

# DMT INSTITUTE

Developing Mathematical Thinking Institute (DMTI)



Professional  
Development



Curricular  
Resources



Assessment

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# About the DMTI Modules

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The DMTI modules are designed to guide classroom instruction and formative assessment for teachers implementing the DMTI curricular materials.

The lessons are not necessarily intended for a single day of instruction. Teachers are encouraged to use their professional judgement regarding pacing. A suggested number of weeks is provided.

# DMTI Day Overview

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Overall, each module highlights historical and/or cultural themes used to build the lessons. Each Day should start with a warm-up, one or two major components of a lesson, and a take-away.

## **Components of a DMTI DAY (whether 45, 60, or 90 minutes long)**

*Warmup (3-5 minutes)*

*Lesson Component – Problem Solving Situation*

*Lesson Component – Explanation of math concepts and ideas*

*Lesson Component – Varied Tasks*

*Lesson Component – Varied Practice*

*Takeaway (2-4 minutes)*

# DMTI Lesson Component Overview

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Overall, each module highlights historical and/or cultural themes used to build the lessons. Each Lesson will focus on one or more of the following Lesson Components:

**Lesson Component – Problem Solving Situation** (~3 to 10 minutes)

**Lesson Component – Explanation of Math Concepts and Ideas** (~3 to 5 minutes; explanation of math concepts and ideas (with historically, culturally relevant and mathematically accurate ideas)

**Lesson Component – Varied Tasks** (~10-20 minutes; Completed together, in small groups or individually)

**Lesson Component – Varied Practice** (~15-30 minutes; Enactive, Iconic, Symbolic or Context, Iconic, and Symbolic)

**Lesson Review** (After every few lessons a review with different questions – skill, problem solving, conceptual, and justification – will be incorporated as both practice and a formative assessment or checkpoint for teachers.)

# Grade K

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GEOMETRY AND SPATIAL REASONING

*2-3 WEEKS*

# Module Sequence

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**Warm Ups:** Mini-lessons to build fluency and understanding

**Lesson 1:** Shape Names

**Lesson 2:** Shape Practice

**Lesson 3:** Shape Sort

**Lesson 4:** Shapes Around Us

**Lesson 5:** Pattern Block Shape Composing

**Lesson 6:** Shape Concentration

**Lesson 7:** Relative Positions

**Lesson 8:** Shape Scavenger Hunt

# Geometry and Spatial Reasoning

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## Materials

- Scissors
- Print Templates
- Pattern Blocks

# Warm Up Tasks

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BUILDING UNDERSTANDING AND FLUENCY



# Warm Up Tasks

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The following tasks are intended to be used at the beginning, or in the middle of lessons, in order to increase engagement and to develop students' fluency with mathematical operations.

These tasks are not intended to be taught until mastery. They are meant to be short duration (3-5 minutes) with a high frequency (every lesson) for the purpose of enhancing the mathematical environment of the classroom.

These tasks do not necessarily align with the content of the lessons in this unit. The content addressed by the warm ups varies.

# Warm Up: How many?

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1. Present the picture to the child for less than a second and then click on the next slide?
2. Ask, “How many do you see?”
3. Encourage students to begin seeing quantities and patterns (instead of always counting).

# Warm Up: How many?

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How many do you see?

How many do you see?

# Warm Up: How many?

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How many do you see?

How many do you see?

# Warm Up: How many?

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How many do you see?

How many do you see?

# Warm Up: How many?

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How many do you see?

How many do you see?

# Grade K

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*GEOMETRY: TWO-DIMENSIONAL SHAPE AND SPACE*

# Module Sequence

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**Lesson 1:** Shape Sort: 2-D

**Lesson 2:** Shape Names: 2-D

**Lesson 3:** Shape Practice: 2-D

**Lesson 4:** Pattern Block Shape Composing

**Lesson 5:** Shape Concentration

**Lesson 6:** 2-D Shape Attributes

**Lesson 7:** Relative Positions

**Lesson 8:** Centers – Constructing 2-D Shapes

**Lesson 9:** Shapes in the World: Scavenger Hunt

**Lesson 10:** Centers – Puzzles & Games



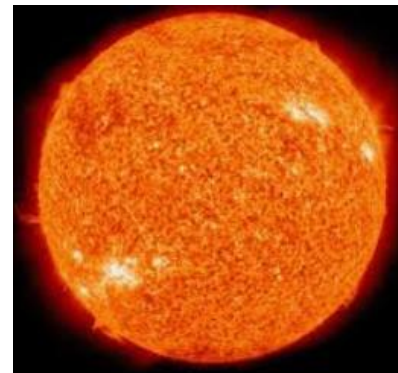
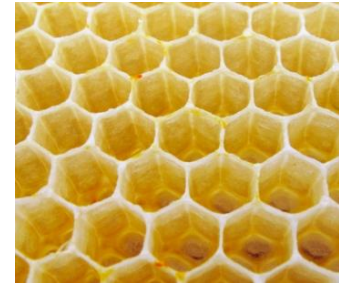
# Lesson 1

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## SHAPE NAMES

# Lesson 1: Warm up

What do you see?



# Lesson 1: Shape Names

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We are going to name 5 two-dimensional (or flat) **shapes** and describe their **attributes** (characteristics).

Shape

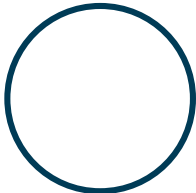



Shape Name

Attributes

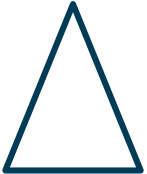



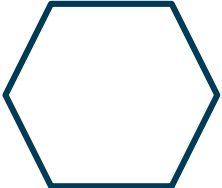

# Lesson 1: Shape Names

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Name these 5 two-dimensional (or flat) shapes and state their attributes.

<u>Shape</u>		<u>Shape Name</u>	<u>Attributes</u>
		Circle	Round, curved lines, no straight lines
		Square	Four straight lines, all the same length, and four equal angles

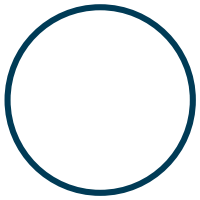
# Lesson 1: Shape Names

<u>Shape</u>		<u>Shape Name</u>	<u>Attributes</u>
	 <div>What is the name of this shape?</div>	Triangle	Three straight lines
	 <div>What is the name of this shape?</div>	Rectangle	Four straight lines, two are longer, four equal angles
	 <div>What is the name of this shape?</div>	Hexagon	Six straight lines

# Lesson 1: Review

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Name these flat shapes and state their **attributes**.



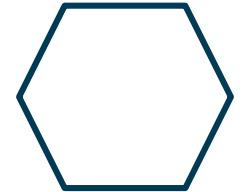
*Circle*

*Round  
Curved lines  
No straight lines*



*Triangle*

*Three straight lines*



*Hexagon*

*Six straight lines*



*Square*

*Four straight lines  
All the same length  
Four equal angles*



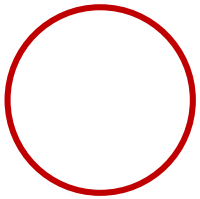
*Rectangle*

*Four straight lines,  
two are longer, four  
equal angles*

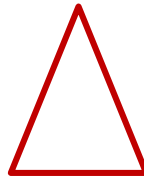
# Lesson 1: Review

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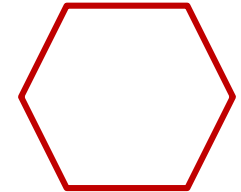
Now have students trace the shape in the air when the shape is named or the attribute is stated.



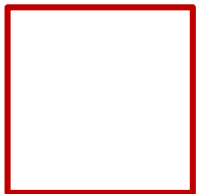
Round  
Curved lines  
No straight lines



Three straight lines



Hexagon



Four straight lines  
All the same length  
Four equal angles

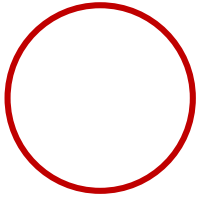


Rectangle

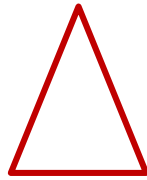
# Lesson 1: Review

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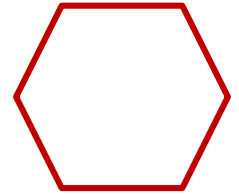
Now have students trace the shape in the air when the shape is named or the attribute is stated.



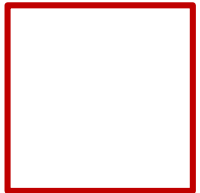
Circle



Triangle



Six straight lines



Square



Four straight lines,  
two are longer, four  
equal angles



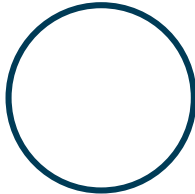
# Lesson 2

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## SHAPE PRACTICE

# Lesson 2: Shape Practice

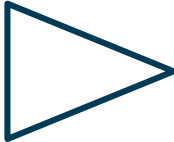
You will be given either the shape, the shape's name, or the shape's attributes. You must try to name or describe the missing ones.

Shape	Shape Name	Attributes
	?	?
?	?	Four straight lines, all the same length, and four equal corners


# Lesson 2: Shape Practice

Shape	Shape Name	Attributes
?	Hexagon	?
	?	?
?	?	Three straight lines

# Lesson 2: Shape Practice

Shape	Shape Name	Attributes
?	Square	?
?	?	Round, curved lines, no straight lines
	?	?

# Lesson 2: Shape Practice

Shape	Shape Name	Attributes
	?	?
?	?	Four straight lines, two are longer, four equal angles
?	Circle	?

# Lesson 2: Shape Name Review

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How many two-dimensional (or flat) shapes did we name?

5

Try naming them from memory?

