

## **Title: Geometry Safari**

### **Brief Overview:**

In this unit, students will explore geometry through hands-on activities, creative constructions, literature, and technology. Students will identify and explore attributes of two-dimensional figures and incorporate mathematical language while manipulating geometric shapes. Students will develop mathematical strategies and reasoning through cooperative learning experiences.

### **NCTM Content Standard/National Science Education Standard:**

Geometry

[Analyze characteristics](#) and properties of two-dimensional geometric shapes and develop mathematical arguments about geometric relationships  
[Use visualization](#), spatial reasoning, and geometric modeling to solve problems

### **Grade/Level:**

Third Grade

### **Duration/Length:**

Fifty-minute lessons over a period of four days. One day for assessment.

### **Student Outcomes:**

Students will analyze characteristics and properties of two-dimensional geometric shapes by:

- Identifying, comparing, and analyzing attributes of two-dimensional shapes and developing vocabulary to describe the attributes
- Classifying two-dimensional shapes according to their properties and developing definitions of classes of shapes
- Making and testing conjectures about geometric properties and relationships and developing logical arguments to justify conclusions
- Students will use visualization and spatial reasoning, and geometric modeling to solve problems by building and drawing geometric objects.

### **Materials and Resources:**

#### **Lesson One**

- Plastic bags containing two-dimensional geometric shapes. (Teacher Resource Sheets 1 and 2) (1 bag per student)
- Book –[Twizzlers Shapes and Patterns](#) by Jerry Palotta
- Individual bags of Twizzlers- five strands cut in half. (Total of 10 per child)

- Picture of the Pentagon in Washington, D.C. (Teacher Resource Sheet 3)
- Picture of snowflakes (Teacher Resource Sheet 4)
- Geoboards and Rubber Bands
- Geoboard Dot paper (Student Resource Sheet 1)
- Snappy Shape Sort Worksheet (Student Resource Sheets 2 and 3)
- Homework paper- Geometry Scavenger Hunt (paper with headings, square, circle, rectangle, triangle, oval, pentagon, hexagon. Find two examples of each in your home. (Student Resource Sheet 4)
- Cut shapes out of construction paper and make labels on sentence strips: square, circle, rectangle, triangle, oval, pentagon, hexagon

### **Lesson Two**

- Animal Cards – (Teacher Resource Sheets 5- 9) (Cut apart cards for Gatekeeper Game.)
- Straws
- Pictures of angles, parallel lines, quadrilaterals, and right angles and labels for chalk board. (Teacher Resource Sheet 10).
- Teacher Resource Sheet – Train Track (Teacher Resource Sheet 11)
- Puzzling Parallels- BCR (Student Resource Sheet 5) – Make one copy per student of the test and one copy of the Answer Key for teacher.
- Geometric Terms, Labels (Student Resource Sheet 6)
- What’s My Line – (Student Resource Sheet 7)

### **Lesson Three**

- Pattern Blocks
- Geoboards and rubber bands
- Gate Keeper Game Cards with Geometric Shapes (Teacher Resource Sheets 12 - 16)
- White Construction Paper
- Create a Creature (Student Resource Sheets 8 and 9)
- Summative Assessment – (Student Resource Sheets 10 & 11) (Teacher Resource Sheet 17)
- National Library of Virtual Manipulative Website:

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_289\\_g\\_2\\_t\\_3.html?open=activities](http://nlvm.usu.edu/en/nav/frames_asid_289_g_2_t_3.html?open=activities)

### **Development/Procedures:**

#### **Lesson 1**

#### **Objective-**

Students will identify and label a square, triangle, circle, rectangle, polygon, oval, pentagon, and hexagon.

### **Pre-Assessment –**

Distribute packets of two-dimensional geometric shapes. (Teacher Resource Sheets 1 and 2) Ask students to place all shapes in front of them on their table. Ask students to select and hold up a square, triangle, circle, rectangle, oval, pentagon, and a hexagon. Make note of students demonstrating difficulty with task.

### **Launch-**

Begin the unit with a literature connection by using the text, Twizzlers Shapes and Patterns by Jerry Pallotta.

- Ask students, “What does candy have to do with math?”
- Think Pair Share-- List student responses on the board.
- Distribute bags of Twizzlers.
- Read and discuss pages 1, 3, 6, 7, 8, 9, 12, 14, 15, 16, and end by reading the last sentence on page 22 in the book, (“As our teacher and the architect talked, I realized we could draw hundreds and hundreds of shapes.”)
- During the reading, students make the appropriate geometric shape with their Twizzlers.
- As geometric shapes are made from Twizzlers, choose a student to select and place the matching shape and label on the board.

### **Teacher Facilitation –**

#### **Pentagon**

- Explain to students what they will be learning to identify and name some new shapes.
- Ask students to use their Twizzlers to make a five-sided closed figure.
- Identify a student who demonstrates the correct response and have that child construct the shape on the overhead.
- Ask students to identify attributes of the pentagon.
- Ask students to identify other objects having this shape?
- Display the picture of the Pentagon without revealing the name of the building. (Teacher Resource Sheet 3)
- Ask students what they notice about the building. ( It has the same shape, five sides.)
- Tell students the name of the building and ask why the building was given this name.
- Explain to students that the prefix “penta” means five.
- 

#### **Hexagon**

- Ask students to use their Twizzlers to make a six-sided closed figure.
- Identify a student who demonstrates the correct response and have that child construct the shape on the overhead.
- Ask students to identify attributes of the hexagon.
- Ask students to identify other objects having this shape.
- Display the pictures of snowflakes. (Teacher Resource Sheet 4)

- Ask students what they notice about the snowflake. (They have the same shape, six sides.)
- Tell students the name of the shape and ask why the shape was given this name.
- Explain to students that the prefix “hexa” means six.

**Student Application –**

- Students will use Twizzlers to construct a pentagon and a hexagon.
- Students will work cooperatively with a partner using geoboards to construct and name a variety of shapes, including the hexagon and pentagon. Students will replicate their designs on geoboard dot paper. (Student Resource Sheet 1) Have students share constructions with class.

**Embedded Assessment –**

- Observe students as they work to assess concept attainment.
- Students will receive a piece of drawing paper folded in half. On half of the paper the student will write copy the word “Pentagon”, draw a picture of that shape and number the sides. Students will replicate the process on the other side of the paper with the word “Hexagon.”

**Reteaching/Extension –**

- Reteach—“Snappy Shape Sort” --Students will use manipulatives to sort shapes into categories of triangle, square, circle, rectangle, oval, pentagon, hexagon on the worksheet. (Student Resource Sheets 2 and 3) (Teacher Resource Sheets 1 and 2) Students will trace the outline of the shapes onto the sorting paper.
- Extension— Students will select five different shapes, construct a design on paper, trace and label the shapes.

**Homework-**

Students will complete a “Geometry Scavenger Hunt” task locating items in their homes that contain various shapes. (Student Resource Sheet 4)

**Lesson 2**

**Objective:**

Students will explore and identify attributes of two-dimensional figures using geometric language terms to describe those figures.

**Pre-Assessment**

Show a rectangle on the overhead. In their math journal, have students describe the shape using mathematical language to determine student’s prior knowledge of geometric terms. Make a note of students experiencing difficulty with the task.

## **Launch**

- Tell students that we are going to play the “Safari Game” and the animals we capture will be placed in cages. Give each student a card with an animal picture. (Teacher Resource Sheets 5 - 9,) Explain that there will be two cages. His/her job is to decide in which cage they belong. (The teacher is the only person at this time that knows that Cage One is only for animals that live in the water and Cage Two is for animals that live on the land.)
- Call the students up one by one and ask them in which cage they think they belong.
- Once all the students are in the correct group, ask them to explain why some are in one group and others not.
- Ask, “What would be a good name for each group?” (“Animals That Live in the Water” and “Animals that Live on the Land.”)

## **Teacher Facilitation –**

Introduce the following terms: angle, right angle, parallel lines, and quadrilateral. (Teacher Resource Sheet 10)

### **Angle**

- Ask students to place two straws on their desk that meet at a single point.
- Identify a few students who demonstrate the correct response and have them draw their angles on the board.
- Ask, “What is formed when 2 lines meet at a single point?” (vertex)  
Point to space where angle is formed.
- Ask students to identify other objects in the room having this attribute? (clock hands, lines of the bricks on the wall, lines on the ceiling tiles)
- Call on student to place “angle” pictures and label on board.

### **Right Angle**

- Ask students to place two straws on their desk to make the shape of an “L.”
- Identify a few students who demonstrate the correct response and have them draw their angles on the board. (Be sure to show various positions.)
- Say, “We call this a “right angle” no matter how it is turned.
- Have students identify objects in the classroom having a right angle.

### **Parallel Lines**

- Show Teacher Resource Sheet – “Train Track” on the overhead. (Teacher Resource Sheet 11)
- Ask students to describe the train track. (Guide students to the conclusion that the two lines never meet and are the same distance apart at all times.)

- Ask, "Does anyone know the term for these two lines that never meet?"
- Say, "Two lines that never meet and that are the same distance apart at all points are called "Parallel Lines."
- Have students locate parallel lines in the classroom.

