

# Geometry

## Exploring the Basics

created by Laura Candler

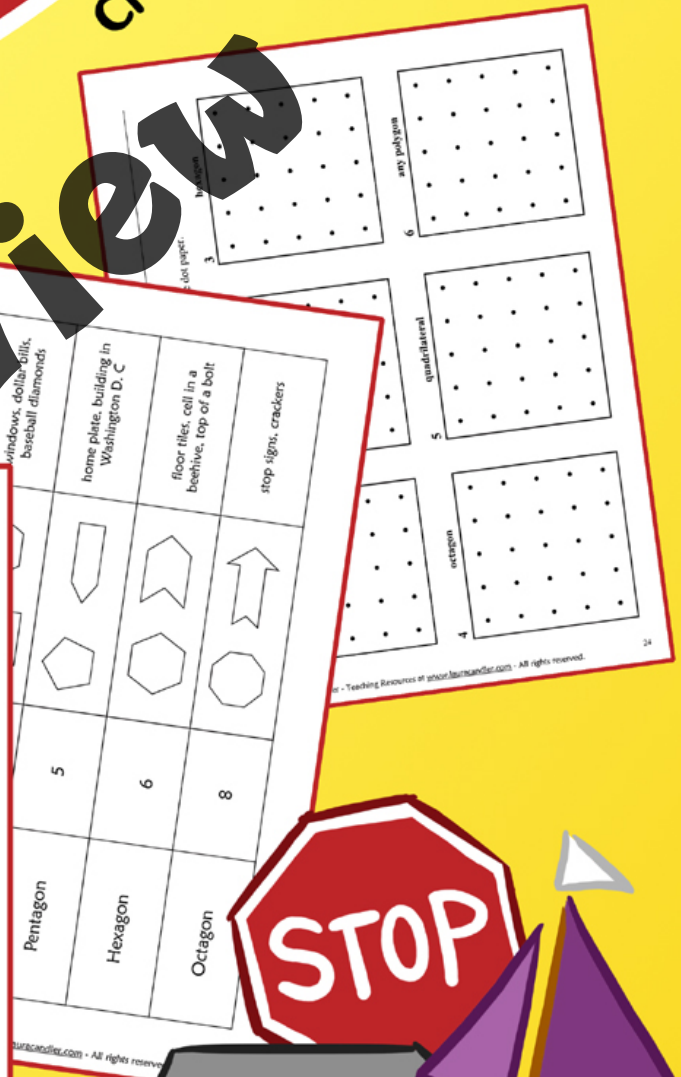
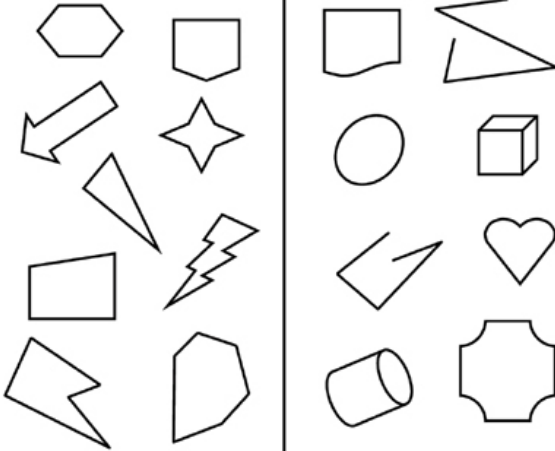
power pack

### What is a Polygon?

- Polygons are 2-dimensional closed figures with straight sides
- Polygons are named by their number of sides and angles
- Regular polygons have congruent sides and angles; irregular polygons have sides and angles that are different

Polygons

Not Polygons



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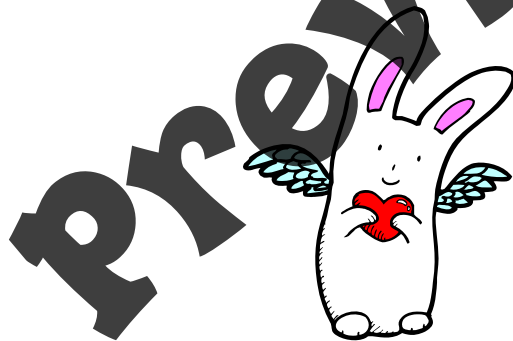
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## Acknowledgements

I would like to express my appreciation to all the wonderful teachers who have shared with me through the years. It's through sharing with each other that we can improve our teaching and empower our students.

Thanks for all you have given me!

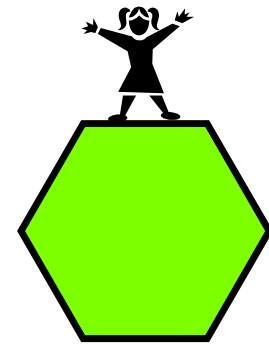


# Exploring the Basics

## Power Pack Suggestions

### Power Pack Sections

How to Use This Power Pack.....	Page 4
Lines and Angles .....	Page 5
Simple Polygons .....	Page 18
Review and Assess .....	Page 27



### Creating a Foundation for Geometry

Have you ever noticed how some kids perk up when you start your geometry unit? The students who struggle with abstract concepts and numbers seem to come alive when asked to create shapes on geoboards or put together Tangram puzzles. Suddenly they are the experts, the ones who can see geometry in the world around them. Unfortunately, as children get older, they are also expected to master the language of geometry and learn dozens of words that have special mathematical meanings. Even visual learners who love playing with shapes will struggle without the labels to describe the concepts they are exploring. It's critical that students master these basics before they have to tackle increasingly complex geometric concepts, and that's what this book is all about.

Exploring the Basics consists of a variety of lessons and activities designed to help students master the basic concepts of geometry. You'll find lots of blackline masters and games for introducing lines, line relationships, and simple polygons. You'll also find a variety of review activities and two forms of a simple paper-and-pencil assessment. What you won't find is complex problem solving activities – kids need to master the basics before they are ready for higher level thinking, and this book is just about the basics. This is the first Exploring Geometry Power Pack and future books in the series will provide plenty of problem-solving experiences. Begin by creating a foundation with the basics, and students will soon be ready for problem solving.

### How to Use this Power Pack

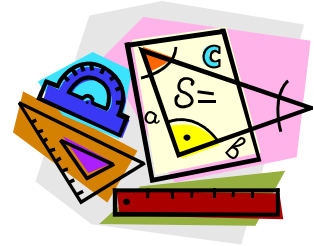
Most teachers will want to introduce lines and angles first and then move on to polygons. These activities may be introduced slowly to explore new concepts or quickly to revisit prior learning. Don't feel you need to teach every lesson; choose only the activities that meet your needs. Then use the blackline masters in the Review and Assess section to determine if further instruction is needed. Many of the materials in this book are designed to be used as overhead transparencies or projected onto an interactive whiteboard, while others can be used as games for reviewing concepts. Be sure to engage students actively with cooperative learning and hands-on materials like geoboards. Most of all, enjoy these lessons and have fun as you enable your students to master the basics!