*Square, Circle,  
Rectangle, Triangle  
Hexagon*

# Lesson 3

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## SHAPE SORT

# Lesson 3: Shape Sort

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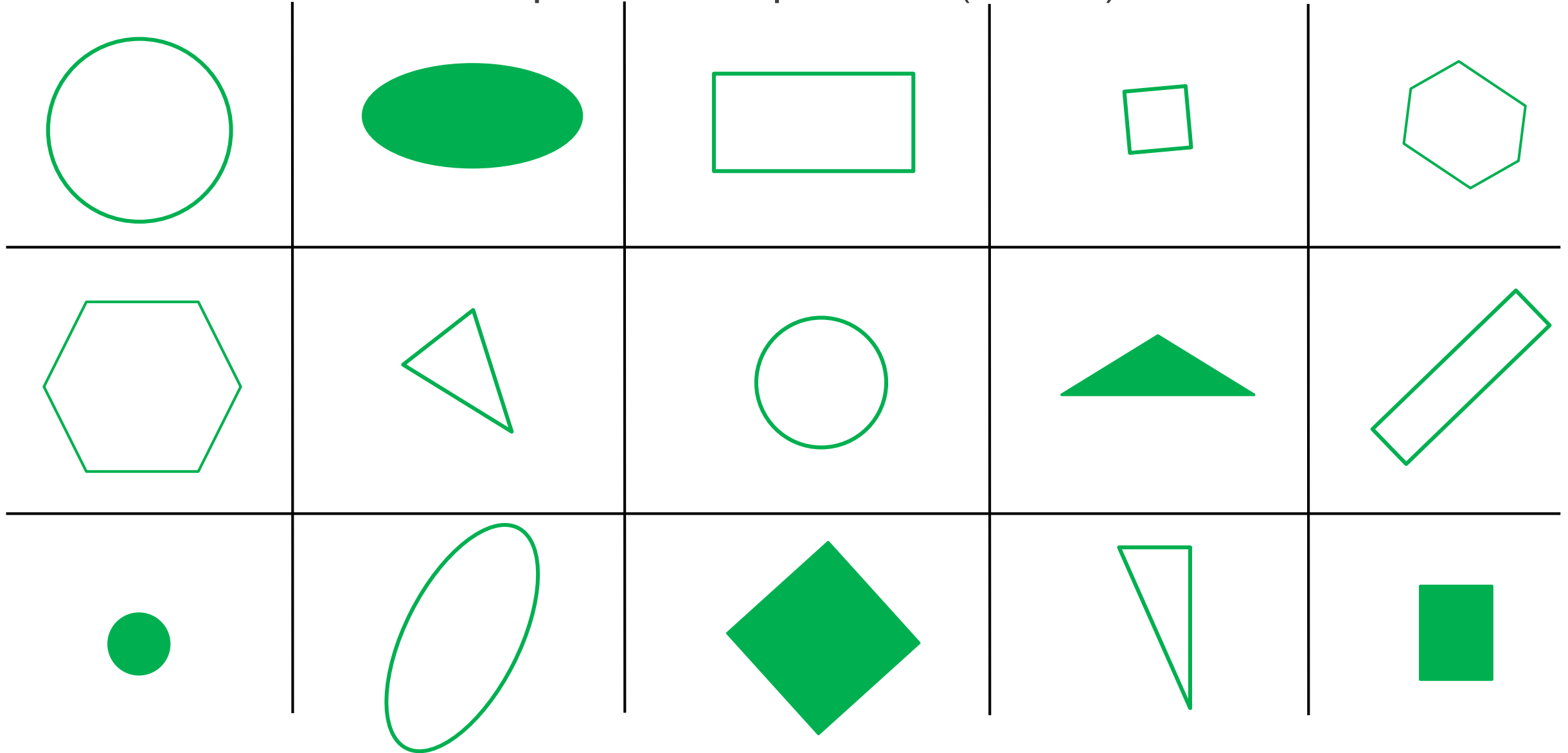
Place shapes (from template 1.1) into each of the two categories (circles on the Shape Sort Mat).

Explain why the shapes in each circle are related.

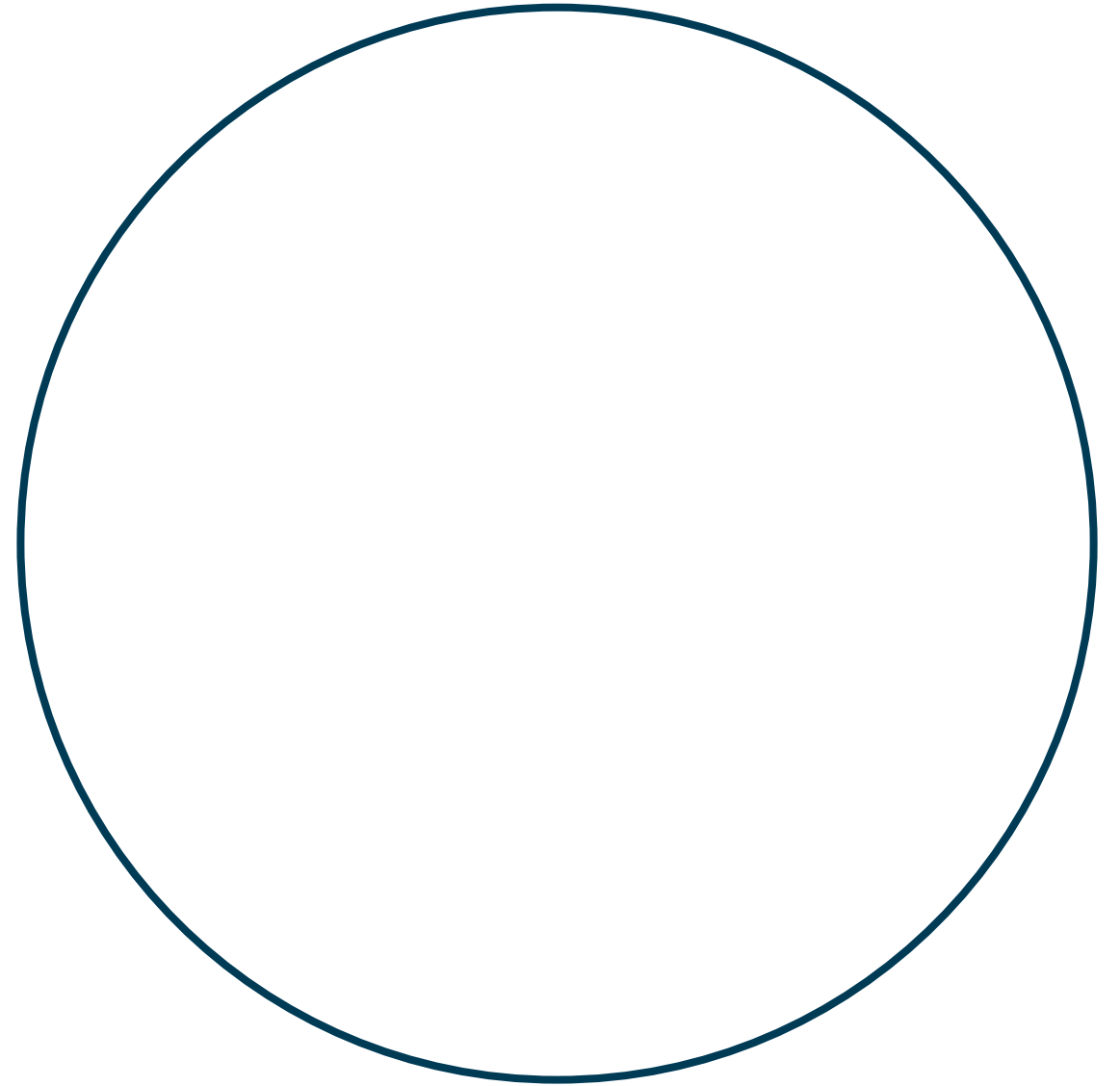
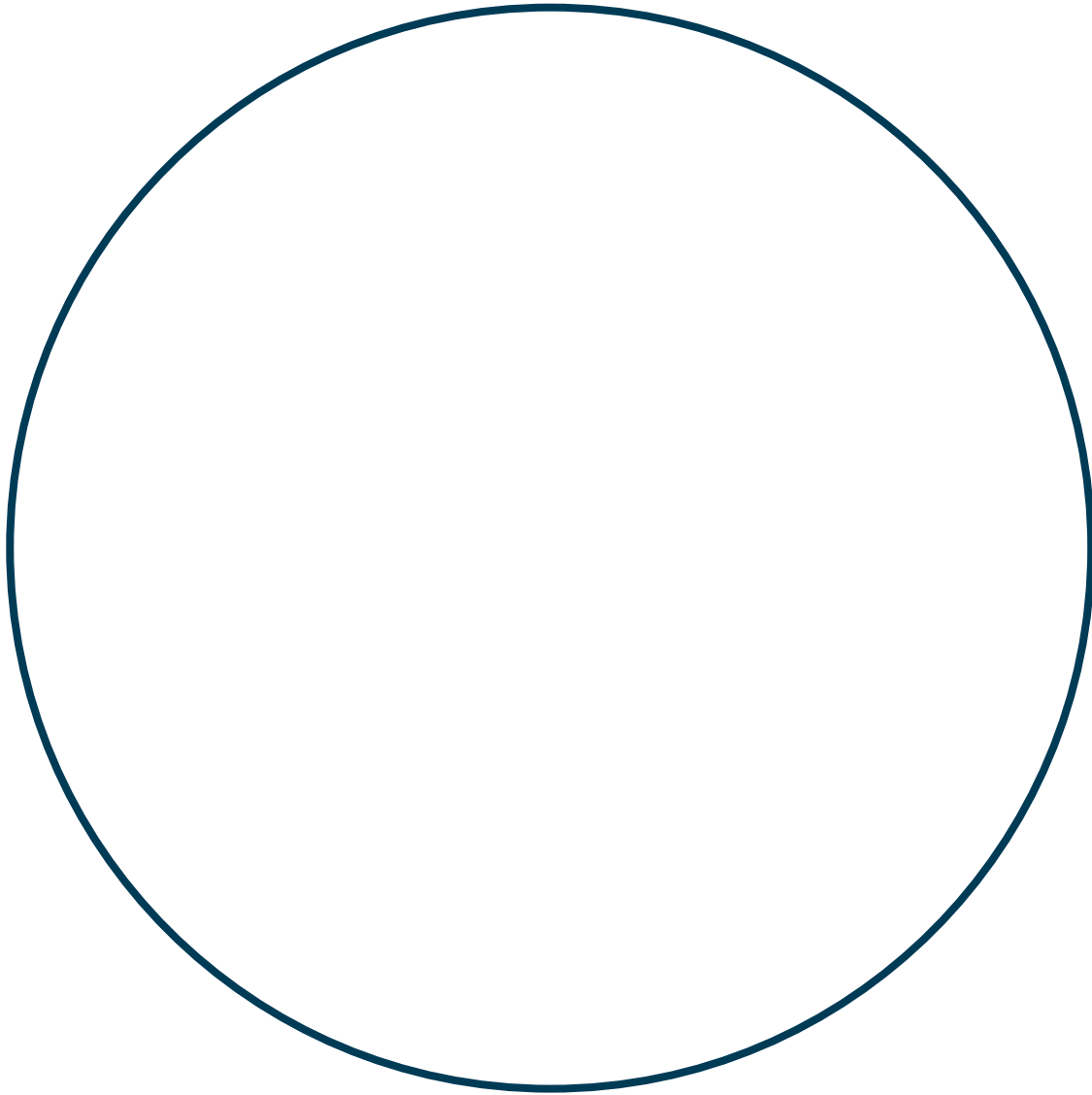
What makes the shapes in one group different than the shapes in the other group?