### **Quadrilaterals**

- Instruct students to work with a partner to create as many different shapes as they are able using only 4 straws per shape.
- Share constructions on the overhead and discuss the attributes using the terms that were just introduced. (angle, right angle, parallel lines)
- Ask, "What is the one thing that all of these shapes have in common?" (four sides)
- Display a quarter. Ask students how many quarters make one dollar. (four)
- Write the words "quarter" and "quadrilateral" on the board. Ask what the two words have in common.
- What do you think the prefix "quar" or "quad" means? (four) Emphasize visual link between quarter and quadrilateral.

### **Embedded Assessment –**

- Students will complete a BCR – to assess attainment of the concept of parallel lines. (Student Resource Sheet 5) Answer Key may be found on Teacher Resource Sheet 12.

### **Reteaching/Extension –**

- Students will locate and label various geometric shapes and attributes on a walk through the school.(Student Resource Sheet 6)

## **Lesson 3**

**Homework** – "What's My Line?" worksheet (Student Resource Sheet 7)

### **Objective**

Students will sort and classify various geometric shapes by their attributes.

### **Pre-Assessment**

Use geoboards to construct examples of the following geometric shapes and attributes.

- A figure with two parallel lines
- Square
- Triangle with a right angle
- A quadrilateral with two long and two short sides (Rectangle)
- Make a note of students who experience difficulty with the task.

### **Launch**

Play the Gate Keeper Game with the students using the following attribute categories.

- Five-sided and four-sided figures
- Quadrilaterals and not quadrilaterals
- Parallel lines and no parallel lines
- Shapes with right angles and shapes without right angles

Play the "Gatekeeper Game" with students. (Teacher Resource Sheets 13 - 17)

- Tell students that we are going to play the "Gate Keeper Game" using geometric shapes. Give each student a card with different attributes. Explain that there are two different categories and the students' job is to determine where their shapes belong. (The teacher is the only person that has knowledge of the category names.
- Call the students up one by one and ask them in which category they think their card belongs.
- The teacher will respond "yes" or "no" to the student's choice.
- Once all the students are in the correct group, ask them to explain why some are in one group and others not.
- Ask, "What would be a good name for each group?"

### **Teacher Facilitation**

Introduce the idea of a geometry safari.

- Ask, "What is a safari?" ( A journey through the jungle or desert)
- Ask, "What do you think you would see on a safari?" (animals)
- Make a word bank of the students' suggestions.
- Inform students that they are going to be making animals using geometric shapes.
- On the overhead model the construction of an animal using pattern blocks. (Think Aloud)
- Have students identify the names of the shapes as they are placed.
- Model how to trace the outline of the animal on the overhead. (Think Aloud)
- Model tracing of the individual pieces that make up the animal.
- Ask students to identify and name your animal on the overhead.
- Distribute white construction paper and pattern blocks.
- Students will design their own animals using pattern blocks and trace the outline of each block used to construct their animals.
- Identify shapes and attributes within.

### **Student Application**

- Distribute white construction paper and pattern blocks.
- Students will design their own animal using pattern blocks and trace the outline of each block used to construct their animal.

- Distribute worksheets “Create a Creature” (Student Resource Sheets 8 and 9) NOTE: If a shape goes in more than one category then they are to trace it 3 times.

**Embedded Assessment –**

- Students will complete the “Create a Creature” worksheet to assess their attainment of the lesson objective.

**Reteaching/Extension –**

- Pair successful student with a struggling student to work on the Internet solving Tangram Puzzles.
- Go to National Library of Virtual Manipulatives Website:

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_289\\_g\\_2\\_t\\_3.html?open=activities](http://nlvm.usu.edu/en/nav/frames_asid_289_g_2_t_3.html?open=activities)

- Taking turns, one partner instructs the other partner how to successfully manipulate a given shape into the puzzle.

**Summative Assessment:**

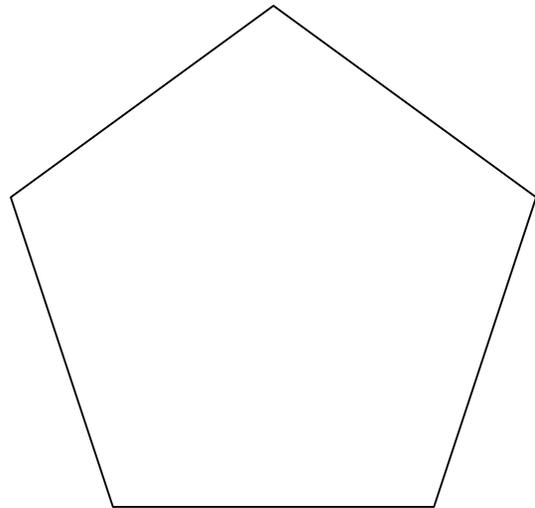
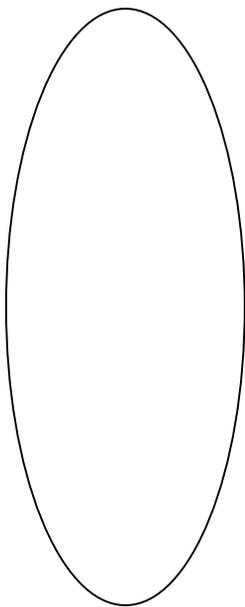
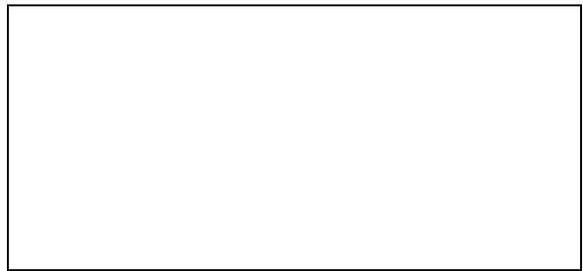
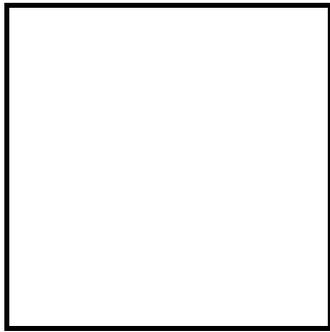
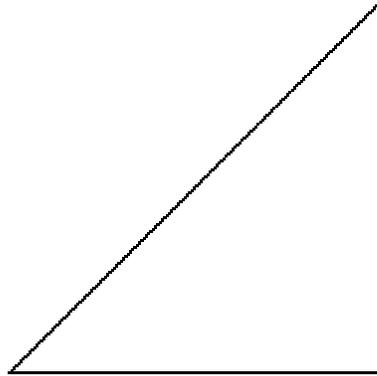
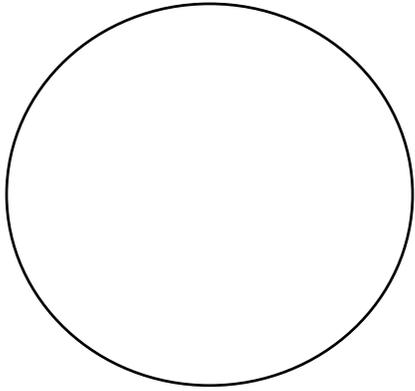
Students will demonstrate an understanding of geometric shapes and their attributes by identifying, labeling, sorting and classifying geometric shapes. Students will need to use appropriate mathematical terms and reasoning to justify their choices. Have students to complete Crazy Critters Summative Assessment (Student Resources Sheets 10 and 11) Summative Assessment Answer Key (Teacher Resource Sheet 18)