# Exploring the Basics

## Lines and Angles

### Introducing Geometry

To find out what your students already know about geometry, conduct a quick class brainstorming session. Write the word geometry on the board and circle it. Then ask your students, “What is geometry? What words and ideas do you think of when you hear the word ‘geometry’?” As students brainstorm ideas, write them on the board. Then point out that geometry is different from many branches of mathematics because it deals with lines and shapes rather than numbers. To understand advanced geometric concepts we have to begin with the basics.

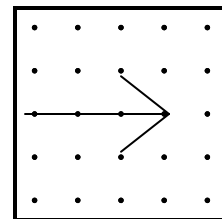


### Geometry Basics and Notes

Place a transparency of the **Geometry Basics** blackline master (page 7) on the overhead projector and ask your students if they are familiar with any of the words in the box. Point to the different illustrations and have students try to name them based on their prior knowledge. As you discuss each picture, refer to the definitions on the **Geometry Notes** blacklines on pages 11 and 12. You may want to duplicate a copy of the blank **Geometry Notes** (page 10) and have your students take notes as you discuss each concept. However, taking written notes should not be the focus of your lessons. Instead, involve your students in using geoboards, drawing on dry erase boards, or acting out the concepts physically.

### Geoboards

If you have access to geoboards, you'll find them to be a great way to engage students actively in almost any geometry lesson. You can have one person on each team be the Geoboard Gofer who is in charge of passing out the geoboards and rubber bands. It's always best to give kids about 5 minutes to play with the boards before you try to teach with them—if you don't, you'll be fighting against your student's natural inclination to be creative and learn through exploration. When you are ready to begin your lesson, have them remove all but one or two rubber bands. Then call out figures such as rays and line segments and have students model them on the geoboard.



### Body Geometry

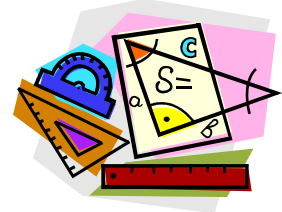
Many students learn best through kinesthetic interaction, so have them use their bodies to represent each geometric concept. Place the **Geometry Basics** transparency back on the overhead projector and have each team create an action or pose for each word. For example, they might make a fist and punch it forward to represent the term “point.” Give them 5 minutes to create their representations, and then let each team demonstrate their actions or poses for the class.

# Exploring the Basics

## Lines and Angles

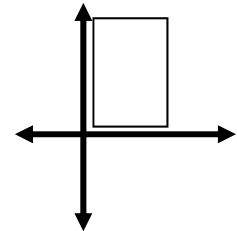
### Lines and Line Relationships

To introduce line relationships and terminology, give each student two drinking straws. Assess their prior knowledge by asking them to hold one straw horizontally, then diagonally, and then vertically. Next have them use both straws to demonstrate parallel, intersecting, and perpendicular lines. Place a transparency of the **Lines and More Lines!** blackline (page 8) on the overhead and review the basic terms. Demonstrate how you can use the square corner of a piece of paper to determine whether or not a pair of intersecting lines is perpendicular. Introduce the term “right angle” if appropriate. Finally, ask your students to look around the room to find examples of intersecting, parallel, and perpendicular lines.



### Lines and Angles Search

This review activity works best if students have some type of method for displaying their work such as individual dry erase boards or chalkboards. Place a transparency of **Lines and Angles Search** (page 9) on the overhead projector. Review accepted conventions for naming lines, angles, and rays. Call out various terms that have been introduced such as line, line segment, parallel lines, etc. Have students identify each geometric figure by naming it on their dry erase board with capital letters.