# Shape Sort Template 3.1 (cut out)



# Shape Sort Mat



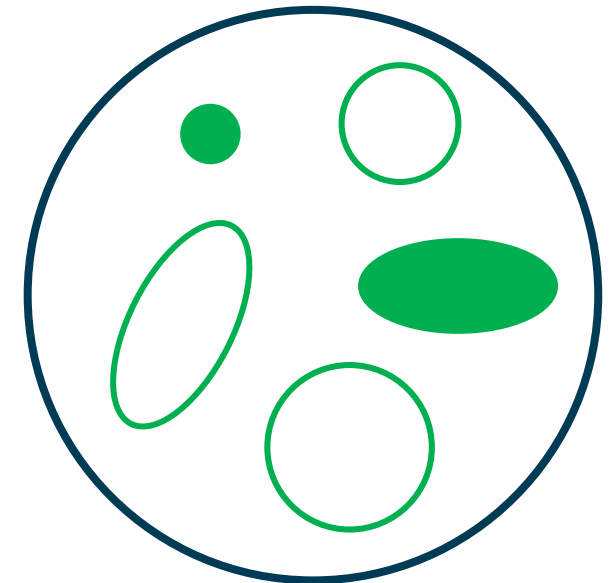
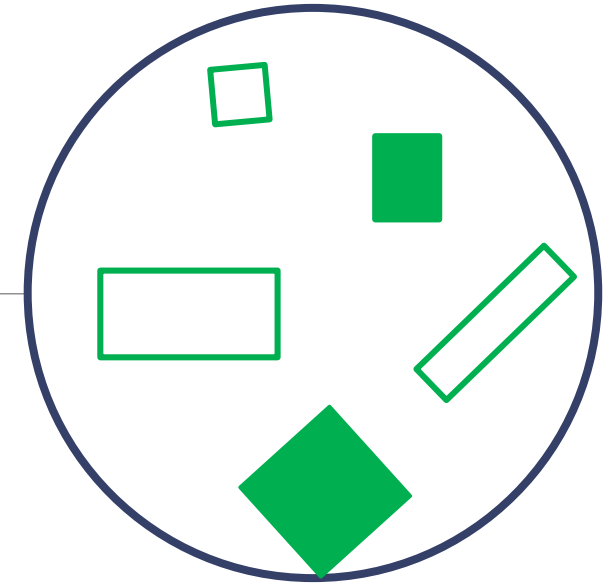
# Lesson 3: Review

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Here is how Emily sorted some of the shapes.

What do you think her rule is for sorting the shapes in each circle?

How are the shapes different between the two circles?



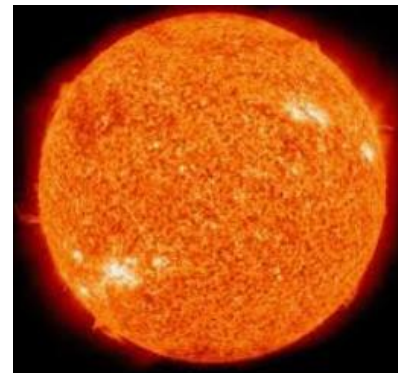
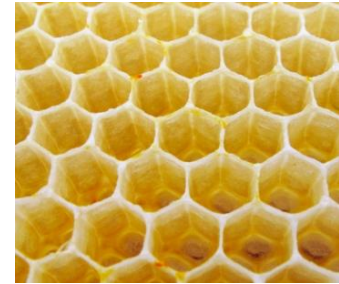
# Lesson 4

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## SHAPES AROUND US

# Lesson 4: Shapes Around Us

Name all the shapes?



# Lesson 5

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## PATTERN BLOCK SHAPE COMPOSING

# Lesson 5: Pattern Block Shape Composing

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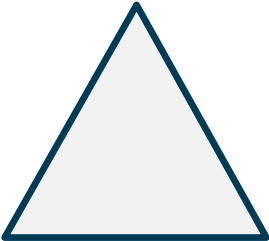
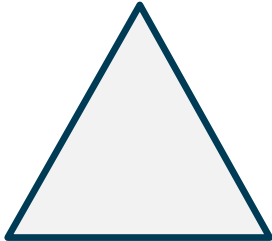
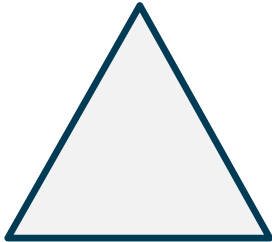
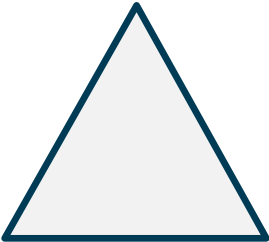
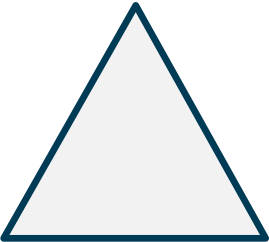
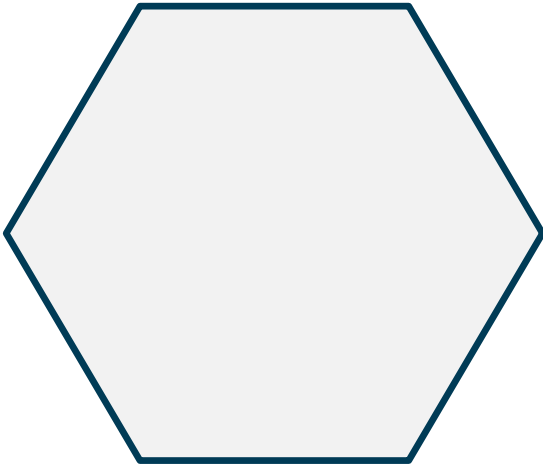
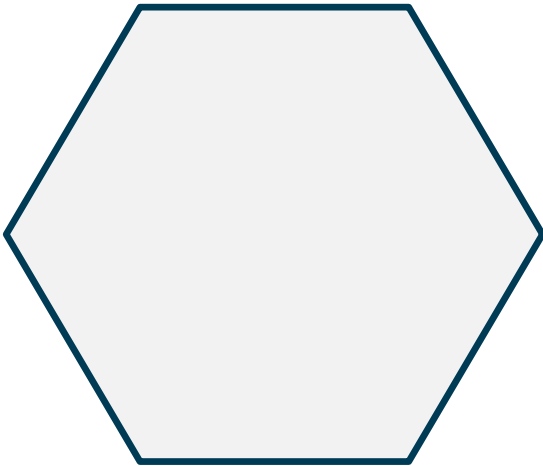
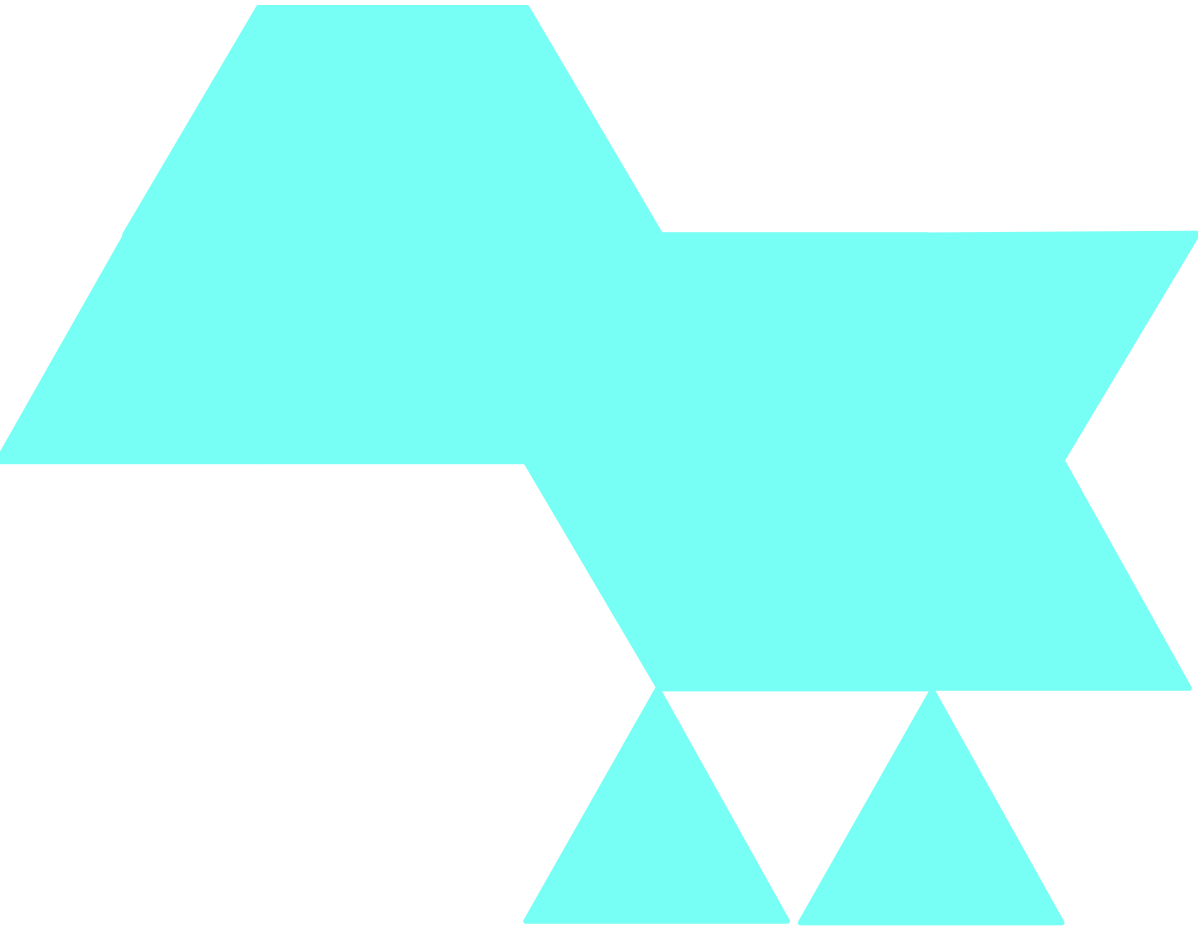
We are going to use pattern blocks to compose the following shapes.