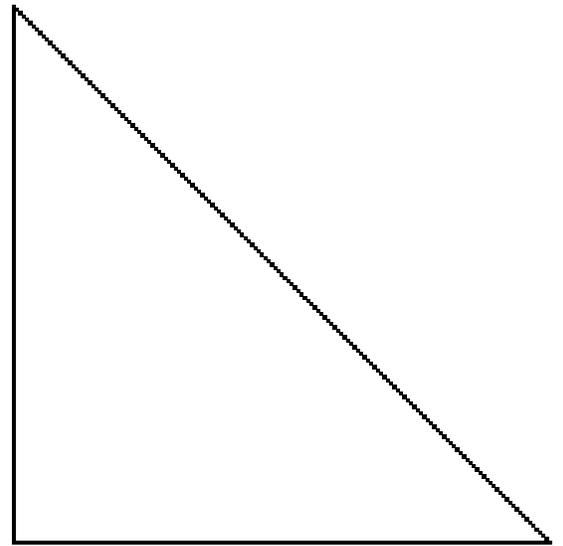
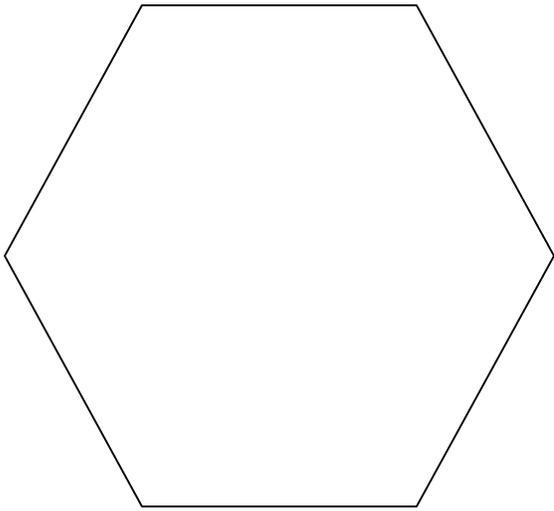
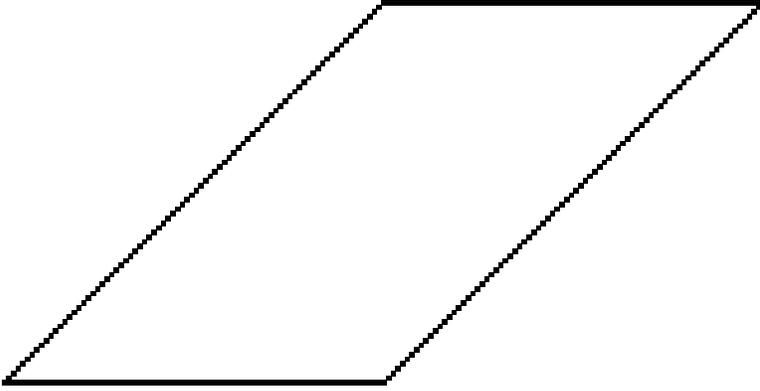
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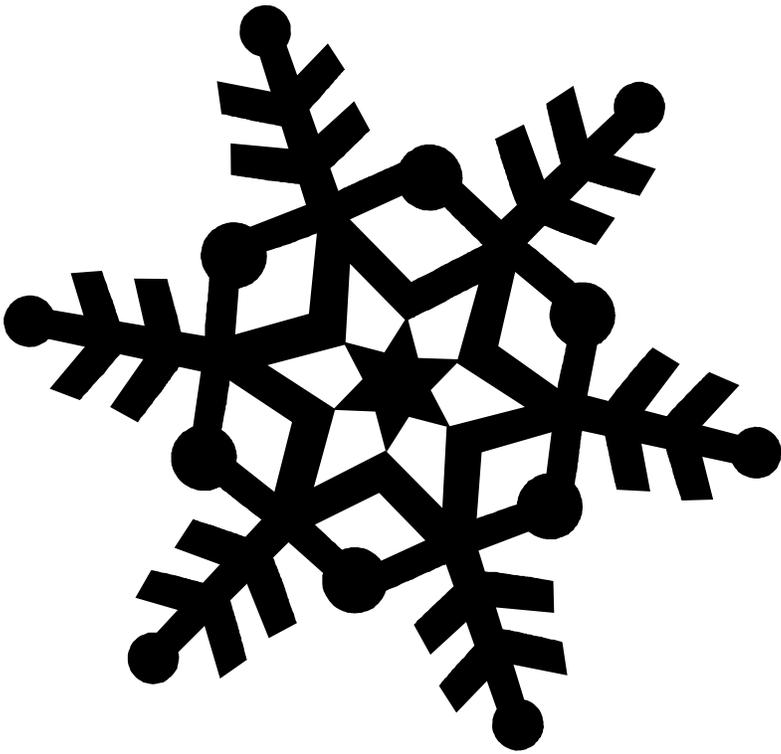
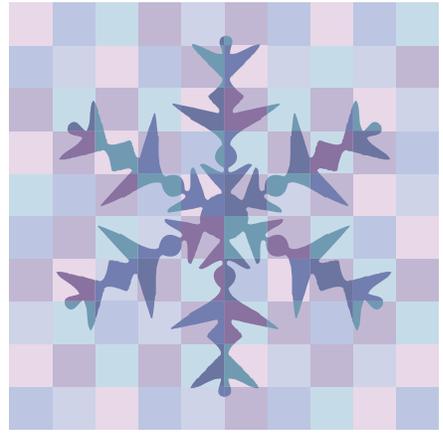
Julia O’Connell  
Cedarmere Elementary  
Baltimore County Public Schools

## TWO DIMENSIONAL GEOMETRIC SHAPES

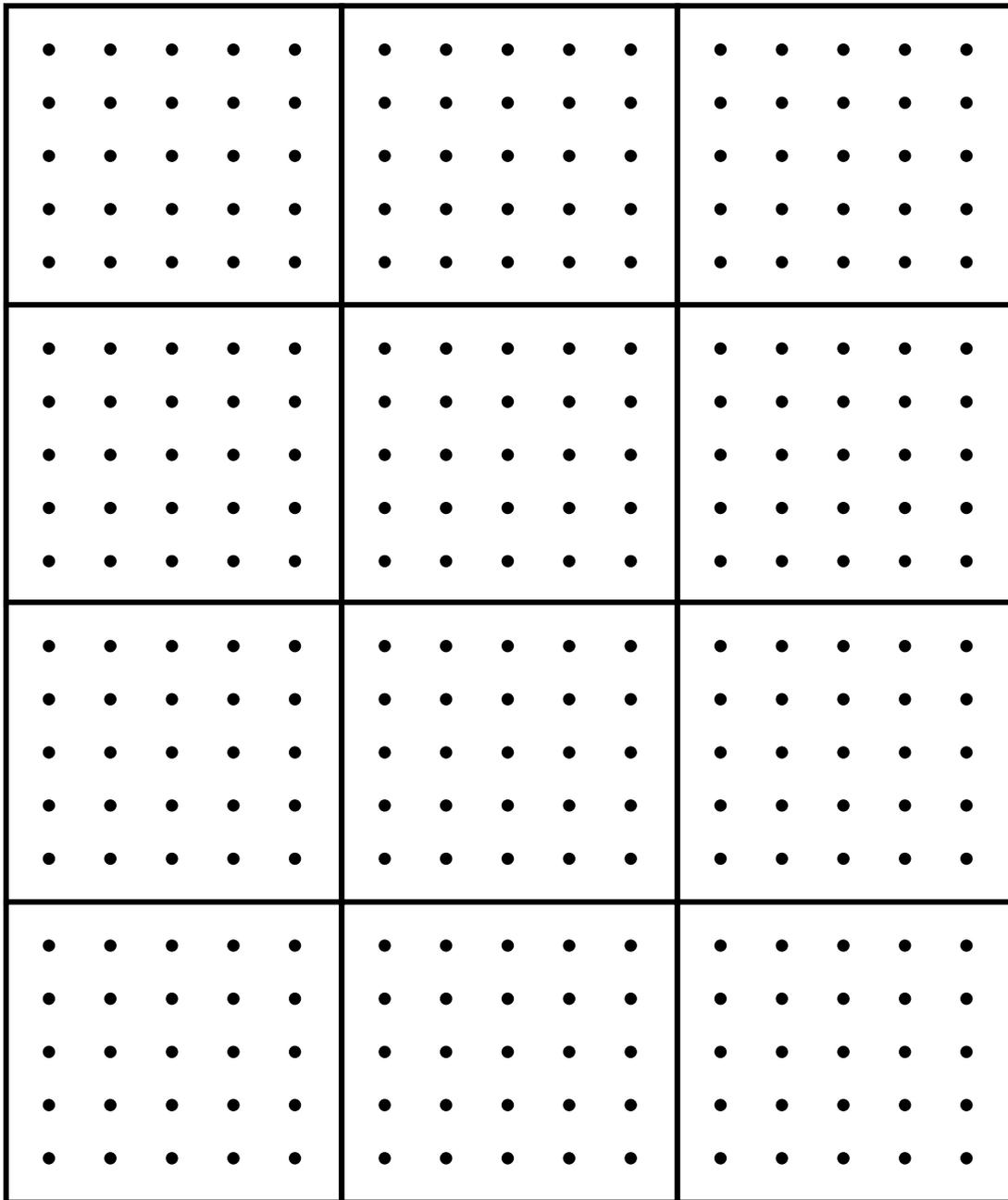


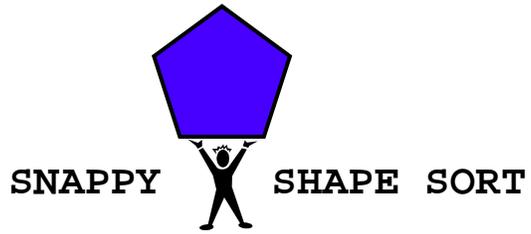






Name \_\_\_\_\_ Date \_\_\_\_\_





Sort and classify your shapes into the following categories...

