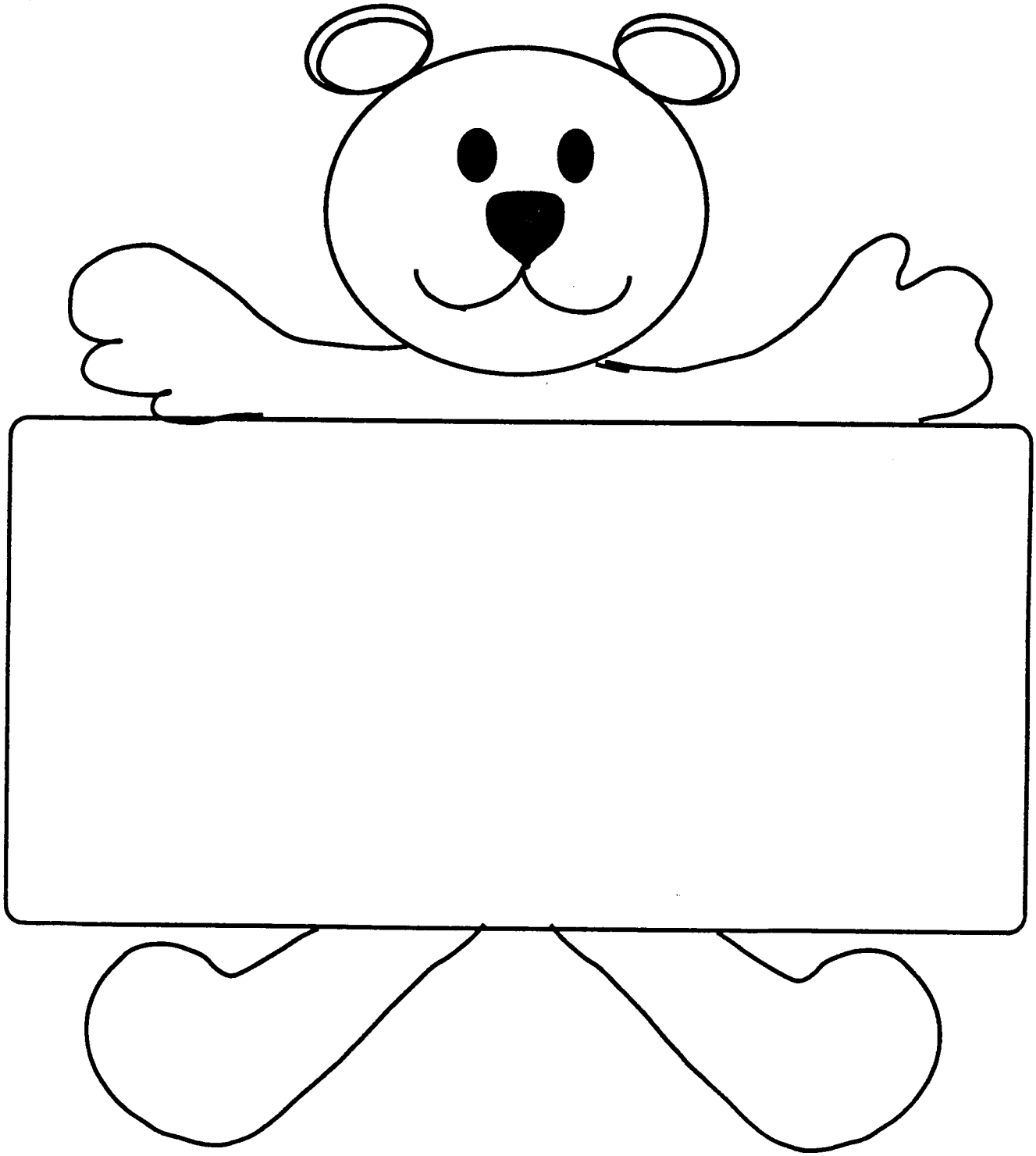
Name _____ Geo-Room Design Student Resource 1

Date _____

A Beary Geometric Picture

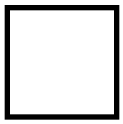
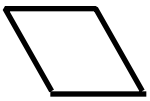
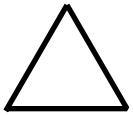
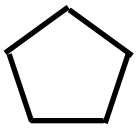
Directions: Select polygons from the story and draw a picture. When you are finished with the picture, write a paragraph to describe your picture.