Graph the number of shapes used to build each shape. (Bar Graph Mat)

For each graph,

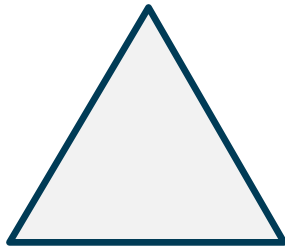
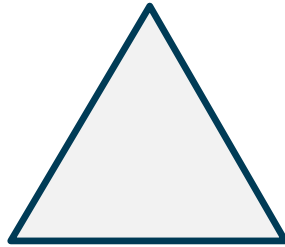
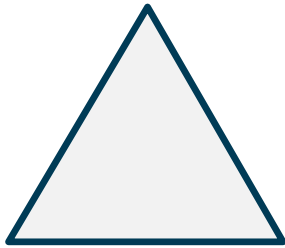
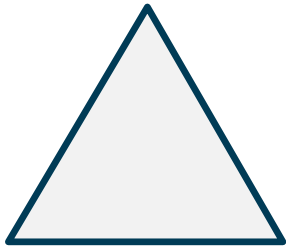
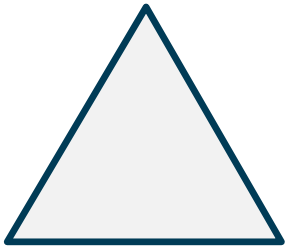
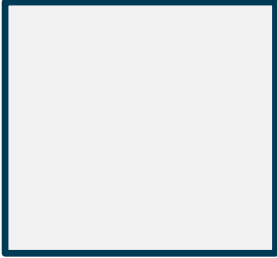
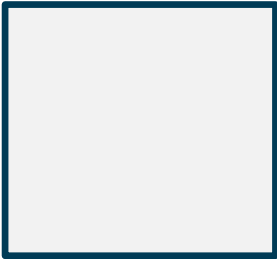
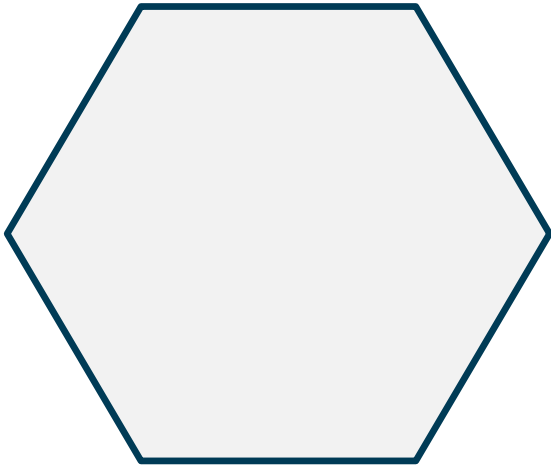
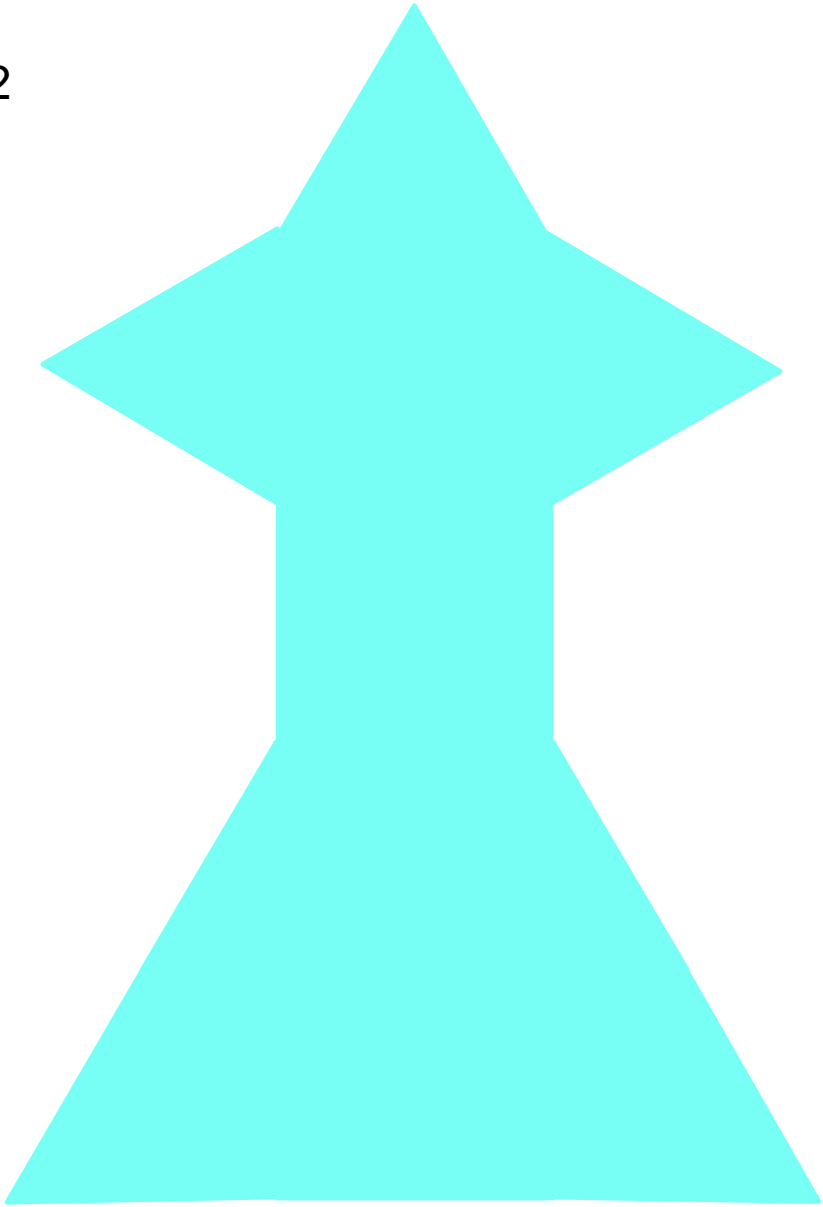
- How many of each shape do you have?
- How many total shapes were used?
- Which shape was used the most?
- Which shape was used the least?

Blackline 5.1

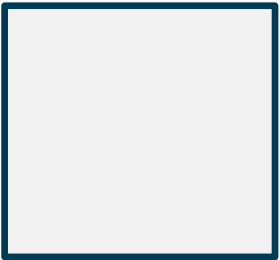
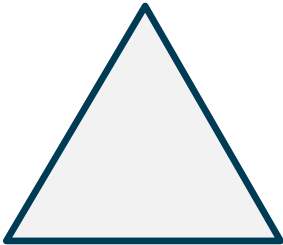
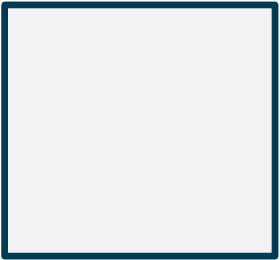
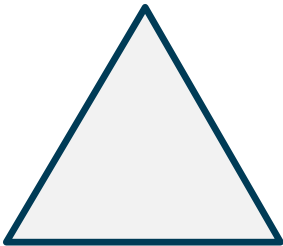
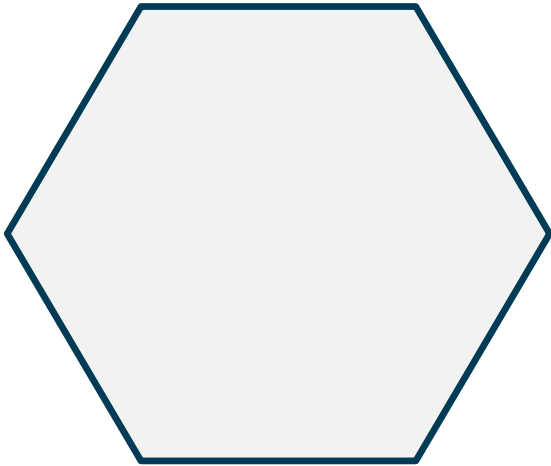
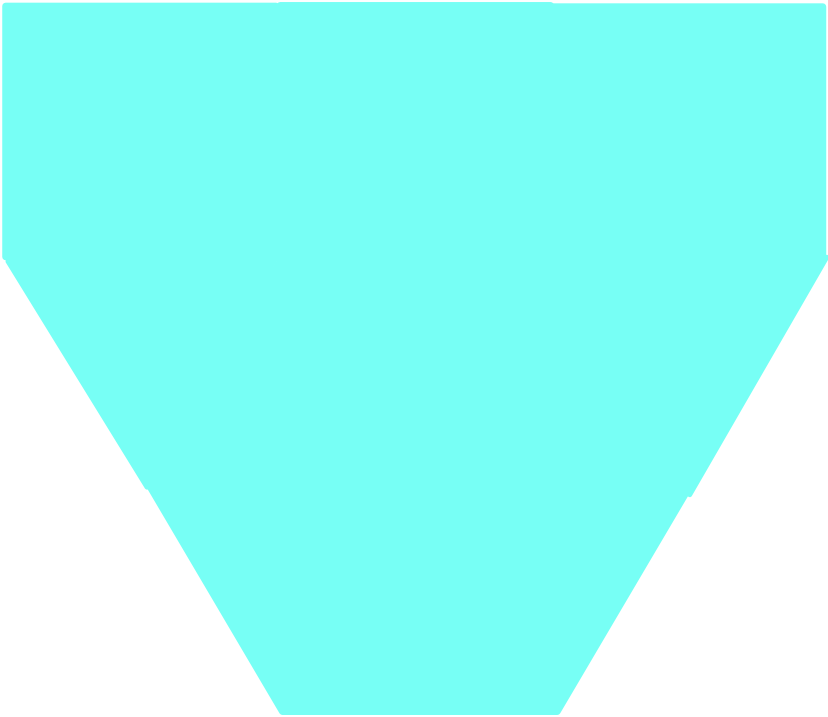