**TRIANGLE**

**CIRCLE**

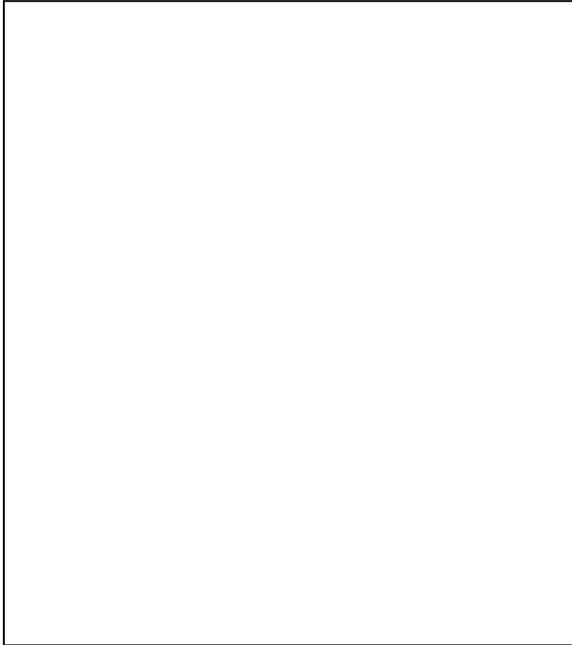
**RECTANGLE**

**SQUARE**

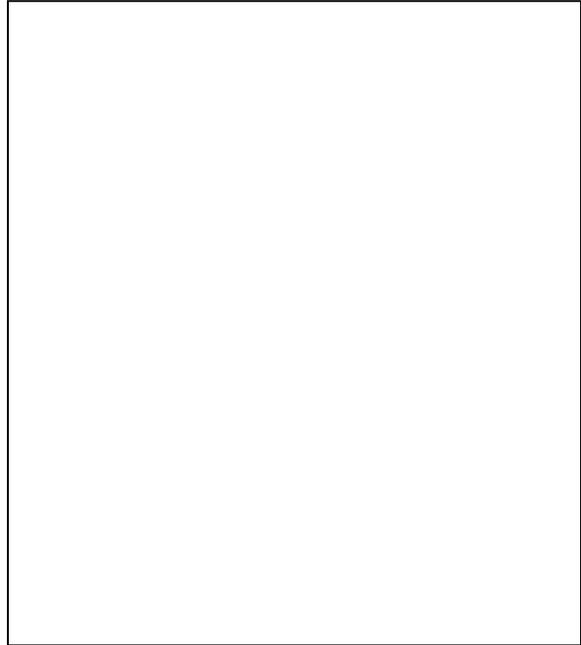
**NAME** \_\_\_\_\_

**MORE SNAPPY SHAPES!**

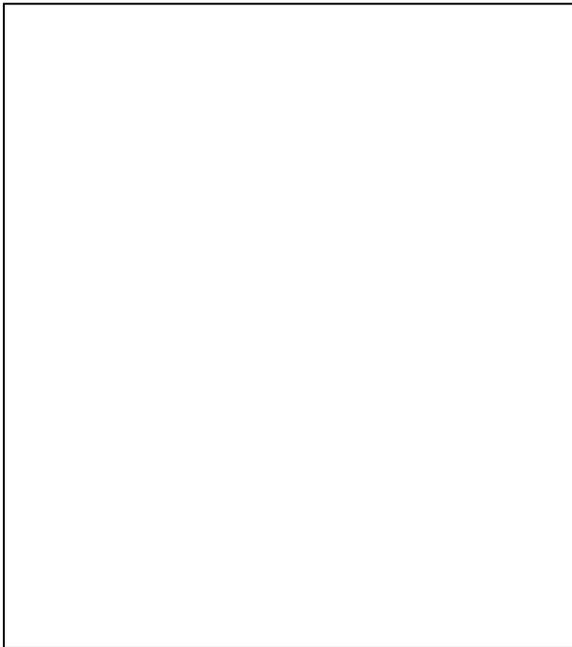
**PENTAGON**



**OVAL**



**HEXAGON**



**NAME** \_\_\_\_\_

Geometry



Scavenger Hunt

Can you find two items in your house that contain one of these shapes?

Circle



1. \_\_\_\_\_

2. \_\_\_\_\_

Square



1. \_\_\_\_\_

2. \_\_\_\_\_

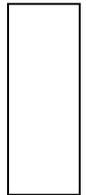
Oval



1. \_\_\_\_\_

2. \_\_\_\_\_

Rectangle



1. \_\_\_\_\_

2. \_\_\_\_\_

Triangle



1. \_\_\_\_\_

2. \_\_\_\_\_

Hexagon



1. \_\_\_\_\_

2. \_\_\_\_\_

Pentagon



1. \_\_\_\_\_

2. \_\_\_\_\_

Great

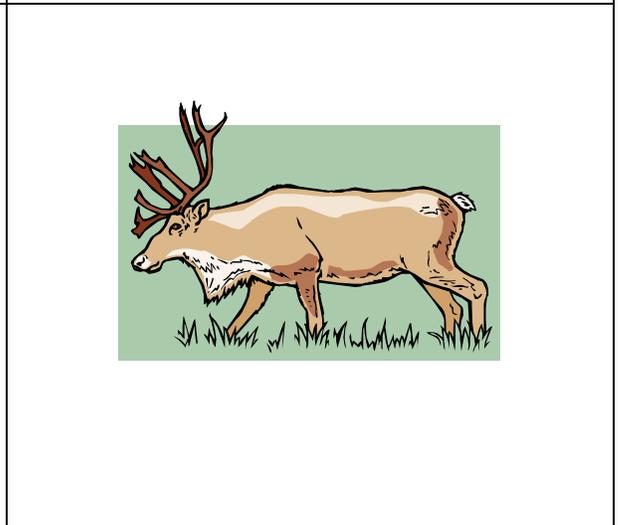
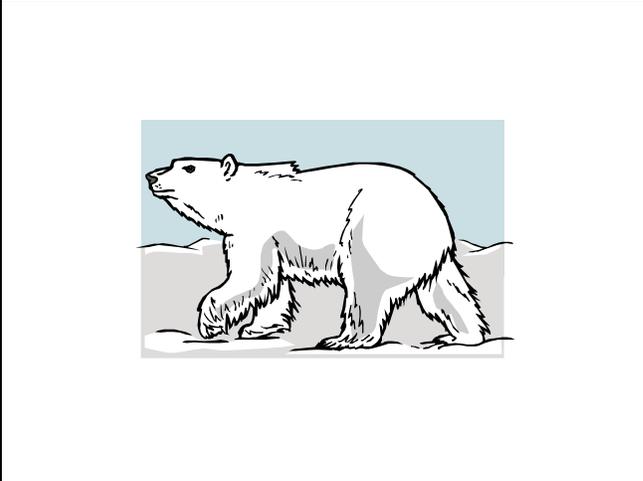
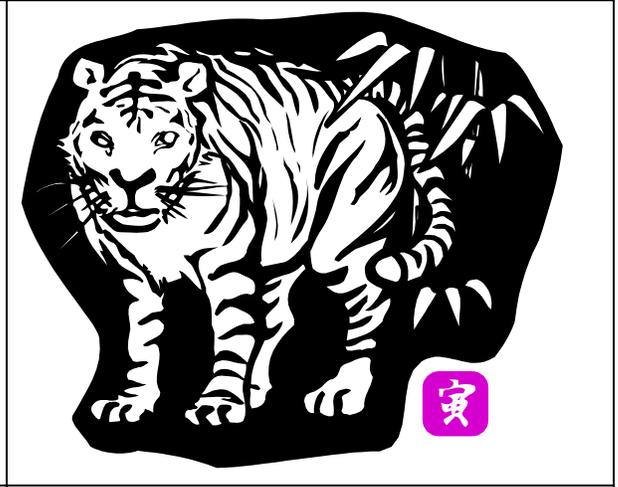
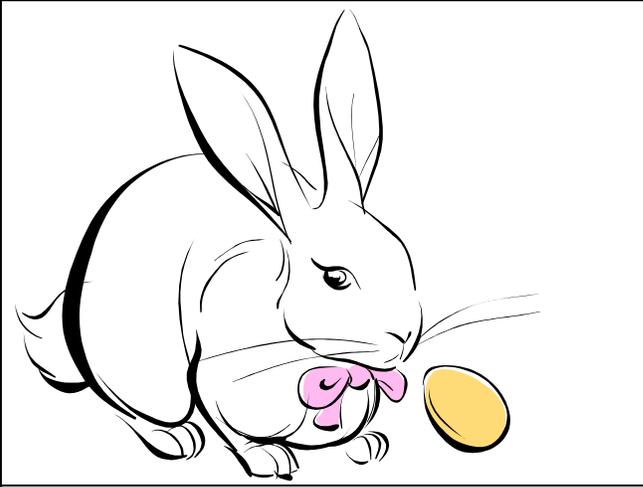


job, Matey!

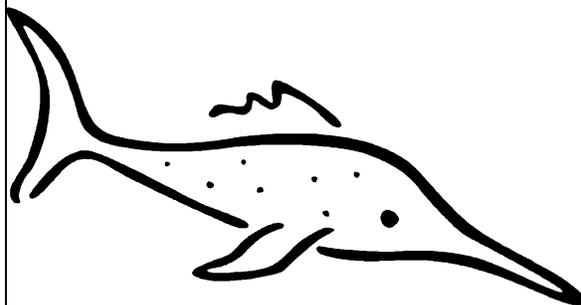
Arrgh!