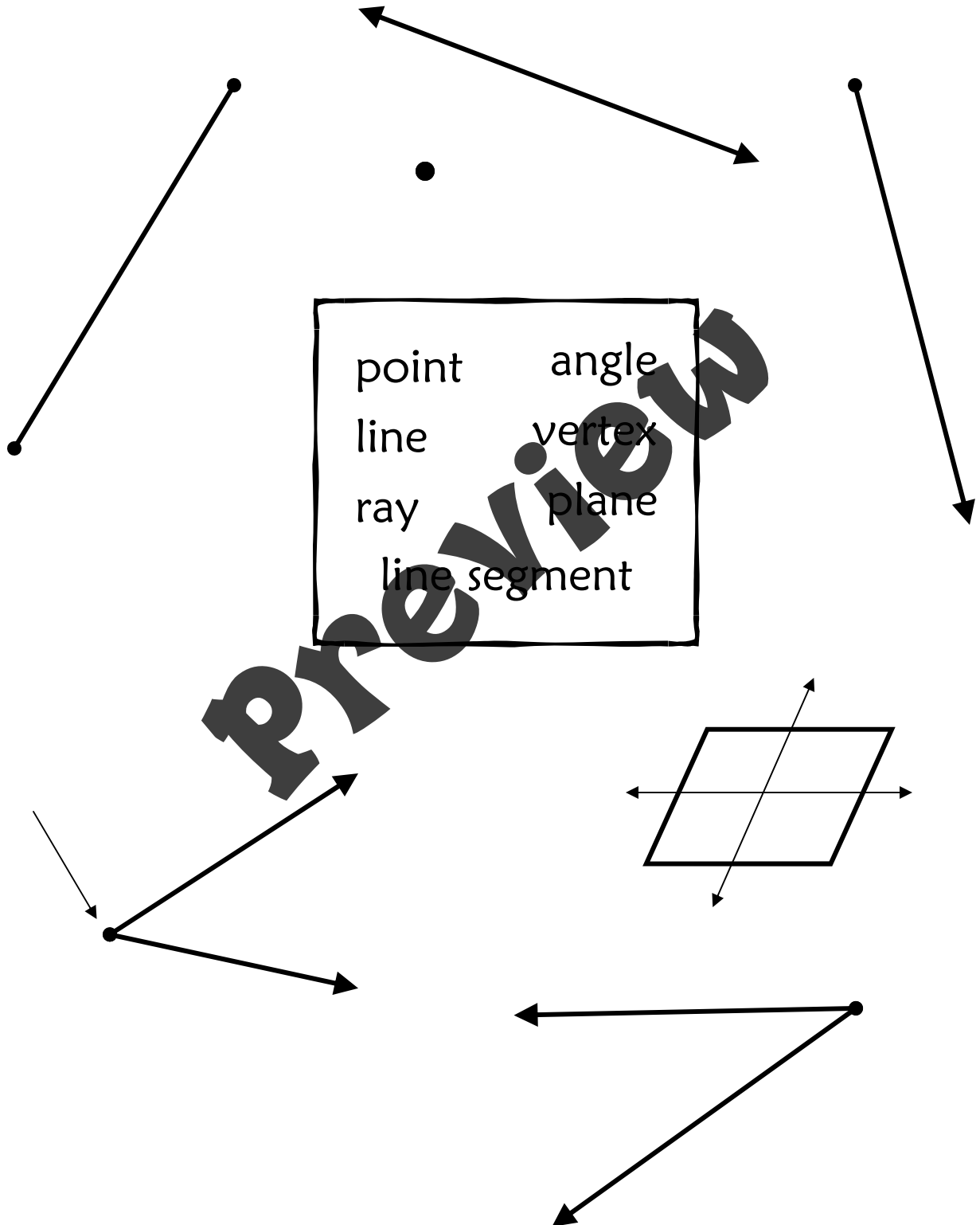
### Line Sorting

Students can practice line relationship concepts by using the **Line Sorting Cards** (pages 13-14). Duplicate a set for each pair of students. Have them take the three topic cards and place them in a row. Then have them shuffle the remaining cards and stack them face down next to the topic cards. Students take turn flipping over a card and deciding if the lines are **parallel**, **perpendicular**, or **intersecting but not perpendicular**. They check with their partner before placing the card under the proper heading. Remind students to check the perpendicular lines with the corner of a piece of paper since some of the cards are tricky. Circulate and check their cards for proper placement. This activity can be played in teams as well as with partners.

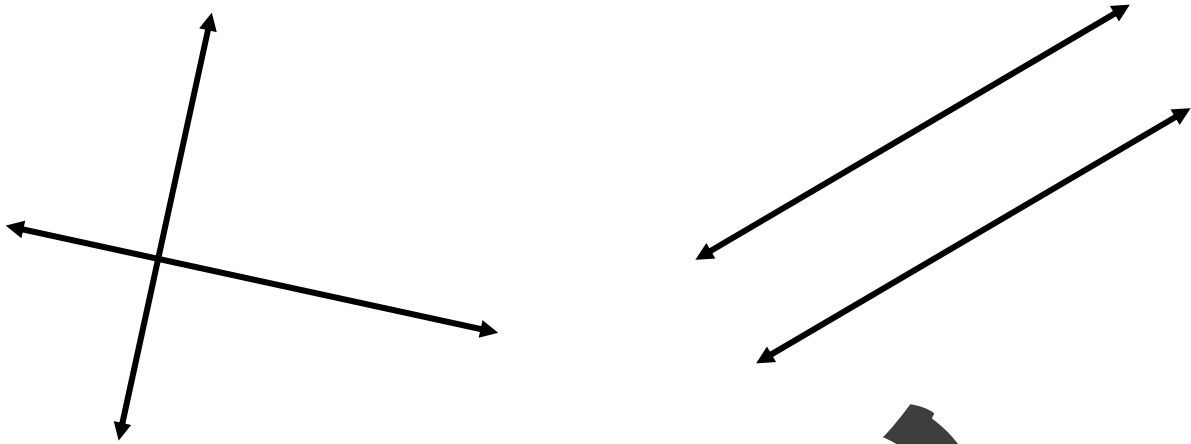
### Geometry Concentration

A simple yet effective review game is Concentration, the classic memory game. This version involves matching geometry words and illustrations, and complete directions are provided on the blackline master on page 15. Copy the directions and glue them onto the front of a 9 x 12” manila envelope. Prepare a deck of Geometry Concentration cards (pages 16 - 17) by duplicating the pages and cutting the cards apart. Place the cards in the envelope for easy storage.