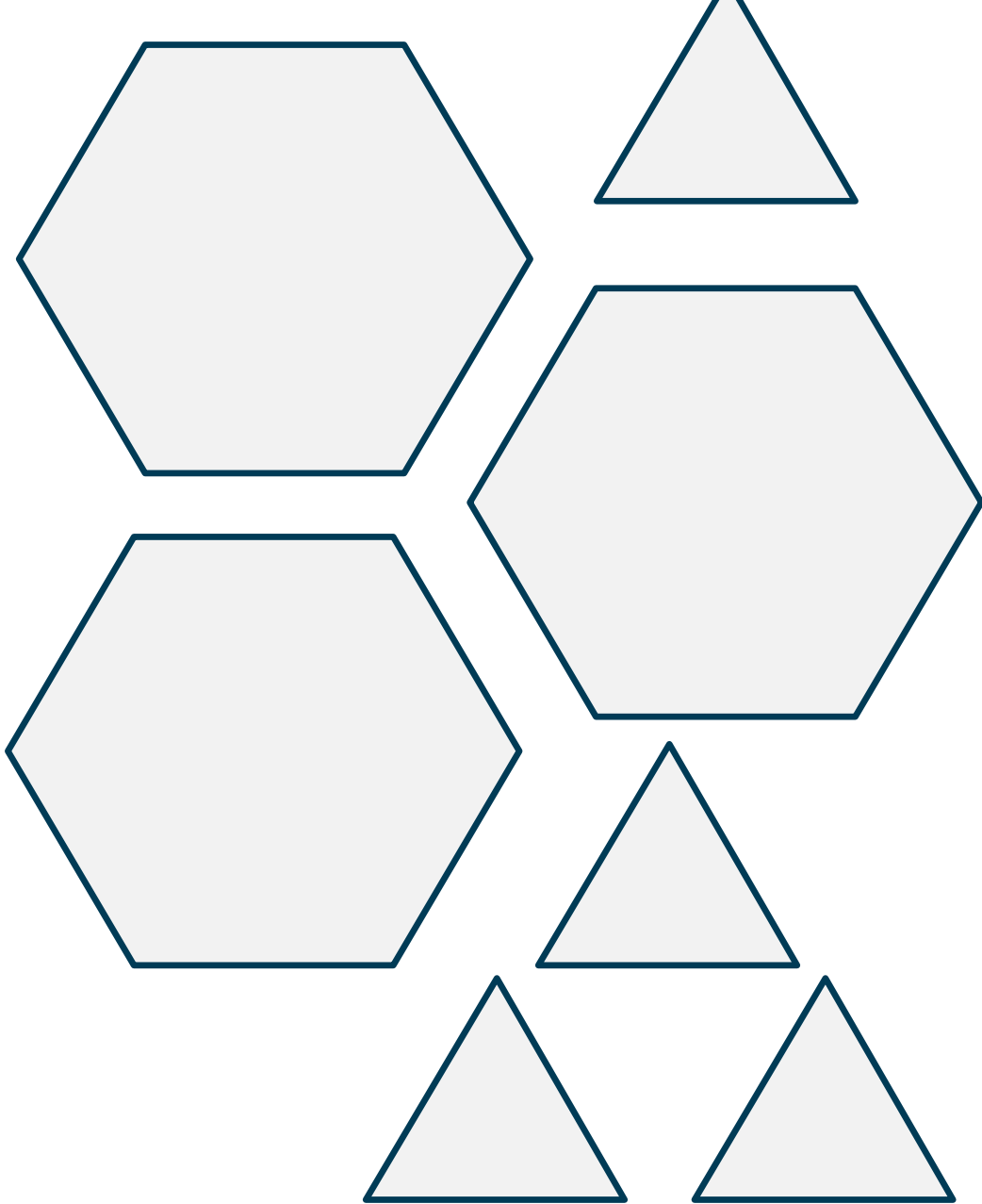
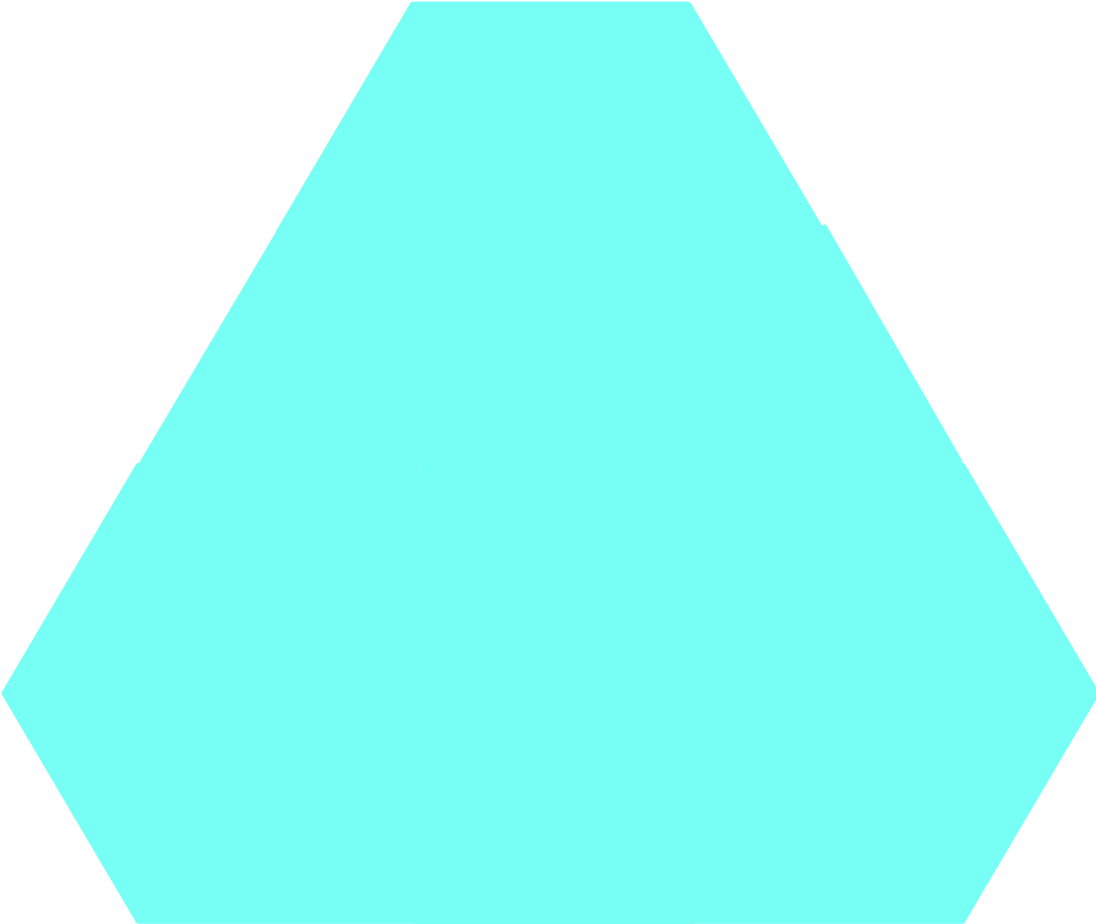
Blackline 5.2



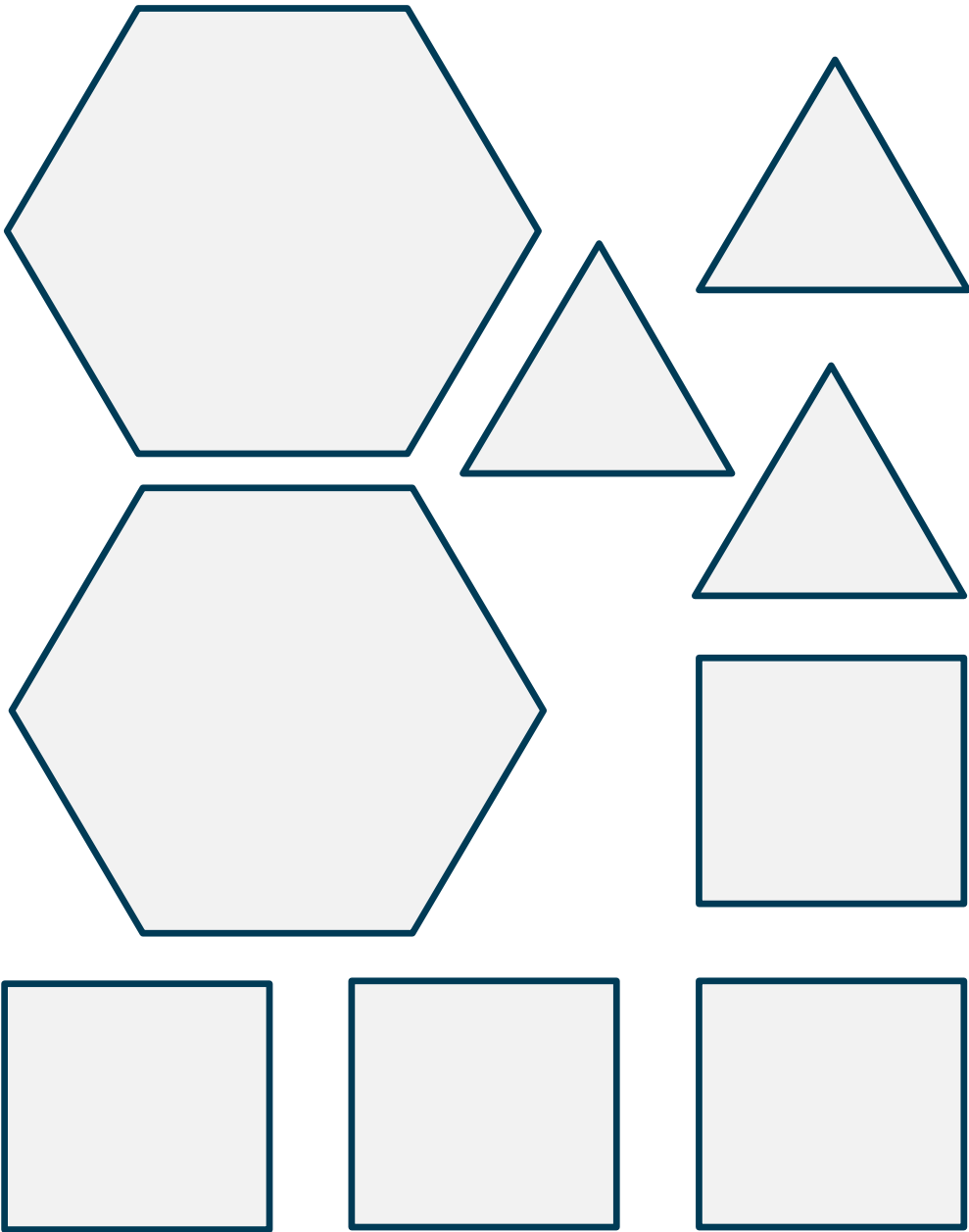
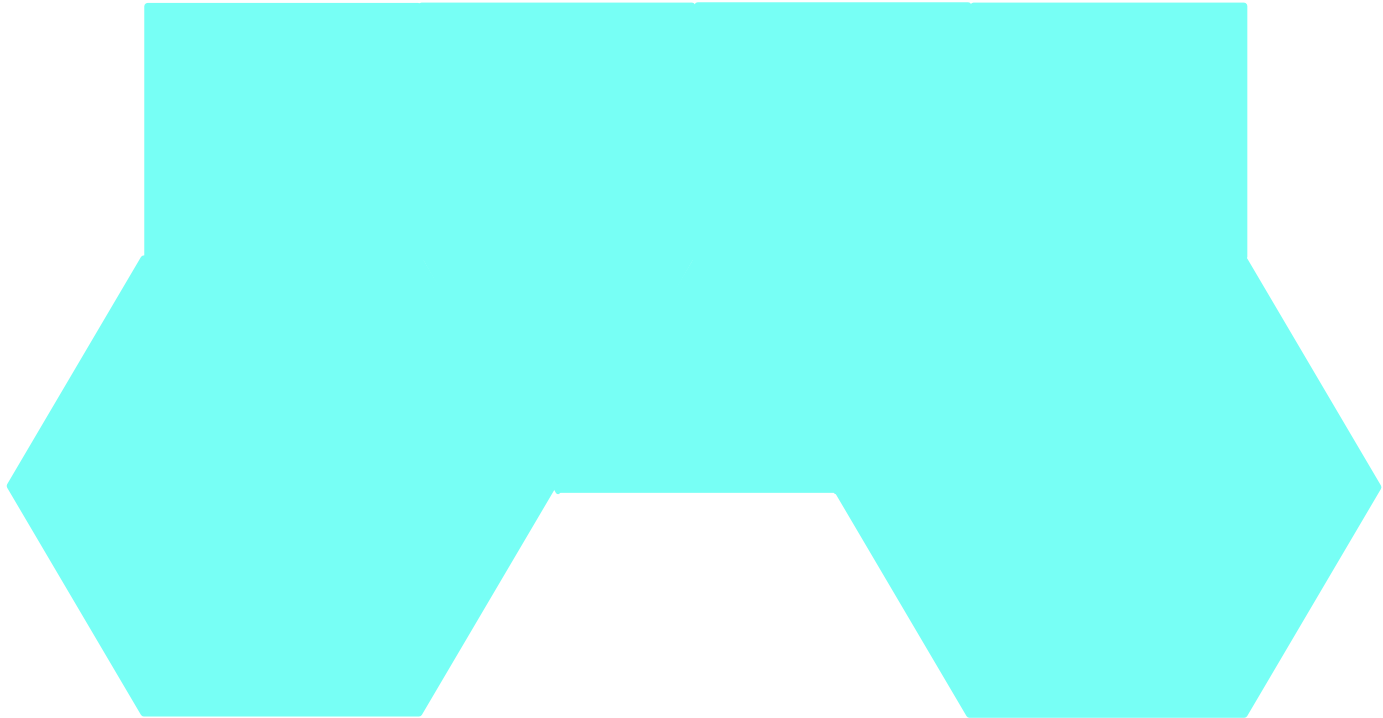
Blackline 5.3