Name \_\_\_\_\_ Date \_\_\_\_\_

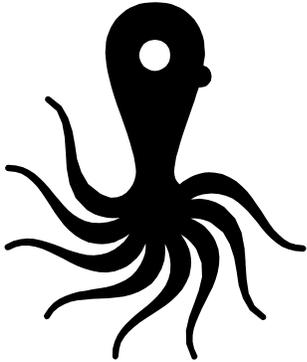
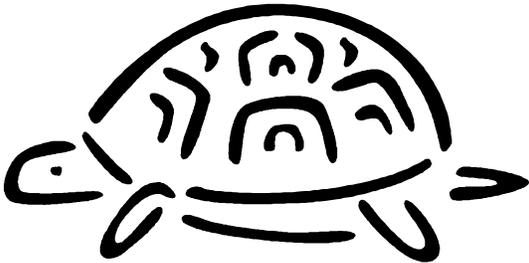
Animal Cards



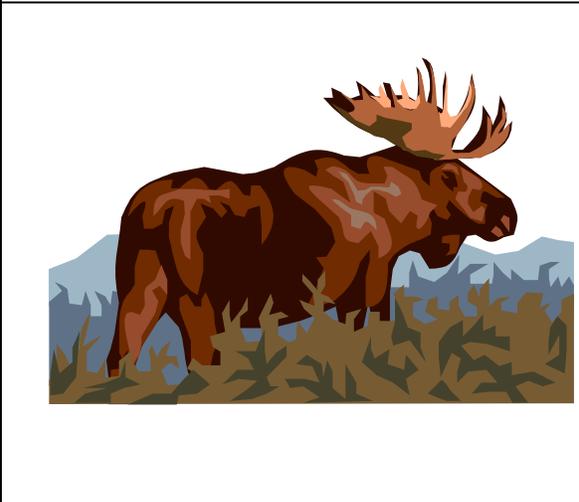
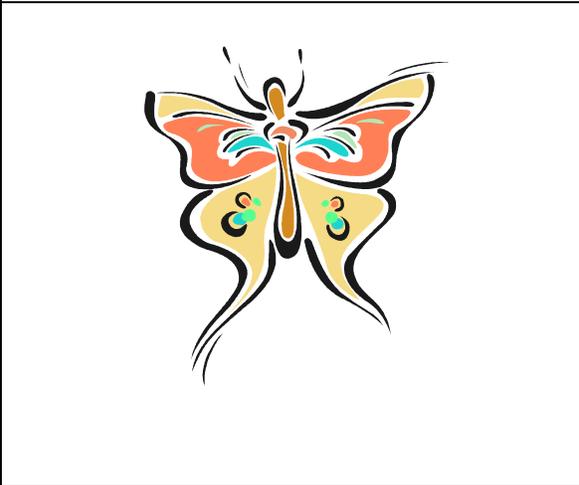
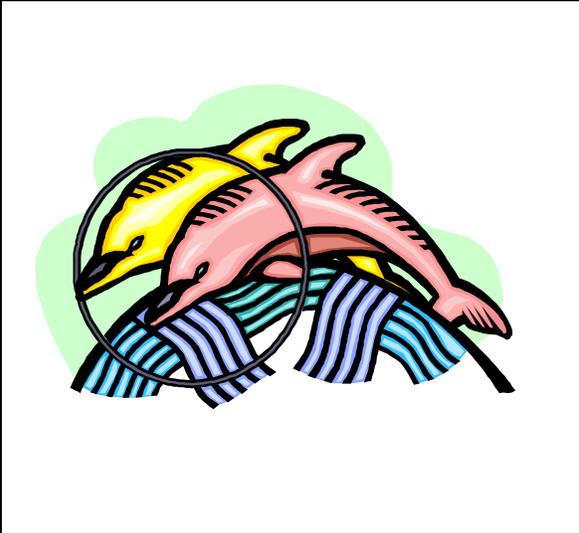
Animal Cards



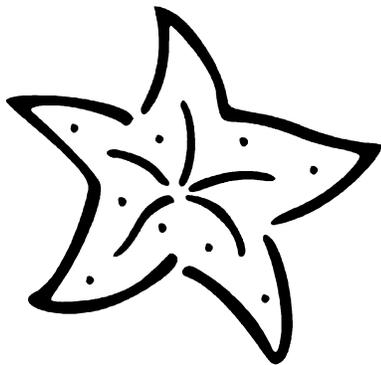
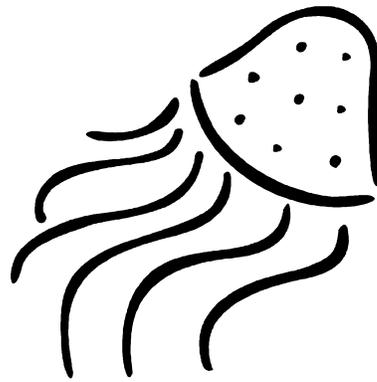
Animal Cards

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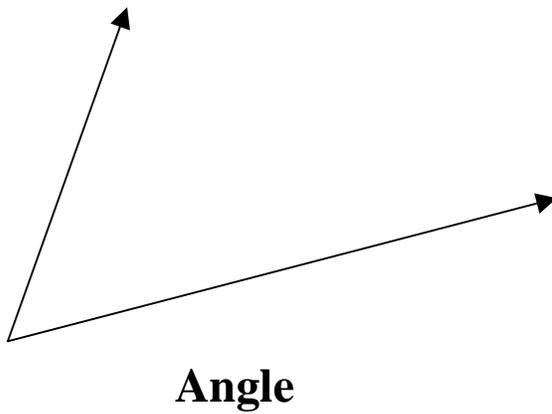
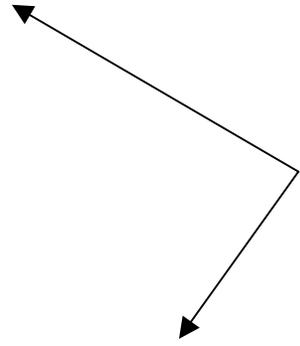
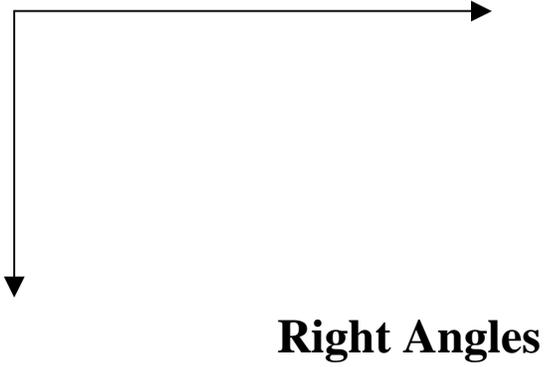
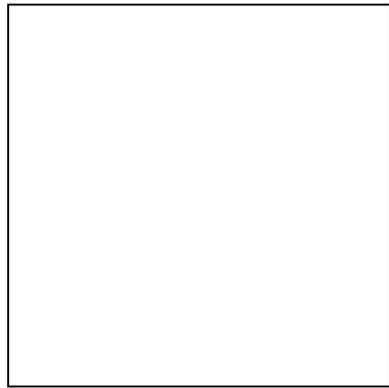
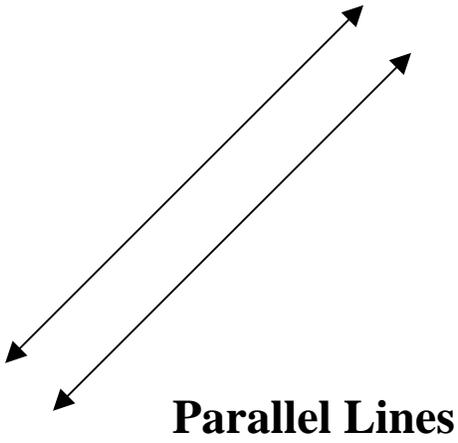
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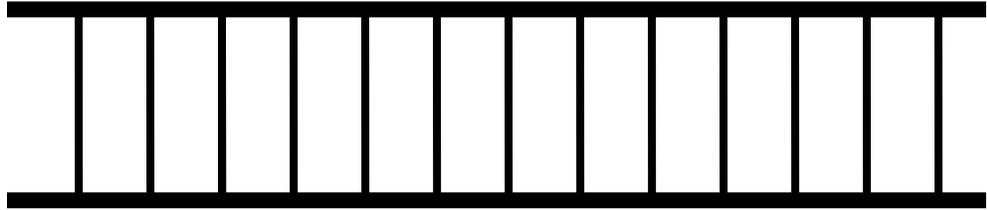


Animal Cards



# Angles, Parallel Lines, Quadrilaterals, and Right Angles

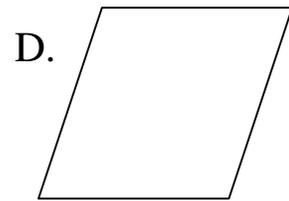
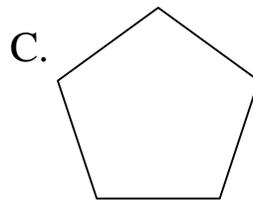
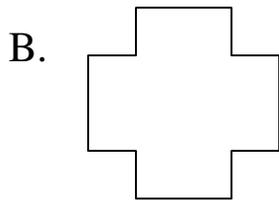
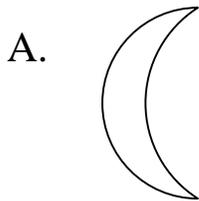






# Puzzling Parallels

Part A. Circle the figures with parallel lines.



Part B.

Using what you know about geometry and parallel lines, explain how you know your answer is correct.

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Name \_\_\_\_\_ Date \_\_\_\_\_

## Grading Rubric For Puzzling Parallels BCR

Score	Criteria
2	<ul style="list-style-type: none"> <li>○ Effective use of a strategy to correctly solve the problem</li> <li>○ Applied mathematical thinking and reasoning correctly</li> <li>○ Used appropriate vocabulary to fully explain the solution</li> <li>○ Used numbers, words, and/or diagrams</li> </ul>
1	<ul style="list-style-type: none"> <li>○ Used a strategy to solve the problem</li> <li>○ Attempted to apply mathematical thinking and reasoning</li> <li>○ Used appropriate vocabulary to fully explain the solution</li> <li>○ Used numbers, words, and/or diagrams</li> </ul>
0	<ul style="list-style-type: none"> <li>○ Ineffective use of a strategy to solve the problem correctly</li> <li>○ No attempt to apply mathematical thinking and reasoning</li> <li>○ Left the answer blank.</li> </ul>

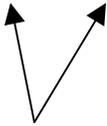
**Geometric Terms Labels**

circle	square
triangle	oval
right angle	angle
quadrilateral	parallel lines
pentagon	hexagon
rectangle	



# What's My Line?

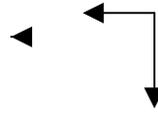
1. Write the word "Yes" under each example of a right angle.