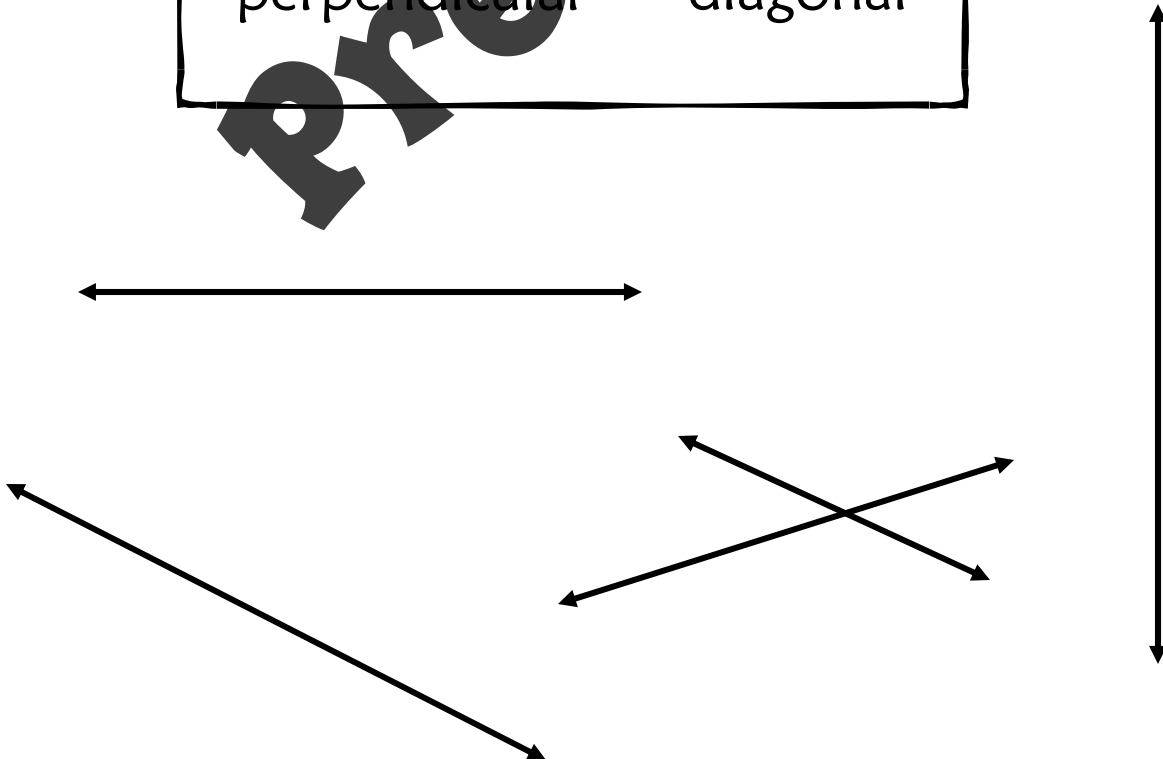
# Geometry Basics



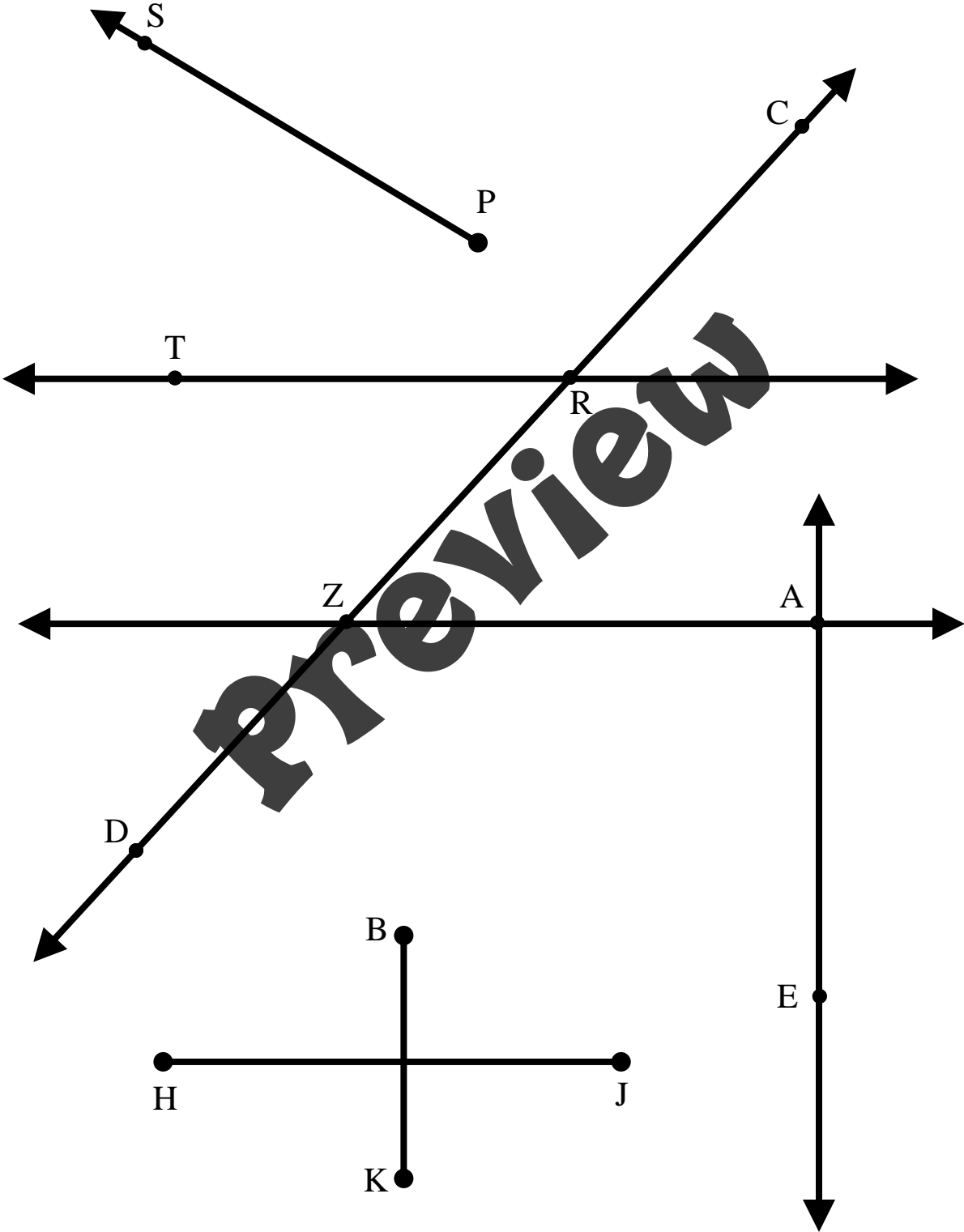
# Lines and More Lines!



parallel      horizontal  
intersecting      vertical  
perpendicular      diagonal



# Lines and Angles Search



# Geometry Notes

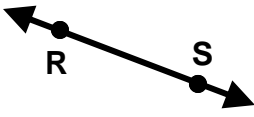

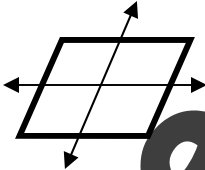

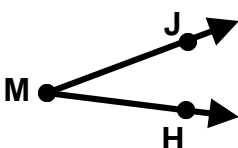
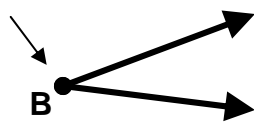



Word	Illustration	Definition

**Preview**

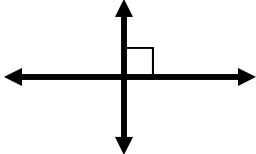





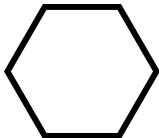
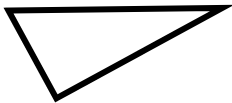
# Geometry Notes



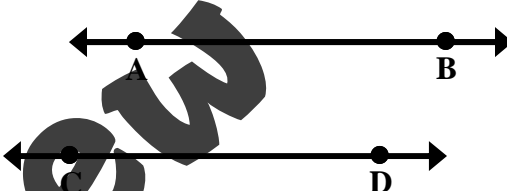
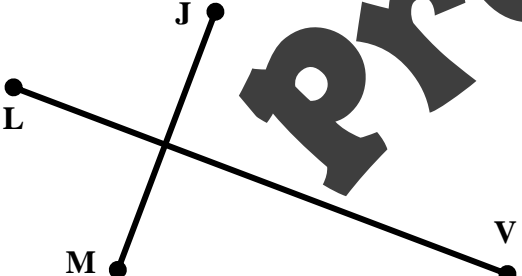
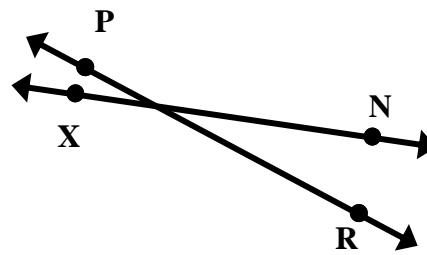
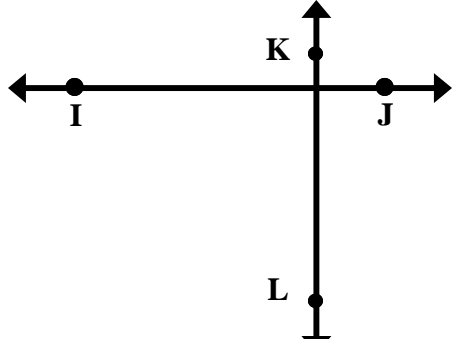
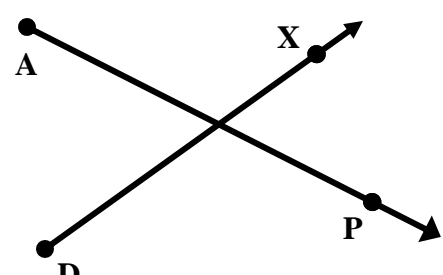
Word	Illustration	Description
point	A ●	an exact location in space; named by a capital letter
line		a straight path that extends forever in opposite directions; named by two points on the line
line segment		a part of a line with two endpoints; named by the two endpoints
plane		a flat surface that extends without end in all directions
ray		a part of a line with one endpoint that extends forever in one direction; named by the endpoint first followed by another point on the ray
angle		two rays joined at a common endpoint called the vertex; named by the vertex or the vertex and a point on each ray
vertex		the point on an angle or polygon where two lines or rays meet; named with a capital letter
intersecting		lines or segments that meet or cross at one point