Adapted From Curriculum and Evaluation Standards for School Mathematics - Number Sense and Operations (1993) NCTM , Grace M. Burton.

Name _____ Date _____

Polygon Scavenger Hunt

Shapes	***Estimate***	***Objects***	***Talleys***
 Square			
 Rhombus			
 Triangle			
 Rectangle			
 Hexagon			
 Trapezoid			
 Pentagon			
Other shapes			

Adapted from Bette Kundert, Howard County Public Schools

Geo-Roomdesign Vocabulary List

Estimate	A guess
Observation	What you actually see
Tally	Count and record how many, amount
Predict	To tell in advance
Polygons	Closed geometric figures that have straight sides and vertexes
Congruent	Geometric figures that are the same shape and same size
Similar	Geometric figures that are the same shape
Triangle	A polygon with three sides and three angles
Square	A regular polygon with four congruent sides and four right angles
Rectangle	A polygon with four sides and four right angles
Trapezoid	A four-sided polygon with two opposites sides parallel
Pentagons	A five-sided polygon with five angles
Hexagon	A six-sided polygon with six angles
Rhombus	A four sided polygon with both opposite sides parallel

Name _____ Date _____

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Shapes	How many polygons?

Name _____ Date _____

Conclusion:
Activity 2

a. Based on the information we have collected in the scavenger hunt, which shapes were found most often in the classroom.

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b. Why do you think it was used most often? Make sure to include the information for the three categories:

- Describe how the shape looks.
- What makes it a popular shape to use in construction of the room?
- Would you use this shape if you were to make a room? Why or Why not? If not, what shape would you use and why?