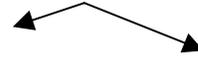
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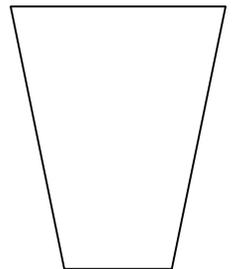
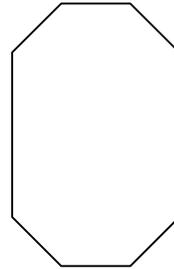
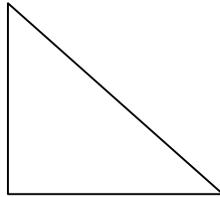
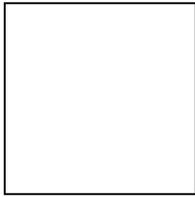


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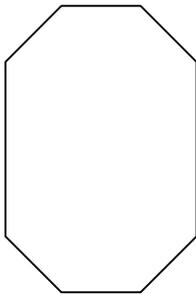


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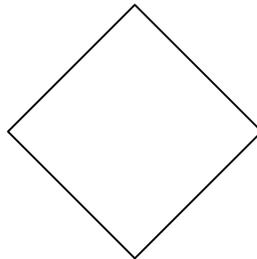
2. Circle each example of a figure with parallel lines. Show which lines are parallel by coloring them with the same color.



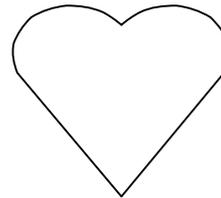
3. Write the word "Yes" under each example of a quadrilateral.



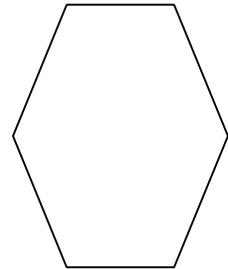
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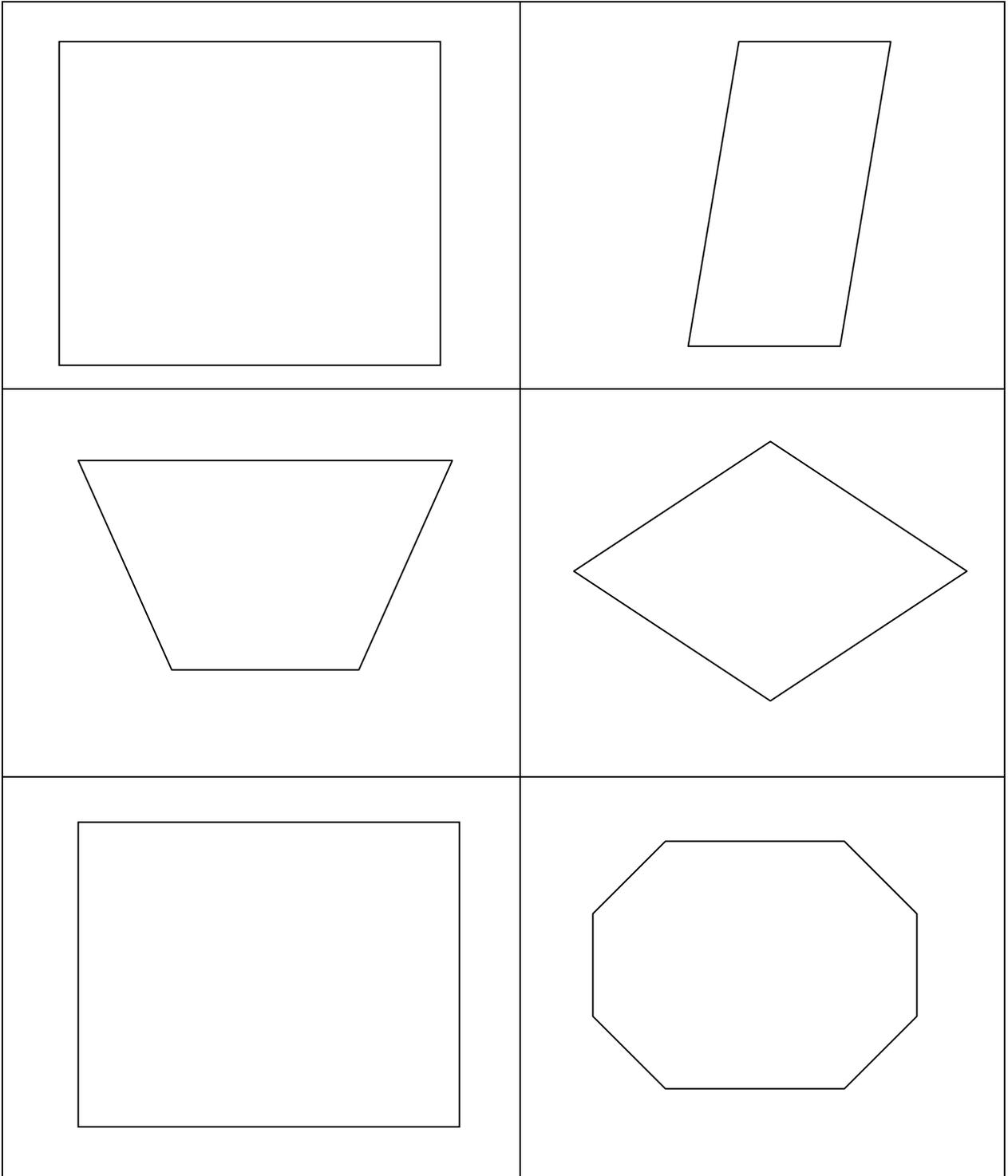
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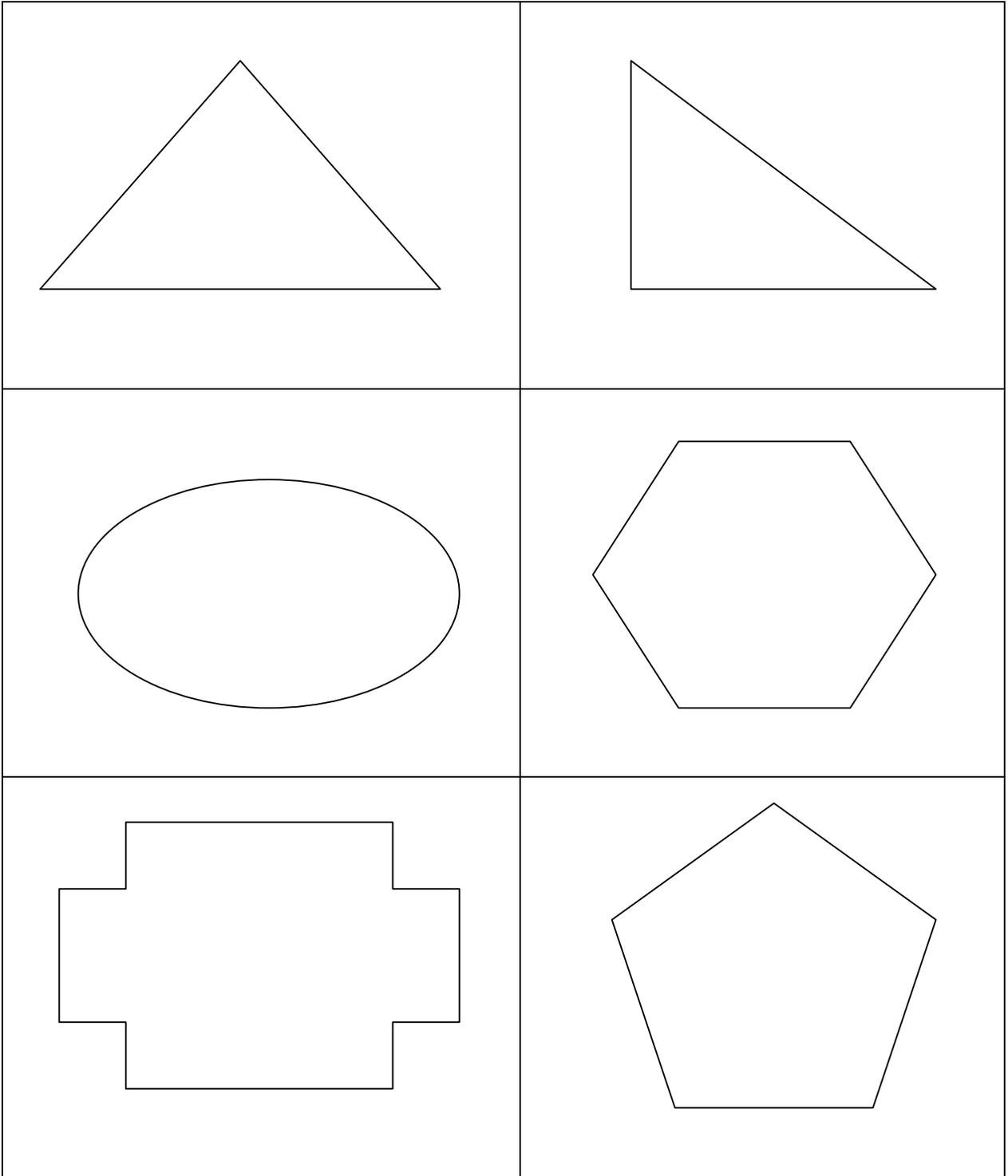
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Name \_\_\_\_\_ Date \_\_\_\_\_