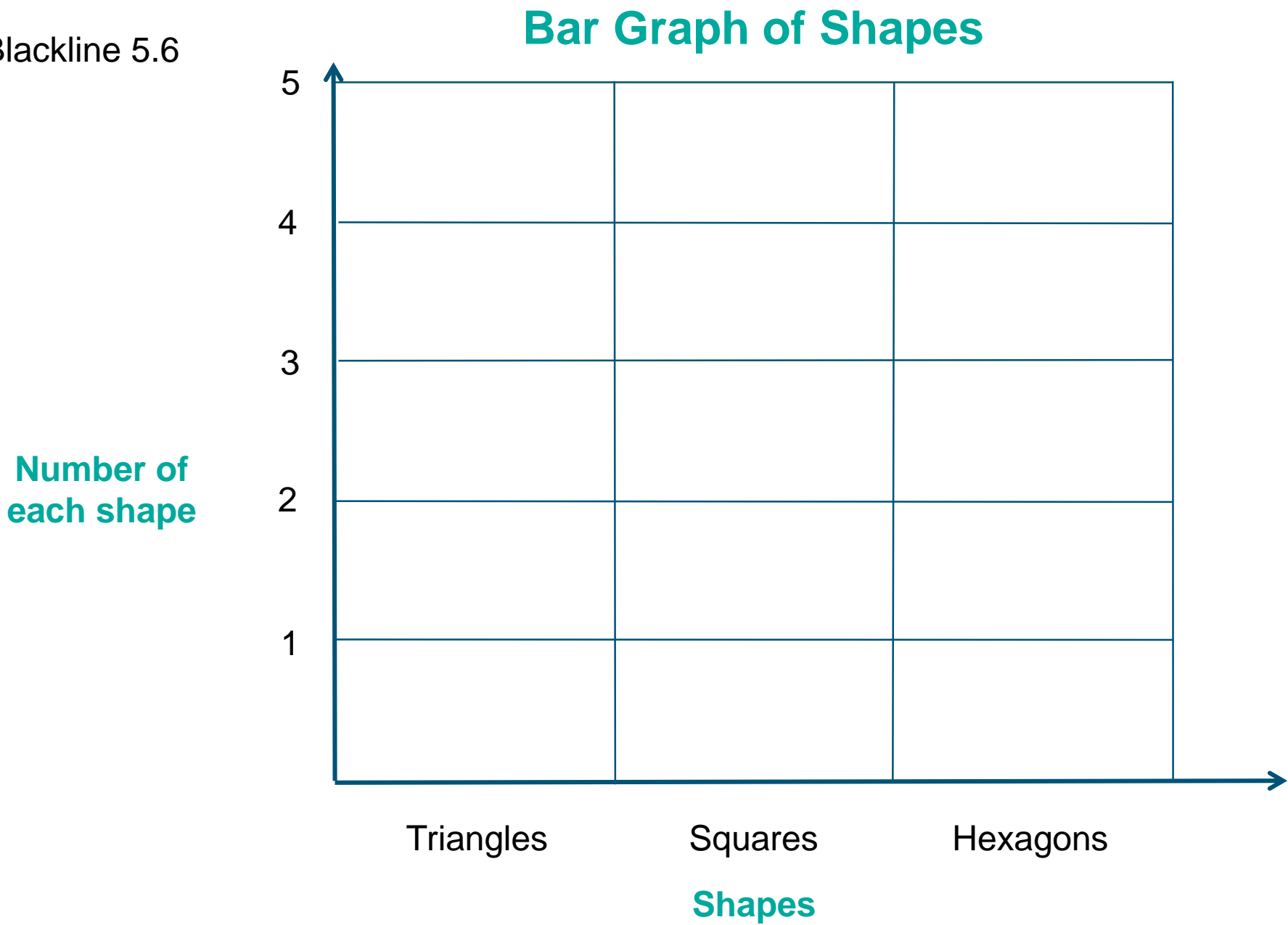


Blackline 5.4



Blackline 5.5





# Lesson 5: Pattern Block Shape Composing

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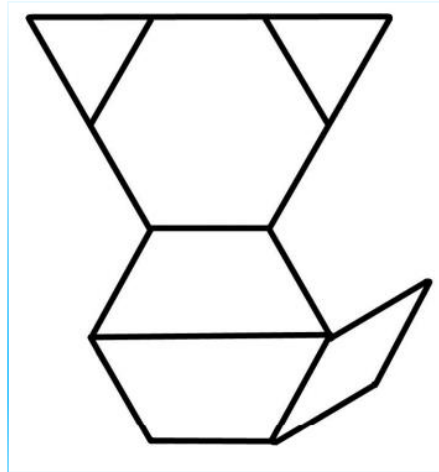
Directions:

1. For each pattern block mat, copy and paste the link for the blackline\* into a web browser and print the blackline. Then, provide students with a set of pattern blocks. Students can work in pairs or individually on these tasks.
2. Students are given the task to “cover” the mat with pattern blocks in more than one way. Their first method should match the outlines of the basic composition provided on the mat. Then, students can be directed to find other ways to cover the same mat by composing the larger shape with different smaller shapes. This may require some investigation of various shape equivalencies (e.g. two red trapezoids create the same shape as one yellow hexagon).
3. Students can be challenged to draw and color one of the unique ways they found to cover the figure on the mat.

\*all blacklines provided by Prekinders.com

**Teacher Example.** Ask the question in the green whenever you can. Students should be encouraged to use the word **compose** or **composed** to respond to the question.

Cat



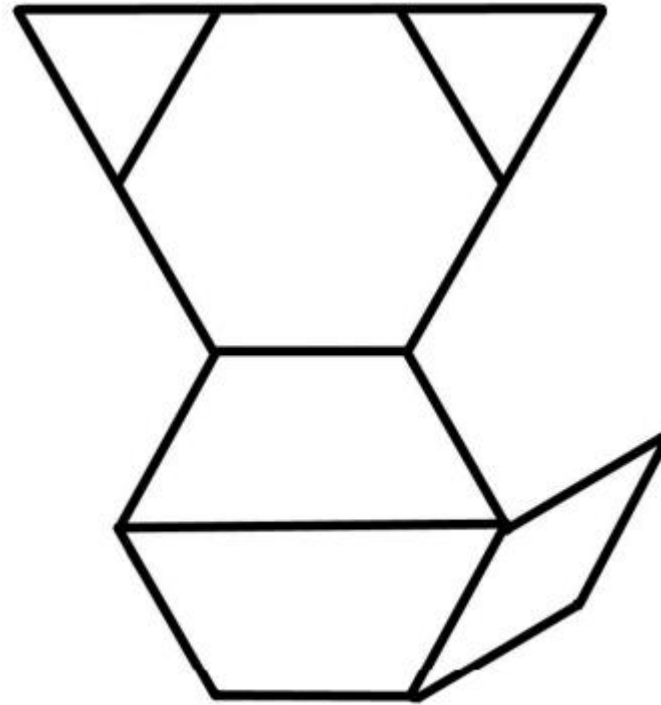
<http://www.prekinders.com/patternblocks/cat.pdf>

*TEACHER: Which pattern block shapes did you use to compose the larger shape?*

*STUDENT 1: I **composed** the new shape by using two triangles, one hexagon, two trapezoids and a rhombus.*