# Geometry Notes

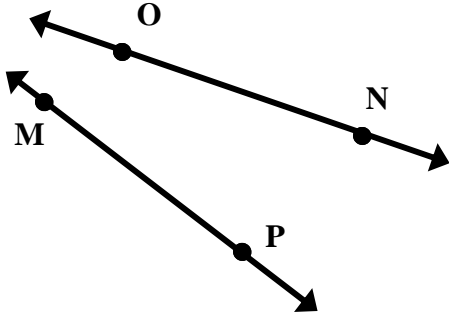
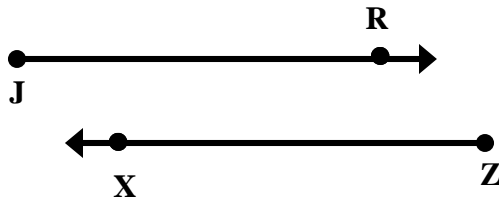
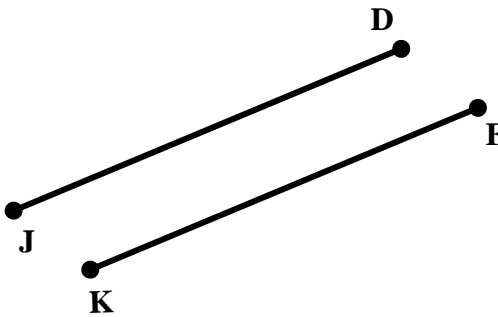
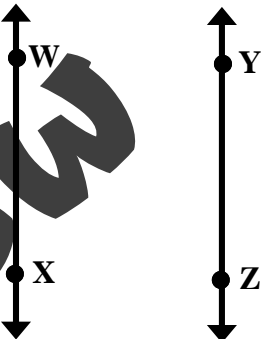
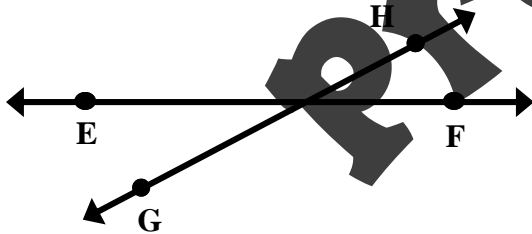
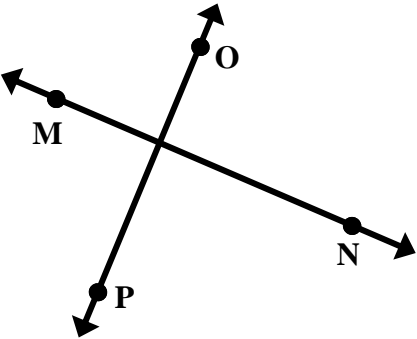
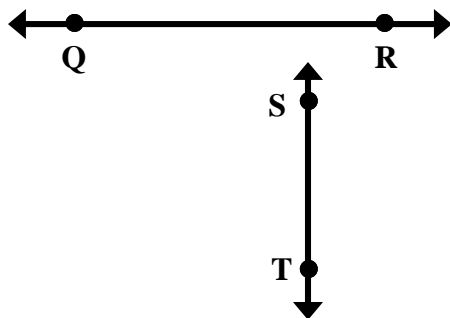
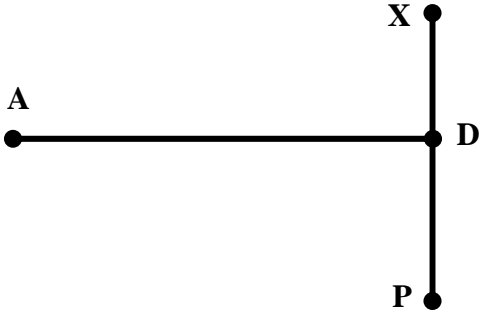


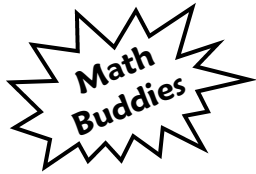
Word	Illustration	Description
perpendicular		lines or segments that meet or intersect to form right angles (or a square corner)
parallel		lines or segments in a plane that stay the same distance apart and never meet or cross
horizontal		parallel to the horizon of the earth
vertical		perpendicular to the horizon of the earth
diagonal		slanted (neither horizontal nor vertical)
polygon		a 2-dimensional closed figure formed from 3 or more line segments that intersect at their endpoints
regular polygon		a polygon with congruent sides and angles
irregular polygon		a polygon with sides and angles that are not congruent

# Line Sorting Cards - Page 1

Parallel	Perpendicular
Intersecting (but not perpendicular)	
	
	

# Line Sorting Cards - Page 2

 <p>Line O: A line with arrows at both ends, passing through point O.</p> <p>Line N: A line with arrows at both ends, passing through point N.</p> <p>Line M: A line with arrows at both ends, passing through point M.</p> <p>Line P: A line with arrows at both ends, passing through point P.</p>	 <p>Line J: A horizontal line with arrows at both ends, passing through point J.</p> <p>Line R: A horizontal line with arrows at both ends, passing through point R.</p> <p>Line X: A horizontal line with arrows at both ends, passing through point X.</p> <p>Line Z: A horizontal line with arrows at both ends, passing through point Z.</p>
 <p>Line J: A line with arrows at both ends, passing through point J.</p> <p>Line D: A line with arrows at both ends, passing through point D.</p> <p>Line K: A line with arrows at both ends, passing through point K.</p> <p>Line F: A line with arrows at both ends, passing through point F.</p>	 <p>Line W: A vertical line with arrows at both ends, passing through point W.</p> <p>Line X: A vertical line with arrows at both ends, passing through point X.</p> <p>Line Y: A vertical line with arrows at both ends, passing through point Y.</p> <p>Line Z: A vertical line with arrows at both ends, passing through point Z.</p>
 <p>Line E: A horizontal line with arrows at both ends, passing through point E.</p> <p>Line F: A horizontal line with arrows at both ends, passing through point F.</p> <p>Line G: A line with arrows at both ends, passing through point G.</p> <p>Line H: A line with arrows at both ends, passing through point H.</p>	 <p>Line M: A line with arrows at both ends, passing through point M.</p> <p>Line N: A line with arrows at both ends, passing through point N.</p> <p>Line O: A line with arrows at both ends, passing through point O.</p> <p>Line P: A line with arrows at both ends, passing through point P.</p>
 <p>Line Q: A horizontal line with arrows at both ends, passing through point Q.</p> <p>Line R: A horizontal line with arrows at both ends, passing through point R.</p> <p>Line S: A vertical line with arrows at both ends, passing through point S.</p> <p>Line T: A vertical line with arrows at both ends, passing through point T.</p>	 <p>Line A: A horizontal line with arrows at both ends, passing through point A.</p> <p>Line D: A horizontal line with arrows at both ends, passing through point D.</p> <p>Line X: A vertical line with arrows at both ends, passing through point X.</p> <p>Line P: A vertical line with arrows at both ends, passing through point P.</p>