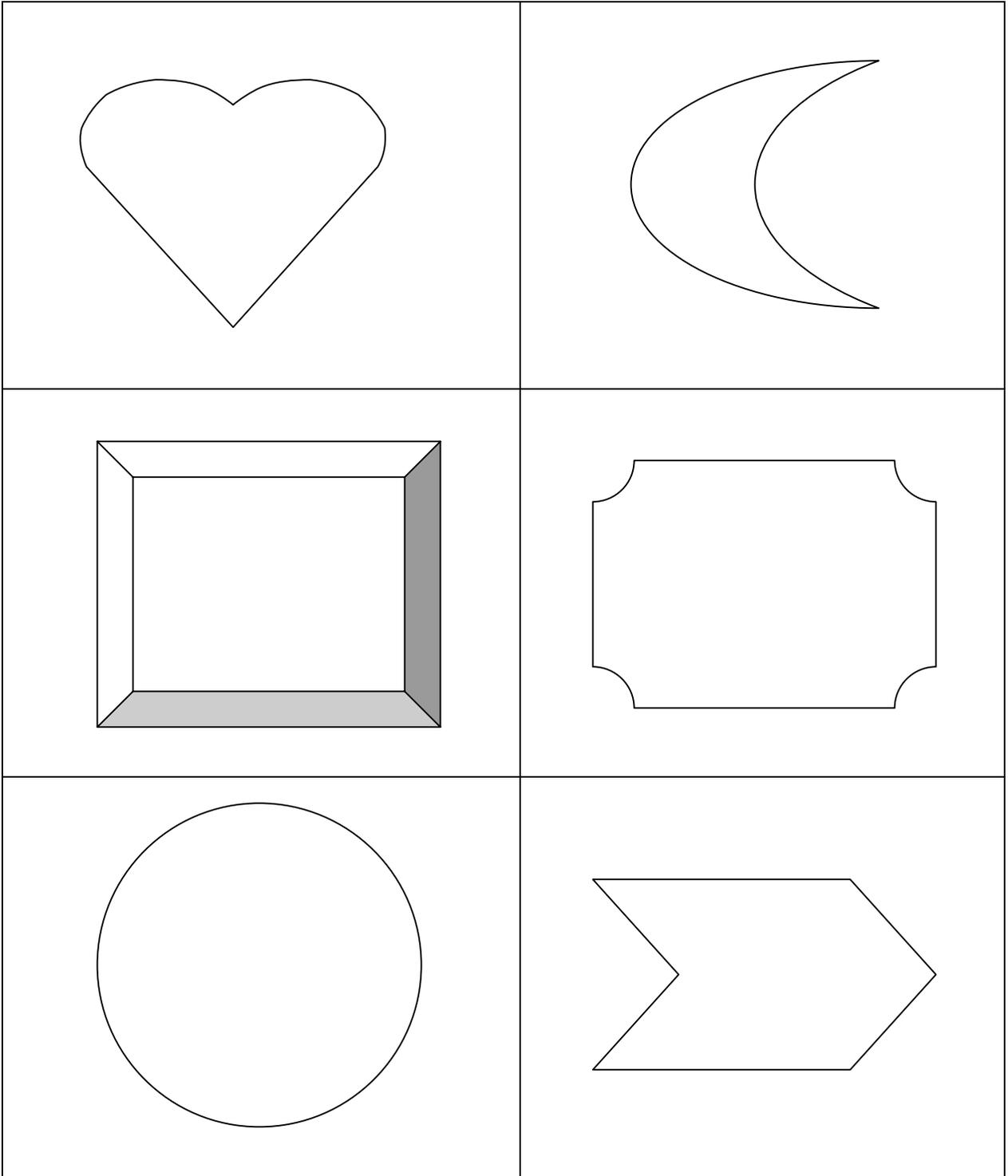
**Geometric Shape Cards**



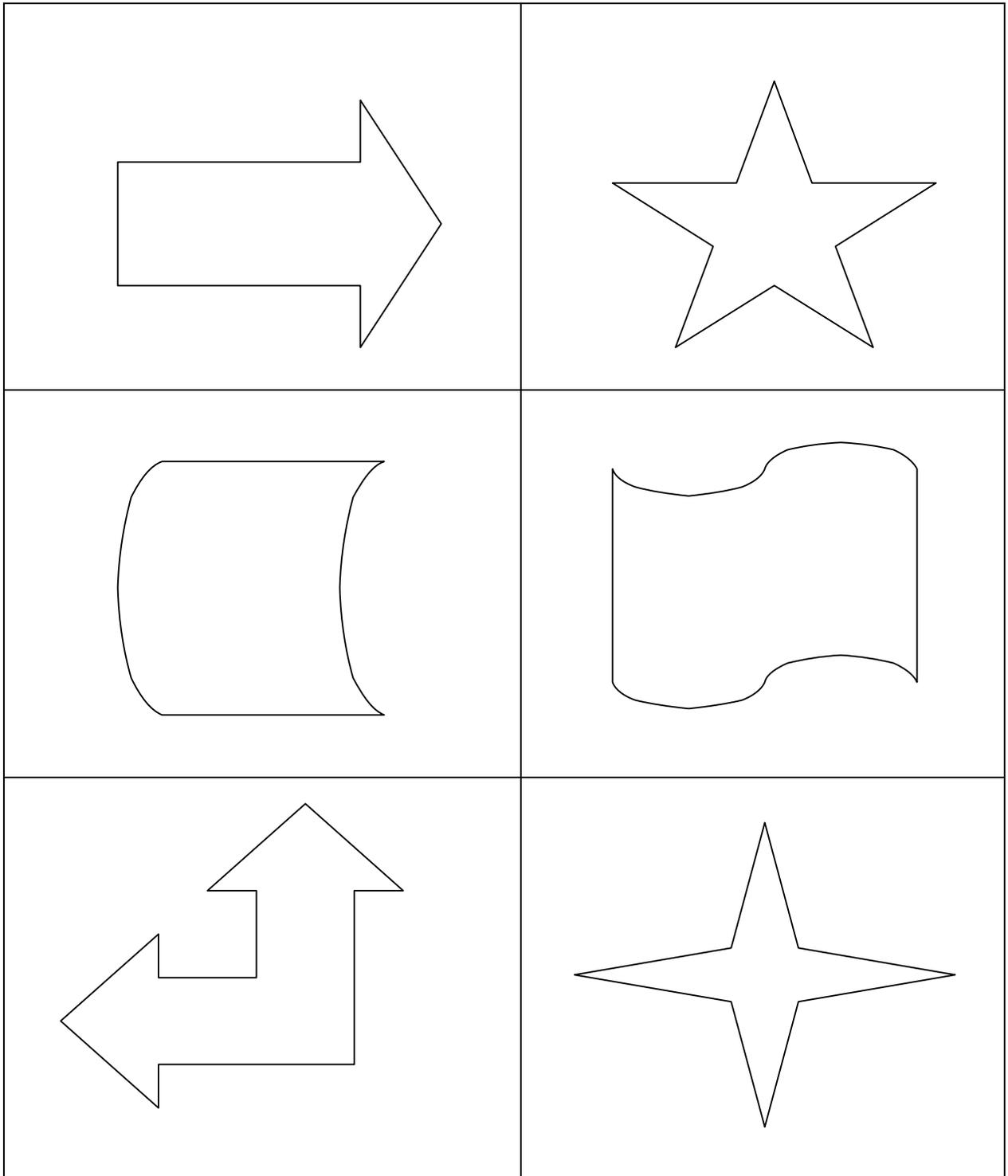
**Geometric Shape Cards**



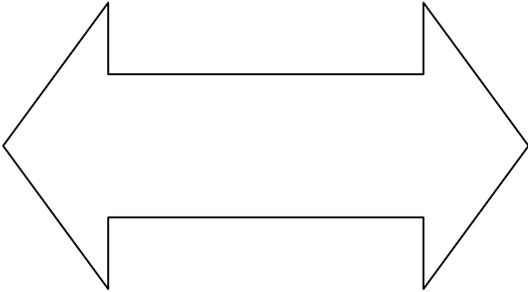
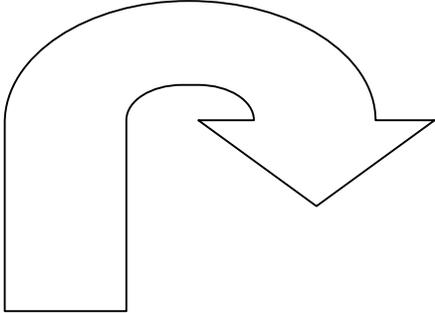
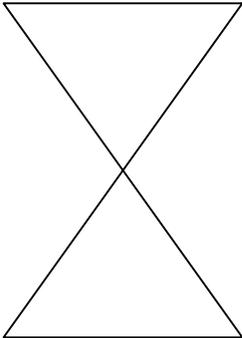
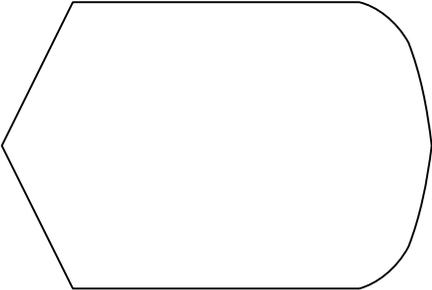
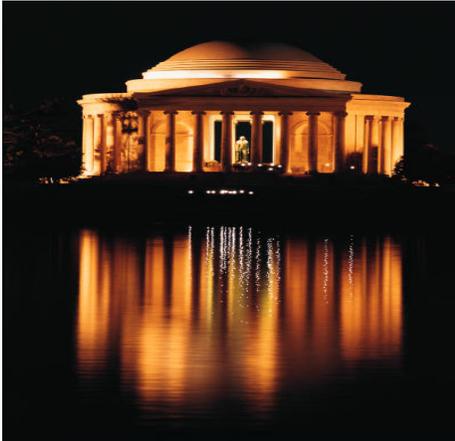
**Geometric Shape Cards**