*STUDENT 2: I used six pattern blocks to **compose** the new shape.*

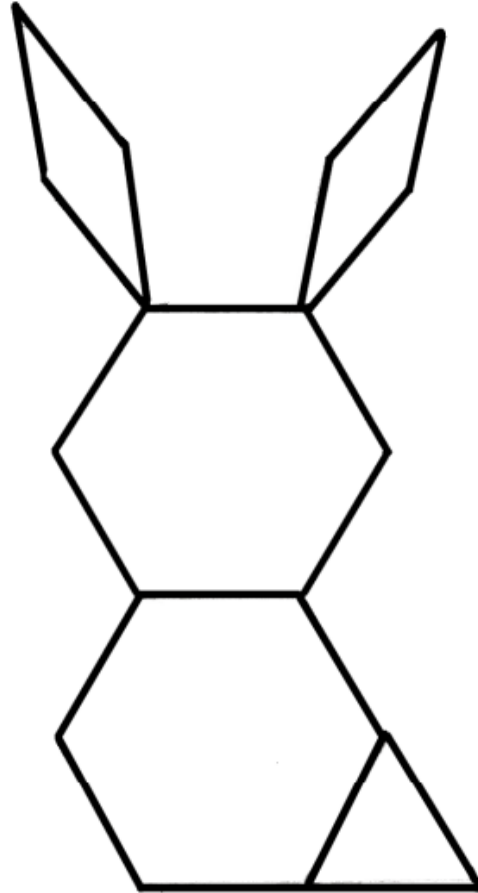
# Cat



<http://www.prekinders.com/patternblocks/cat.pdf>

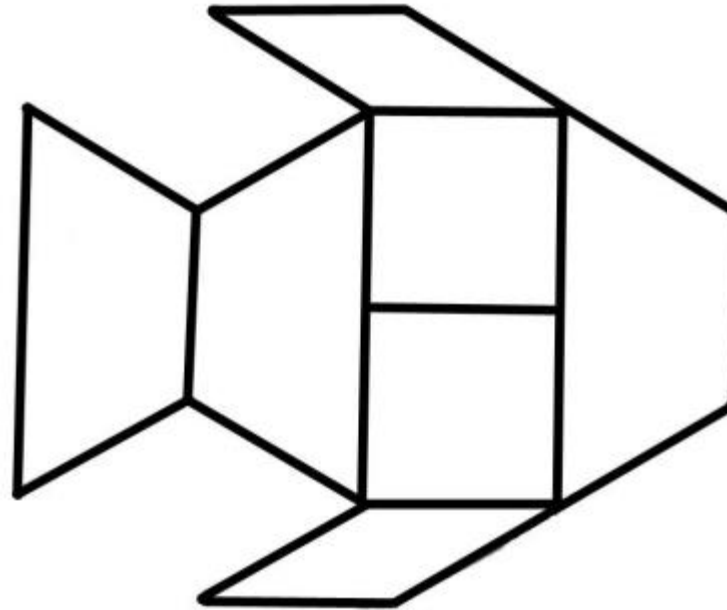


## Rabbit



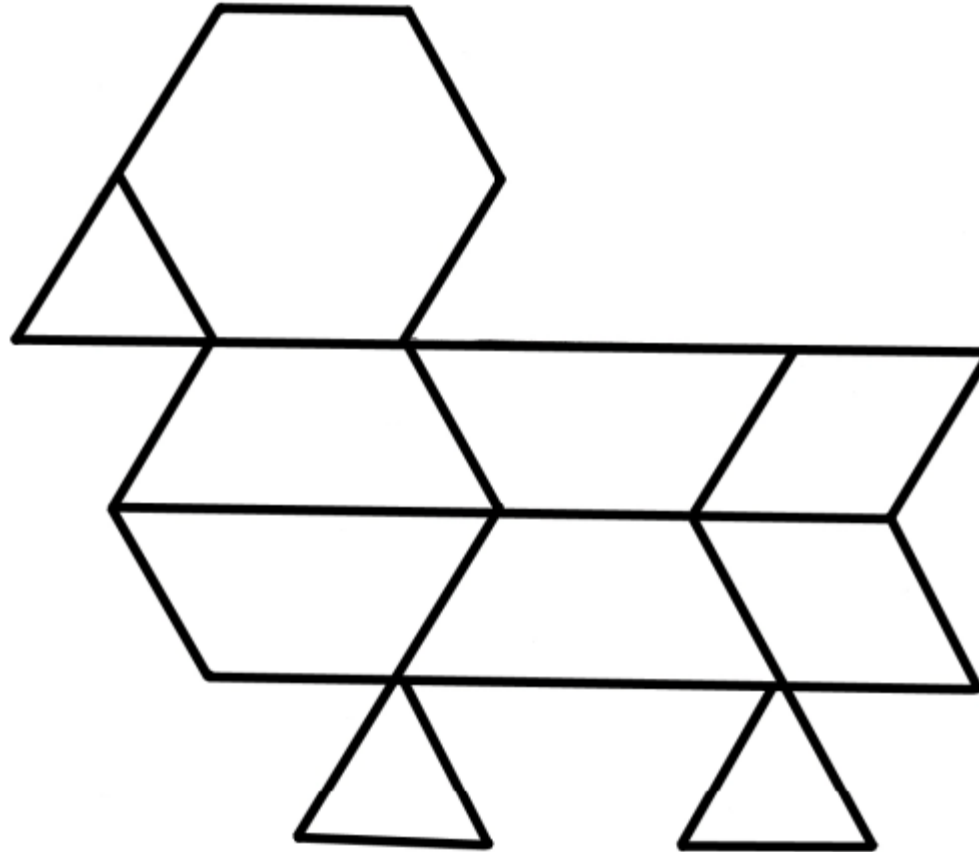
<http://www.prekinders.com/patternblocks/rabbit.pdf>

## Fish



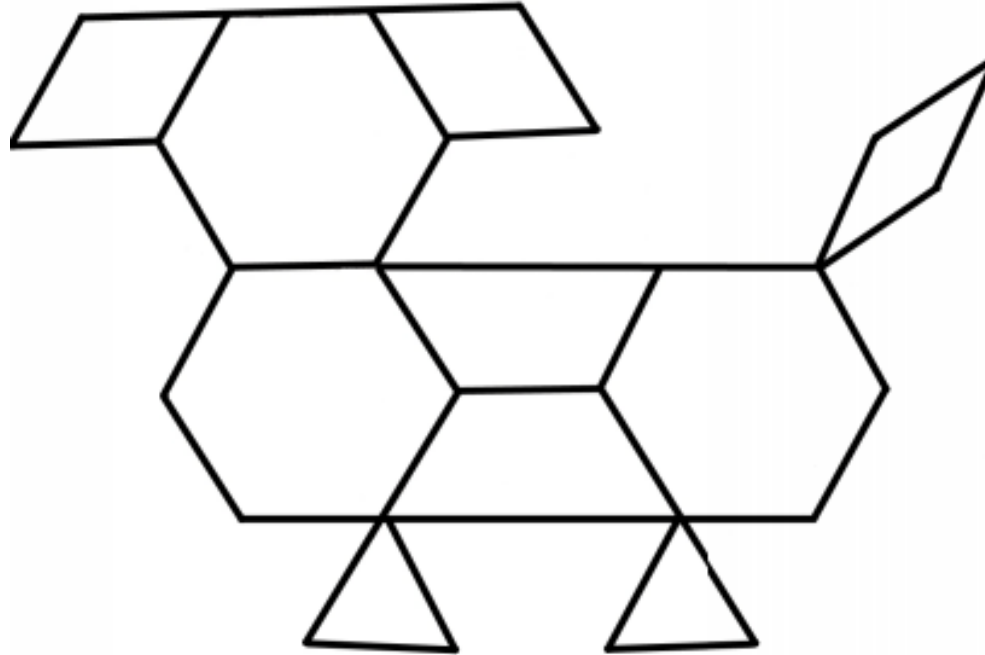
<http://www.prekinders.com/patternblocks/fish.pdf>

# Bird



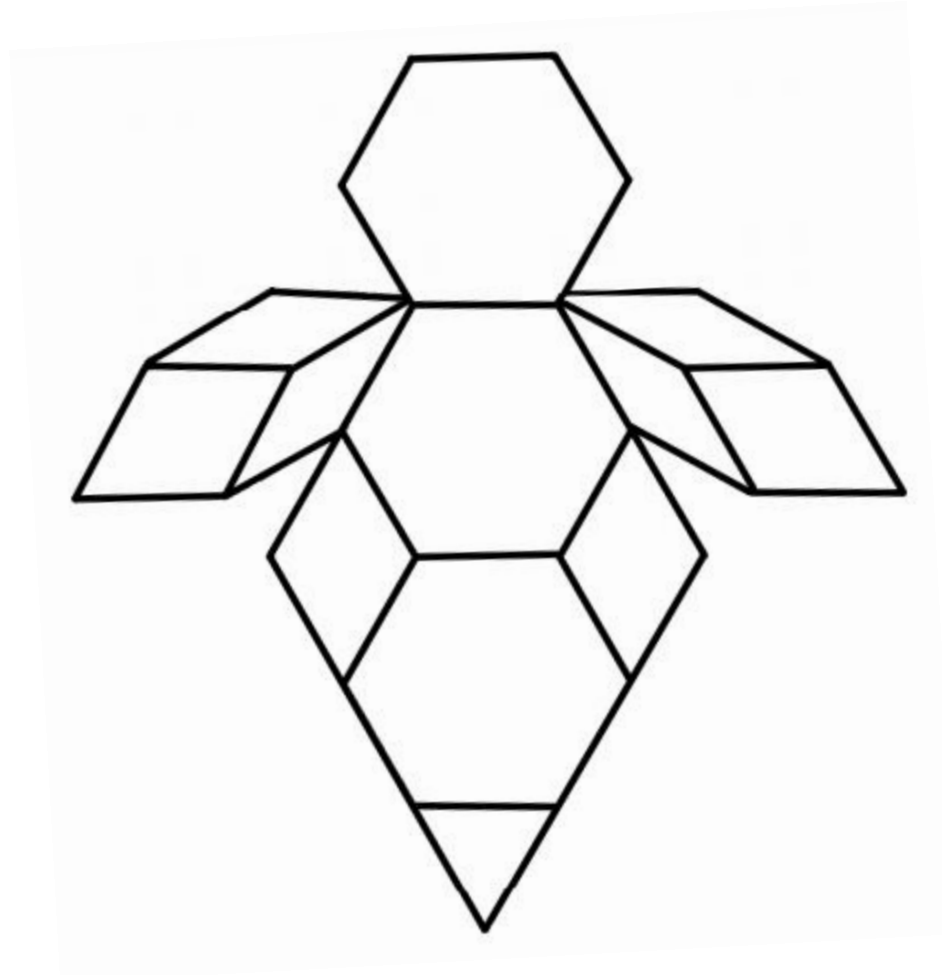
<http://www.prekinders.com/patternblocks/bird.pdf>

## Dog



<http://www.prekinders.com/patternblocks/dog.pdf>

## Bee



<http://www.prekinders.com/patternblocks/bee.pdf>

# Lesson 6

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## SHAPE CONCENTRATION

# Lesson 6: Shape Concentration

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**Directions:** Find matching shapes.