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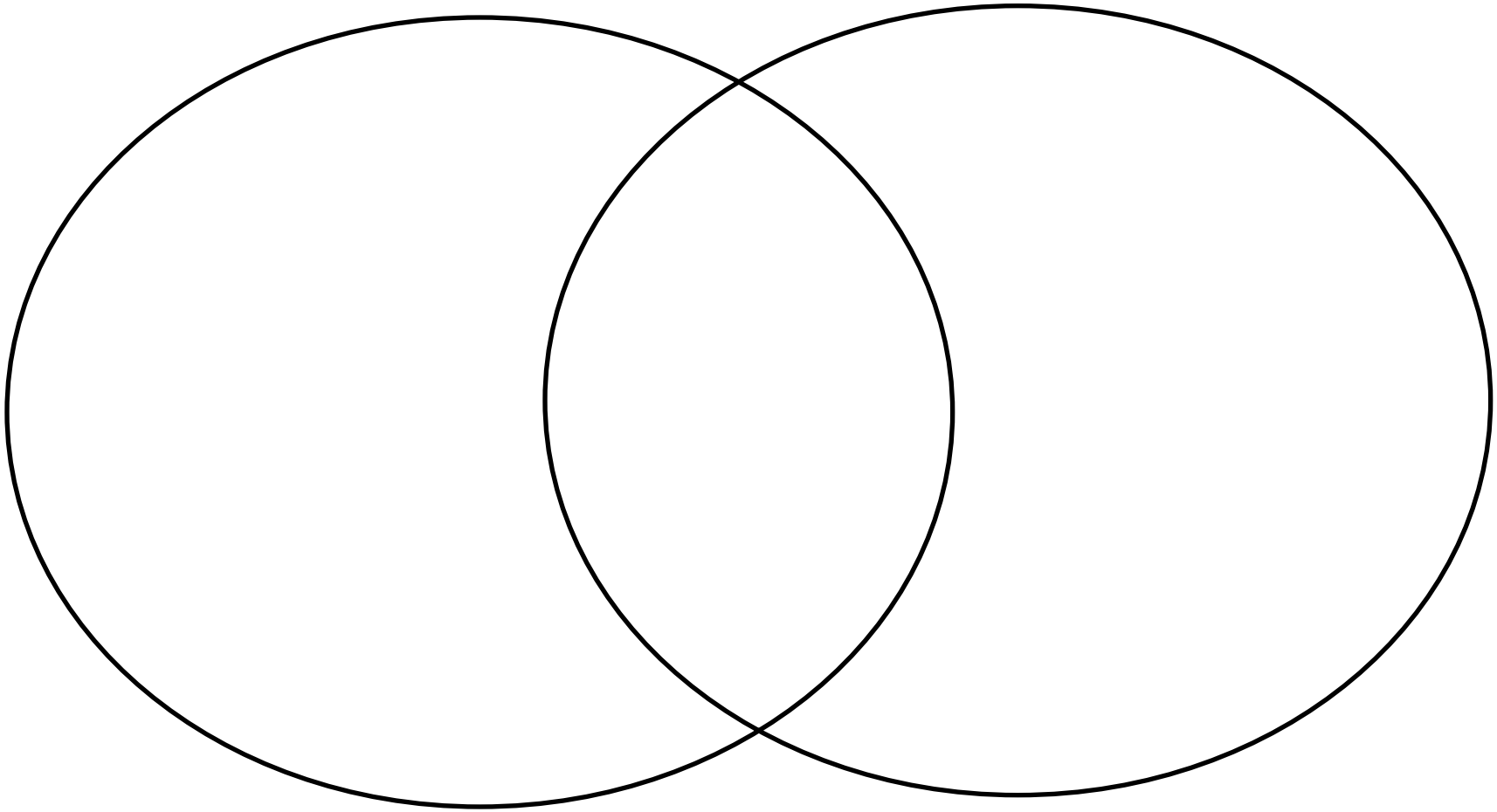
Name _____ Date _____

Geo-Venn Diagram



Name _____ Date _____

Geometric Room Design
Student Prompt

- Children from Planet Polygon are visiting Earth and have decided to stay with your family. You want to make sure that they feel comfortable while they are staying with you. Your parents are allowing you to decorate your room using geometric shapes. Create a picture using geometric shapes to design how your room will look. In the picture include:
    - at least four different types of shapes (such as triangles, rectangles, trapezoids, pentagons, rhombus, hexagon, squares, etc.),
    - shapes that are congruent,
    - shapes that are similar.

  Then write a description of your room using geometric vocabulary and identify the congruent and similar shapes you used for your design. (Refer to the Student Resource 2 for the vocabulary)

- Check your work for punctuation, grammar, capitalization, and spelling.

- Check your work for form, audience, topic and purpose.