Geometric Shape Cards



Geometric Shape Cards



# CREATE A CREATURE

## Part One – Creature Construction

1. On a piece of white construction paper, use pattern blocks to design your own creature. Be sure to use at least 4 different pattern blocks in your design. You may use each kind of block more than one time.
2. Draw an outline around the entire creature.
3. Trace the outline of each individual piece where it fits.  
**\*\*Accommodation for students experiencing difficulty with tracing. - Teacher/Instructional Assistant may need to provide assistance or may have the student skip this step.**
4. Color in your creature.

## Part Two – Sorting and Classifying

1. Use the Attribute Sorting Chart to sort your shapes.
2. Trace the outline of each shape in the appropriate categories.

# Create a Creature

**Right Angles**

**Parallel Lines**

**Quadrilaterals**

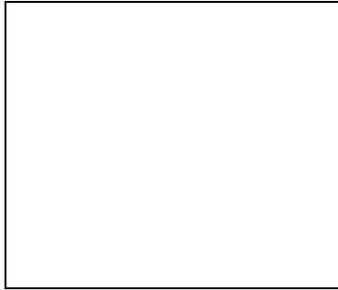
Name \_\_\_\_\_ Date \_\_\_\_\_

# CRAZY CRITTERS

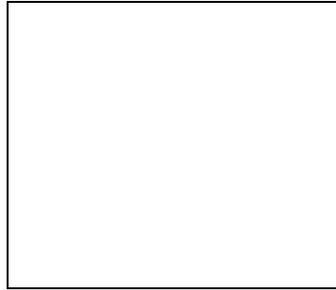
## Summative Assessment

1. Draw an example of each of the following:

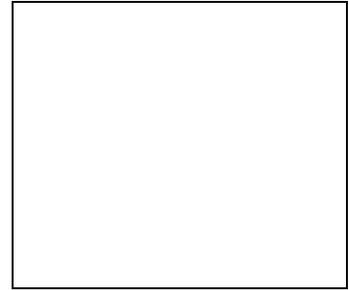
a. Rectangle



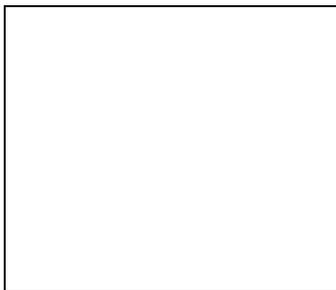
b. Triangle



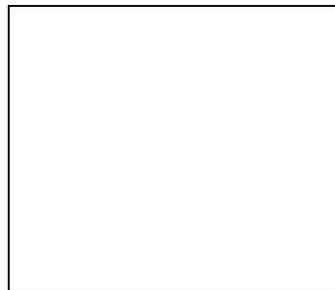
c. Oval



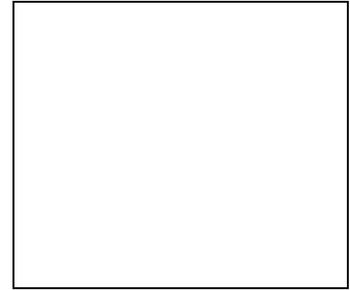
d. Quadrilateral



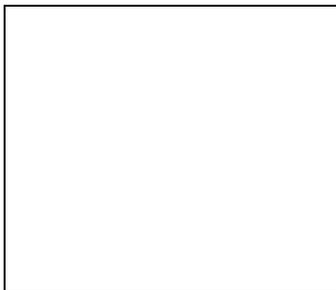
e. a shape with parallel lines



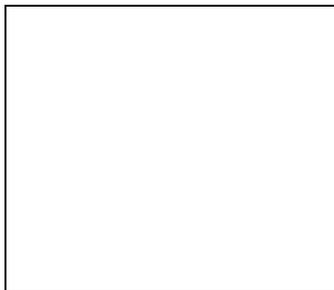
f. a shape with a right angle.



g. Pentagon



h. Hexagon



Name \_\_\_\_\_ Date \_\_\_\_\_

2a. Name the shape below? \_\_\_\_\_



2b. Using what you know about geometry, describe all of the attributes you can identify in this shape.

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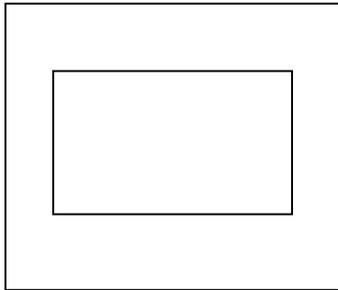
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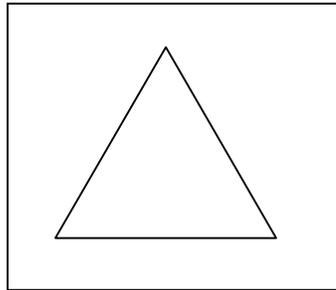
Summative Assessment  
Assessment Key

1. Draw an example of each of the following:  
Student responses do not need to mirror answers in the assessment key but should reflect student knowledge of basic shapes.

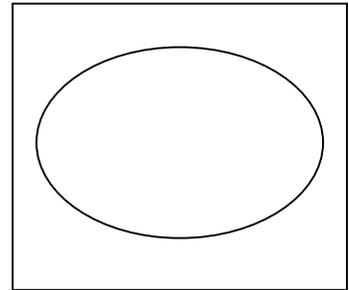
a. Rectangle



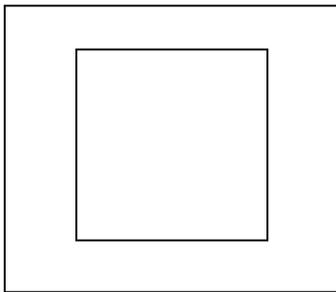
b. Triangle



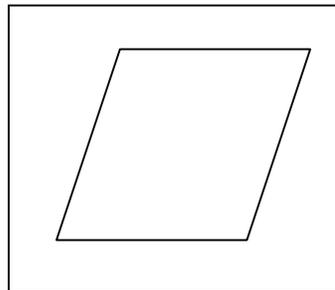
c. Oval



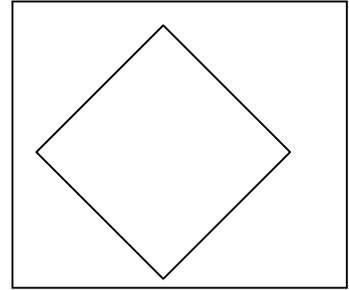
d. Quadrilateral



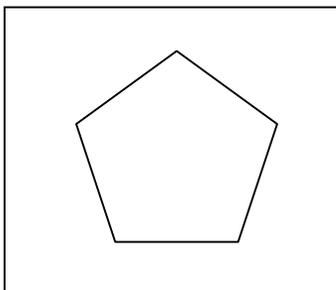
e. a shape with parallel lines



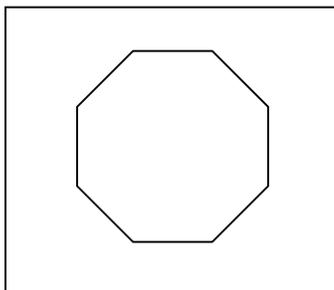
f. a shape with a right angle.



g. Pentagon



h. Hexagon



2a. Name the shape below? rectangle or quadrilateral



2b. Using what you know about geometry, describe all of the attributes you can identify.

Accept a variety of responses. See rubric.

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Score	Criteria
2	<ul style="list-style-type: none"><li>○ Identified two or more attributes</li><li>○ Applied mathematical thinking and reasoning correctly</li><li>○ Used appropriate vocabulary</li><li>○ Used numbers, words, and/or diagrams</li></ul>
1	<ul style="list-style-type: none"><li>○ Identified one attribute</li><li>○ Attempted to apply mathematical thinking and reasoning</li><li>○ Used some appropriate vocabulary</li><li>○ Used numbers, words, and/or diagrams</li></ul>
0	<ul style="list-style-type: none"><li>○ No attributes identified</li><li>○ No attempt to apply mathematical thinking and reasoning</li><li>○ Left the answer blank.</li></ul>