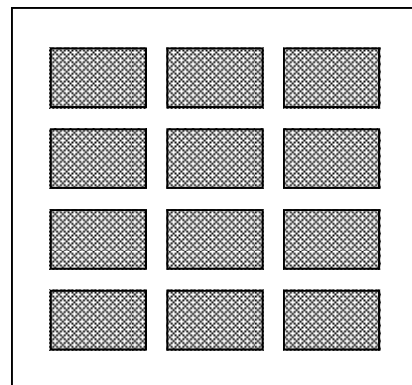
# Geometry Concentration

## Materials Needed:

Deck of Geometry Concentration Cards

## Directions:

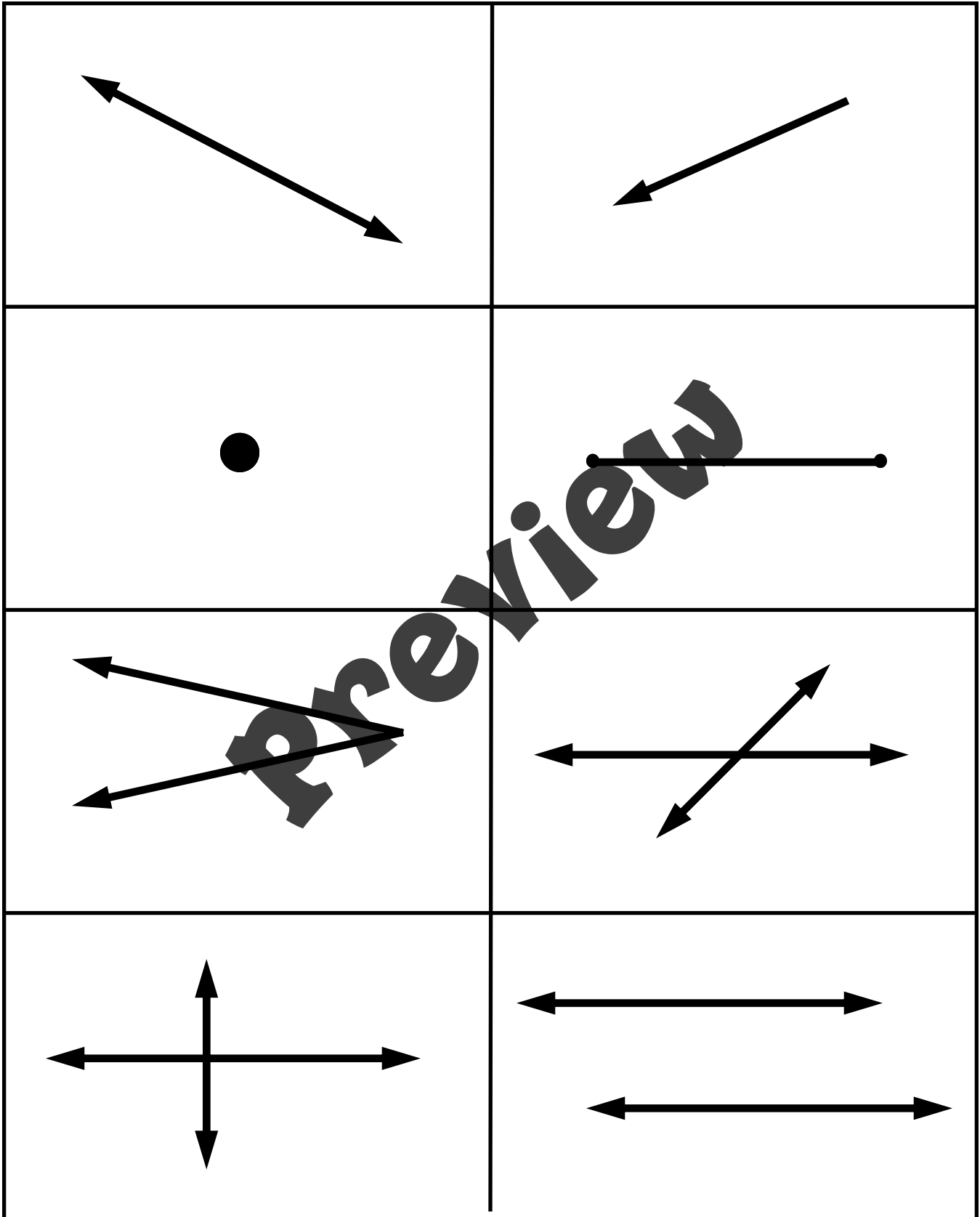
1. Before starting, check to make sure all the cards are in the set. To do this, spread game cards out face up and work with your partner to create matching sets. If there are any cards left over, leave them out of the game.
2. Next, shuffle the cards and turn them face down. Organize them into rows and columns. The array should look similar to the one below, but your set up may have a different number of rows and columns. Decide who will start.
3. The first player turns over 2 cards. If the cards match, he or she may keep them. If the cards don't match, place them back in their positions, face down. Make sure all players have seen the cards. Don't try to be tricky!
4. If a player flips over two matching cards, that person gets another turn. (All players must agree that the two cards match. If you don't agree, find another resource such as a math book or the Internet where you can check the information).
5. Play proceeds in a clockwise direction, or just take turns if you are playing with a partner. Repeat steps 3 and 4 until the end of the game.
6. The player with the most cards at the end is the winner.
7. Be sure to return the cards to the proper storage location!



# Geometry Concentration - Words

<b>point</b>	<b>line</b>
<b>ray</b>	<b>intersecting lines</b> (not perpendicular)
<b>line segment</b>	<b>parallel lines</b>
<b>perpendicular lines</b>	<b>angle</b>

# Geometry Concentration - Illustrations

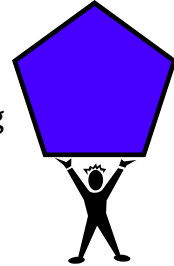


# Exploring the Basics

## Simple Polygons

### Introduce Polygons - Read The Greedy Triangle

A fun way to introduce polygons is to read aloud Marilyn Burns' The Greedy Triangle. In this children's story, a triangle is unhappy with having only 3 sides so it asks the "shapeshifter" for help. As the story progresses, the triangle becomes a quadrilateral, then a pentagon, and so on until it realizes it wants to be a triangle again. Not only does the book provide an opportunity to introduce triangles, it provides an equally important opportunity to sneak in a discussion on self concept.