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Name _____ Date _____

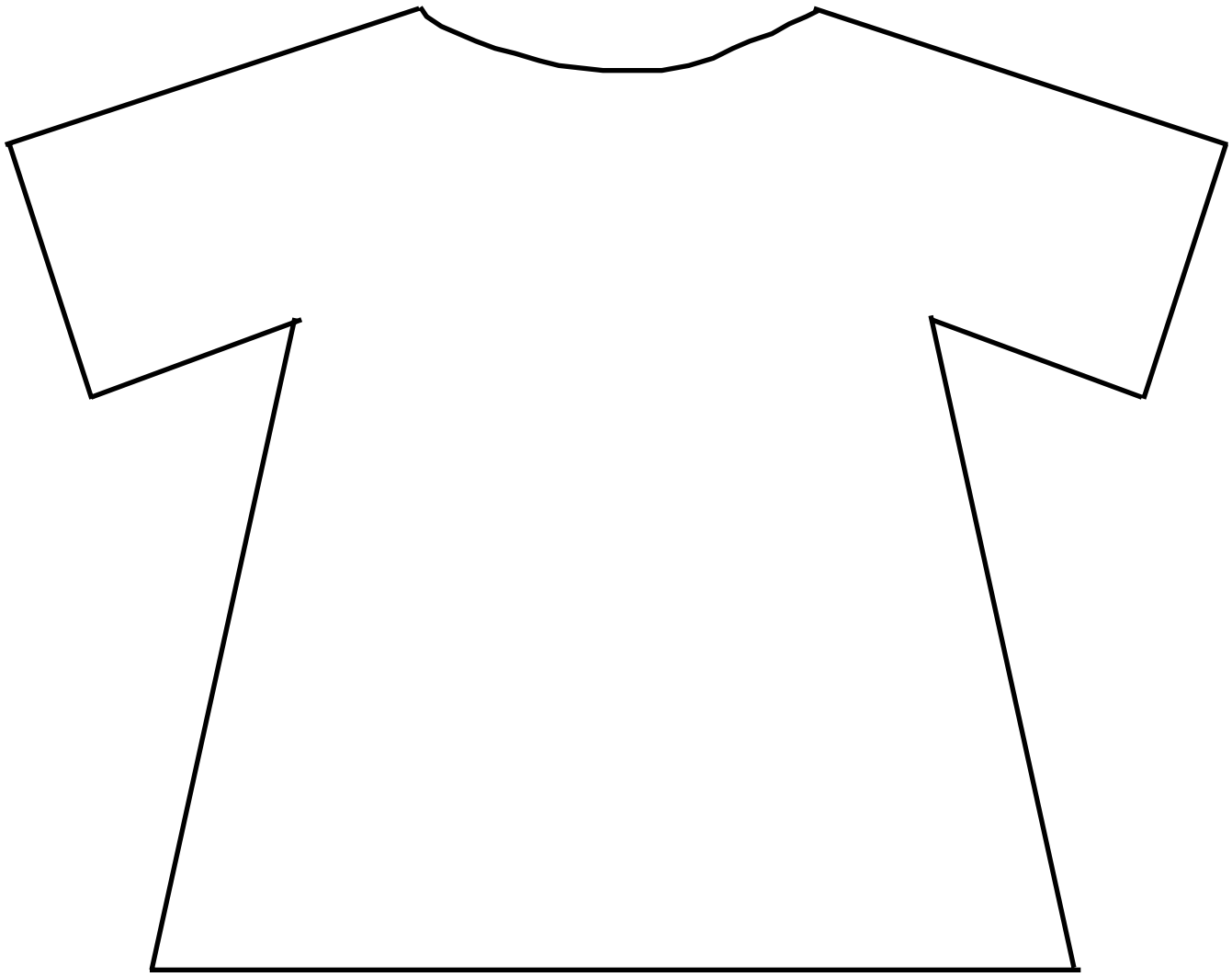
Extension Activity

Geo-Wacky Shirt Activity

Directions: Use geometric shapes to decorate the shirt below.

- Square
- Triangle
- Rectangle
- Trapezoid
- Pentagon
- Hexagon
- Rhombus

When you have finished your design, color it.



- On the back of this sheet write a paragraph describing your shirt design.
- When you are finished, share it with your class and display your work.

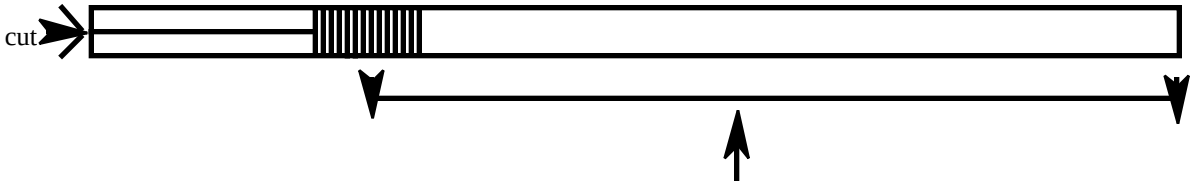
GEO-FLEX STRAW CONSTRUCTION

(Different Length Straws)