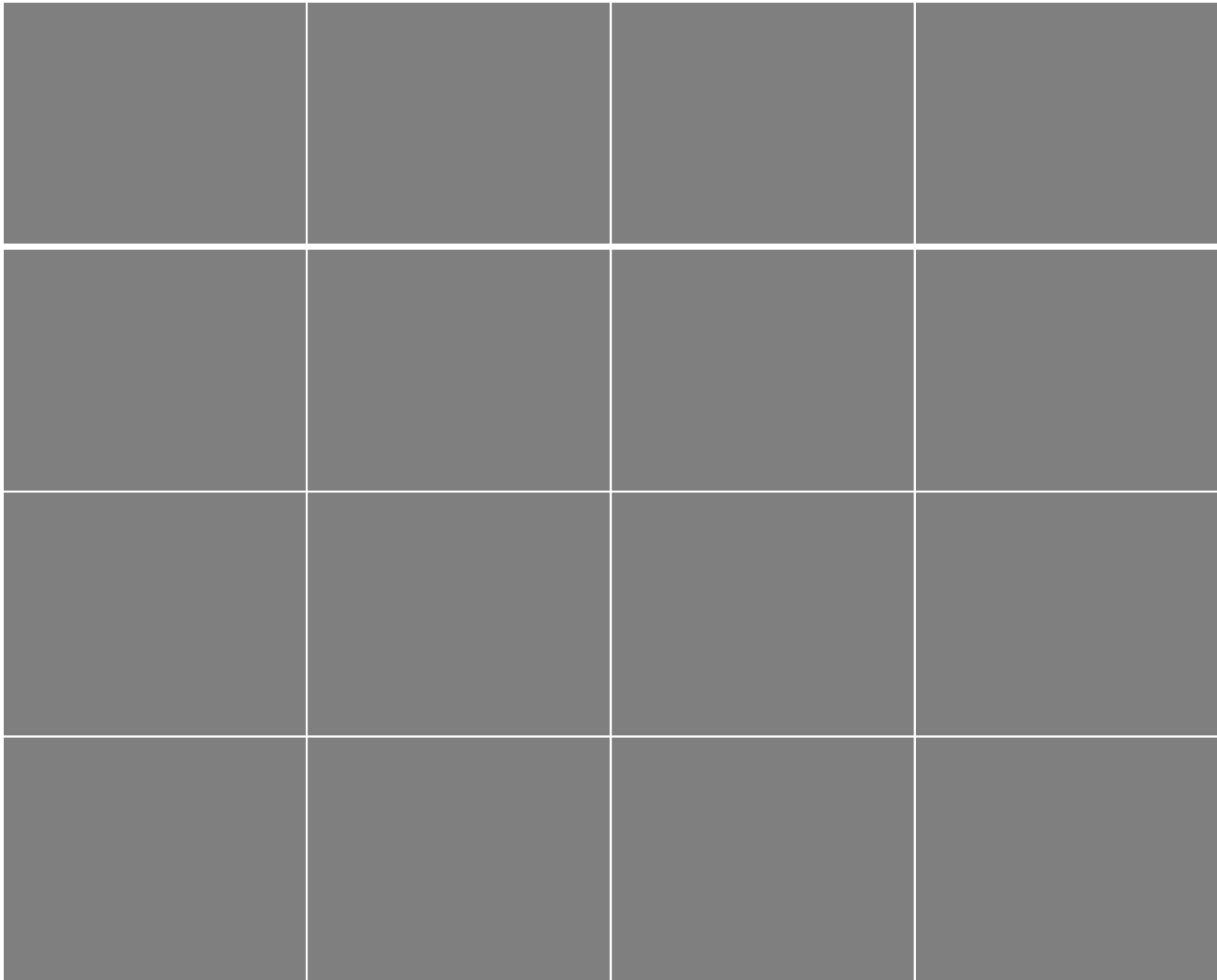
Players: 2

Each player can flip over 2 shapes to determine whether they match.

- If they do not match, then it is the other person's turn.
- If they do match, then the current player can try again.

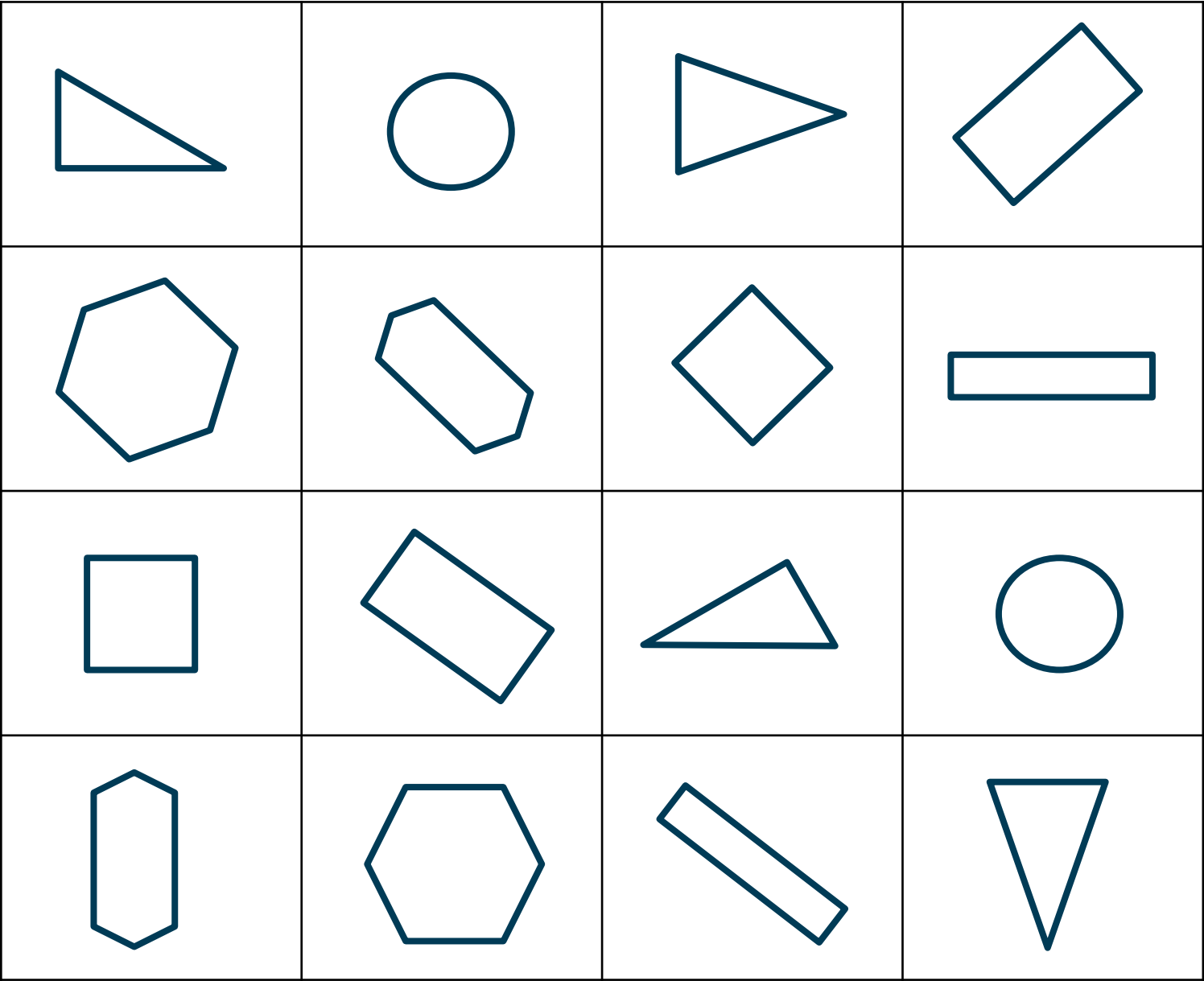
Winner: the person with the most pairs.

Shape  
Concentration  
Game Board





Game Shapes  
Cut these out,  
shuffle the  
shapes and  
place them on  
the game  
board upside  
down (shapes  
not showing).



# Lesson 7

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## RELATIVE POSITIONS

# Lesson 7: Relative Positions

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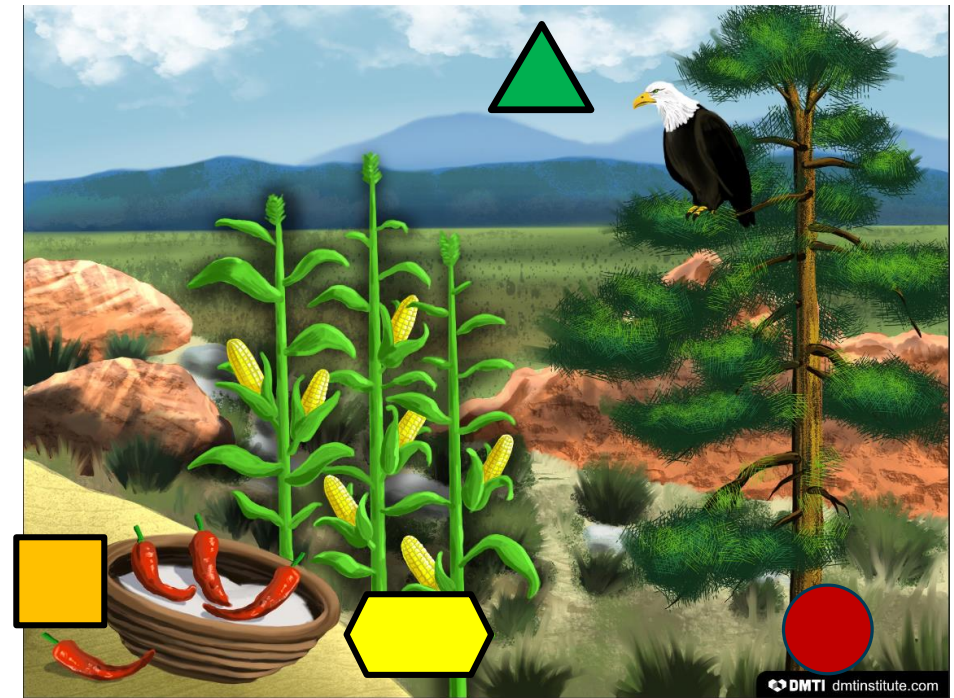
Look at the Jemez Mat and describe what you see. Try to use the words above, below, next to, beside, behind, and in front.



# Lesson 7: Relative Positions

Which of the following statements are true?

1. The square is below the chilies.
2. The triangle is above the mountain.
3. The square is next to the basket.
4. The triangle is next to corn.
5. The circle is below the tree.
6. The hexagon is in front of the corn.



# Lesson 7: Relative Positions

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Using shapes and the Jemez Mat, have students place different shapes onto scene and describe where the shape is relative to other items on the scene. They should use the following phrases:

“In front of . . .”

“Behind . . .”

“Below . . .”

“Above . . .”

“Beside . . .”

“Next to . . .”



# Mat



# Lesson 8

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## SHAPE SCAVENGER HUNT

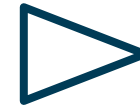
# Lesson 8: Shape Scavenger Hunt

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We have learned about different two-dimensional (flat) shapes such as triangles, squares, rectangles, hexagons, and circles.

Use the Scavenger Hunt Mat to find these different shapes in the classroom, in the school, and at home.

Determine whether it is the exact shape or whether it is similar to the actual shape.



Triangle



Square



Rectangle



Hexagon



Circle



# Lesson 8: Shape Scavenger Hunt

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Ask the following questions. Student helpers and parents can write down the objects in the “Scavenger Hunt Mat” worksheet.

1. Look around and see whether you can find each of the following shapes. Describe what the real world object is.

2. Look around and see whether you can find something that looks similar to each of the shapes to the right. Describe what the real world object is. (These will be close but not the same.)



Triangle



Square



Rectangle



Hexagon



Circle

# Shape Scavenger Hunt Mat (Classroom/School/Home)

Shapes	Exact Real World Shape	Similar Real World Shape
Triangle		
Square		
Rectangle		
Hexagon		
Circle		

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