### What is a Polygon?

After reading The Greedy Triangle, display the **What is a Polygon?** blackline master (page 19) to introduce or review basic polygon concepts. After discussing the statements at the top of the page, ask students to study the T-chart at the bottom of the page. As you point to each example of a polygon or non-polygon, ask students to explain why the shape is placed in that category. Alternatively, you can cut the shapes apart prior to the lesson and draw a T-chart on a transparency. As you place each figure on the overhead projector, have students pair with a partner to discuss its proper placement. Then ask the class to give you a "thumbs up" or "thumbs down" in response to the question, "Is it a polygon?" For further practice, create a set of cards for each team from the blackline masters on pages 20 - 21 titled **Is It a Polygon?** They stack the cards face down in the middle of the team and take turns flipping the cards over. As each card is revealed, team members give a thumbs up or thumbs down and place the cards in two different stacks accordingly.

### Comparing Polygons

Give each student a blank copy of the **Comparing Polygons** chart (page 22) to complete as you review the basic polygon definitions. Have them help you brainstorm different everyday objects that are in the shape of each polygon.

### Geoboard Polygon Practice

This activity provides a chance for students to develop their visual skills as they create shapes on their geoboards and transfer them to dot paper. Give each student his or her own paper, but have them work with a partner to create each shape.

### Polygon Foldable

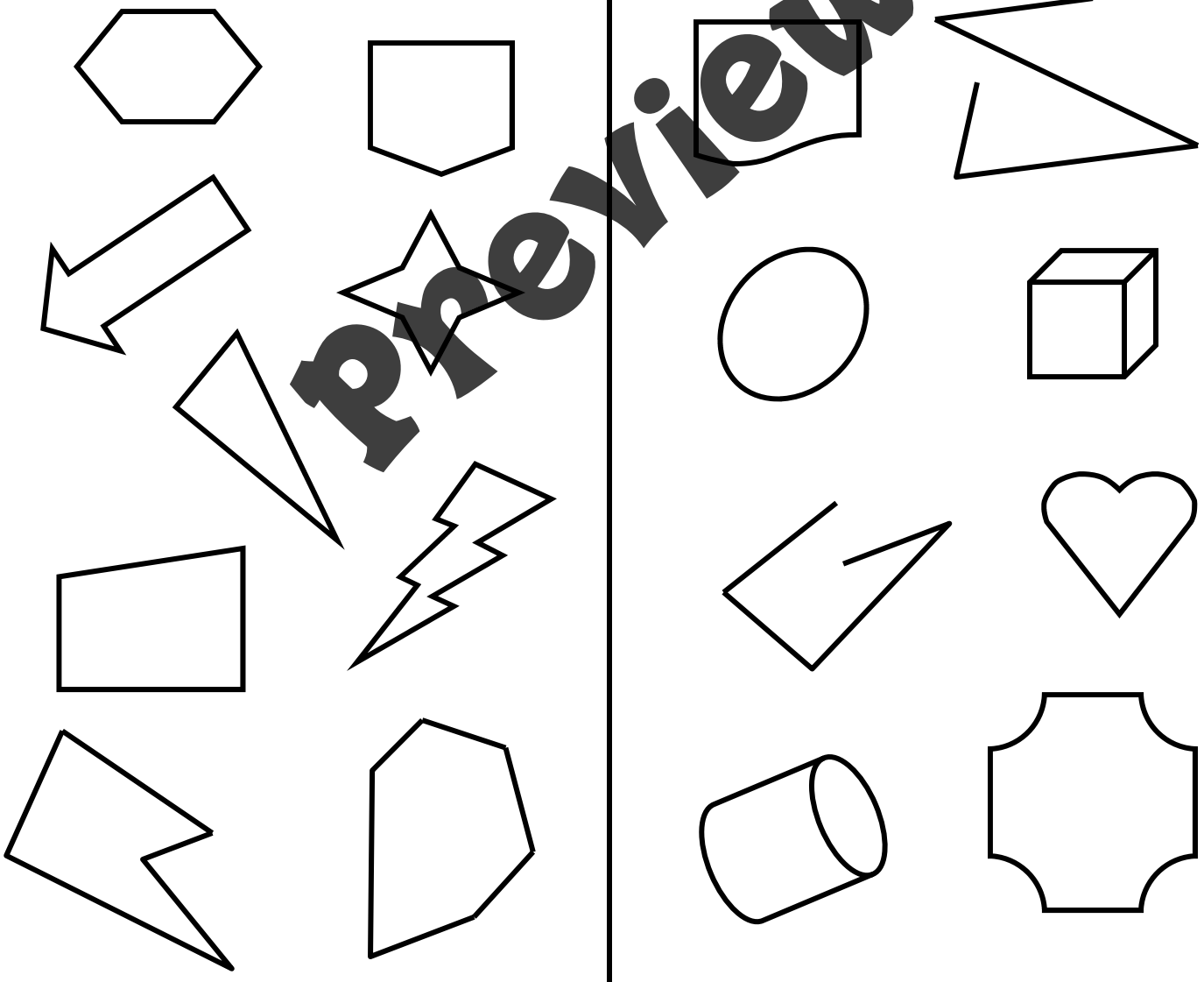
If students need a study guide to help them learn the polygons by name, have them create a foldable using the pattern on page 26. They fold it on the solid line and cut each dotted line to form 5 flaps. Under each flap they write that polygon's number of sides and two different illustrations for that polygon. Be sure to check their work!

# What is a Polygon?

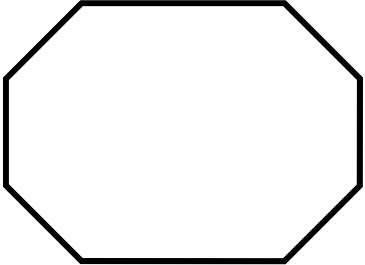
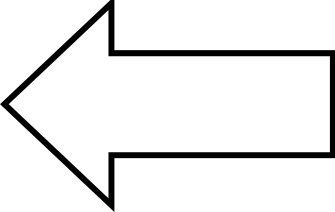
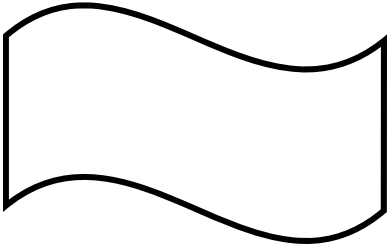
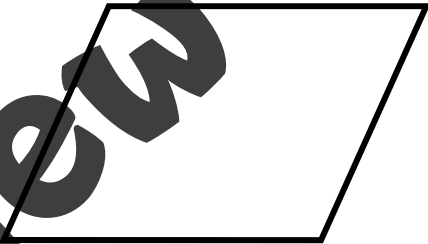