- **Purchase 60 flexible drinking straws for each kit you plan to make.**

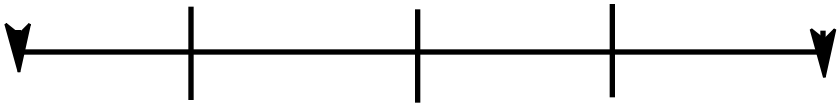
- **Slit the drinking end of the straw from the edge to the flexible joint.**

- **Place the straw which is bent at the flex joint on a blank piece of paper so that the long end of the straw is touch the paper. Draw a line the length of the straw from the bottom edge to the flex joint.**

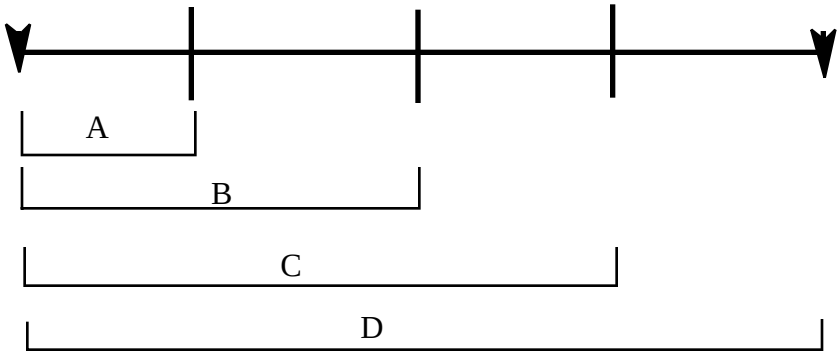


Line drawn to show length of long end of straw.

- **Draw marks on the line to divide it into four lengths.**



- **Make 15 of each length flex-straw by laying the straw on the line to determine where to cut.**



- **Place tape on each straw cut to indicate length:**
  A = green; B = yellow; C = red, and D = blue
- **Shapes can be made by using 3 or more straws and inserting the split portion of straw into the long end of another straw.**
- **Place straws in quart-sized ziplock bag.**

Adapted from Geometry with Flex Straws by Bette Kundert, Howard County Public Schools.

Geo-Roomdesign Rubric

(Use with Student Resource Sheet 7)

Writing Prompt

- Read the following prompt to the students (Student Resource Sheet 5):

  Children from Planet Polygon are visiting Earth and have decided to stay with your family. You want to make sure that they feel comfortable while they are staying with you. Your parents are allowing you to decorate your room using geometric shapes. Create a picture using geometric shapes to design how your room will look. In the picture include:

  - at least four different types of shapes (such as triangles, rectangles, trapezoids, pentagons, rhombus, hexagon, squares, etc.),
  - shapes that are congruent,
  - shapes that are similar.

  Then write a description of your room using geometric vocabulary and identify the congruent and similar shapes you used for your design.

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Rubric

Exceptional

- Contains all the characteristics of a high response.
- The room design has more than four types of shapes.
- Includes many shapes that are congruent and similar.
- Shows original thought.
- No mistakes in grammar, punctuation, capitalization, and spelling.
- The writing uses geometric terms effectively to describe their picture.

High Response

- Shows understanding of the concepts.
- The room design has at least four types of shapes.
- Includes shapes that are congruent and similar.
- Both the picture and the writing is completed.
- Shows creativity.
- Explains thinking clearly.
- Very little mistakes in grammar, punctuation, capitalization, and spelling.

Medium Response

- Shows some understanding of the concepts.
- Has less than four types of geometric figures.
- Includes few shapes that are congruent and similar.
- Both the picture and the writing is completed.
- Description is not clear or appropriate.
- Many mistakes in grammar, punctuation, capitalization, and spelling.

Low Response

- Shows little grasp of concepts.
- Fails to complete either the picture or the writing.
- Does not explain clearly.
- Has major errors in grammar, punctuation, capitalization, and spelling.