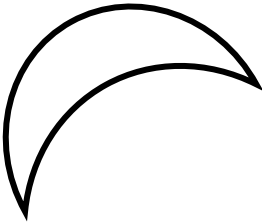
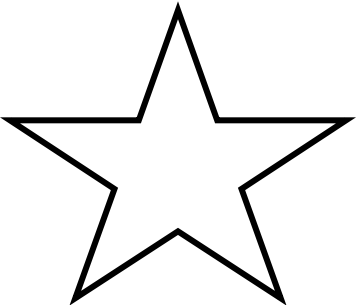
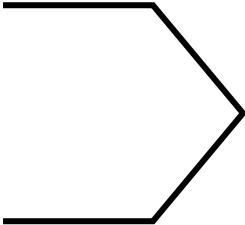
- Polygons are 2-dimensional closed figures with straight sides
- Polygons are named by their number of sides and angles
- Regular polygons have congruent sides and angles; irregular polygons have sides and angles that are different

Polygons

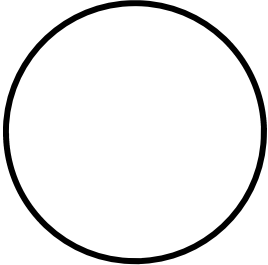
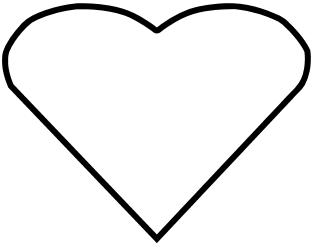
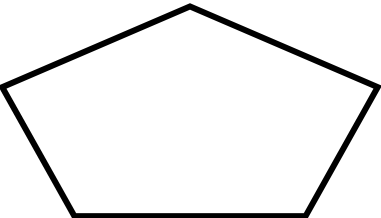
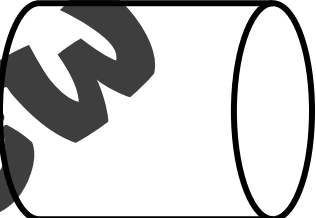
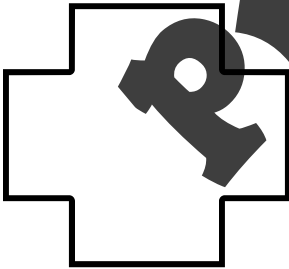
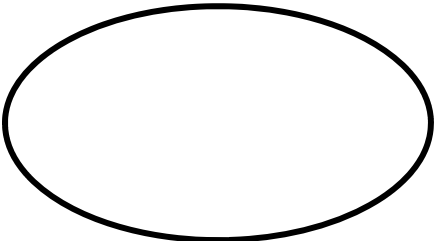
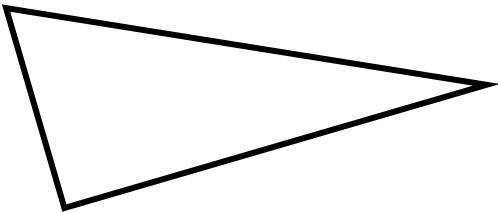
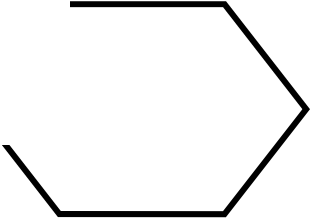
Not Polygons

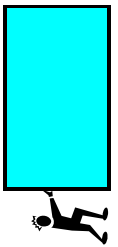


# Is It a Polygon?

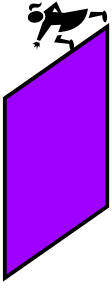
	
	
	
	

# Is It a Polygon?

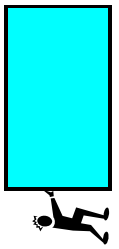


# Comparing Polygons

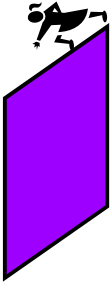


Polygon	Sides	Illustrations	Everyday Objects
Triangle			
Quadrilateral			
Pentagon			
Hexagon			
Octagon			

Preview



# Comparing Polygons



Polygon	Sides	Illustrations	Everyday Objects
Triangle	3		sail on a boat, slice of pie, musical instrument
Quadrilateral	4		windows, dollar bills, baseball diamonds
Pentagon	5		home plate, building in Washington D. C
Hexagon	6		floor tiles, cell in a beehive, top of a bolt
Octagon	8		stop signs, crackers

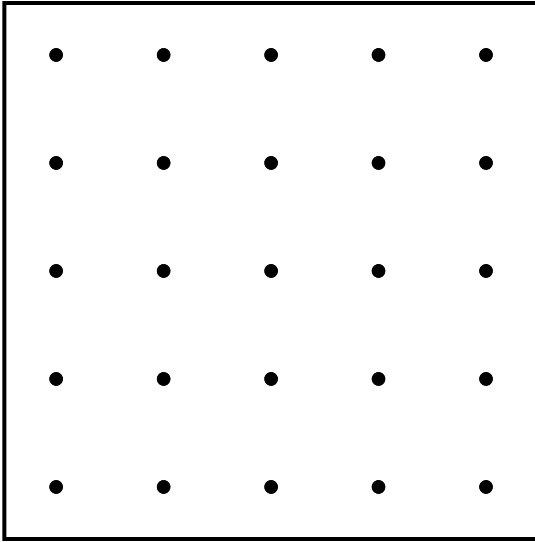
Name \_\_\_\_\_

# Polygon Practice

Directions: Create each geometric figure on your geoboard and then draw it on the dot paper.

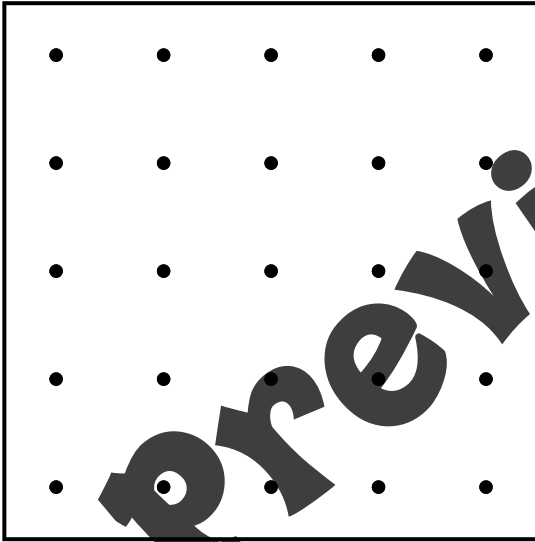
1

triangle



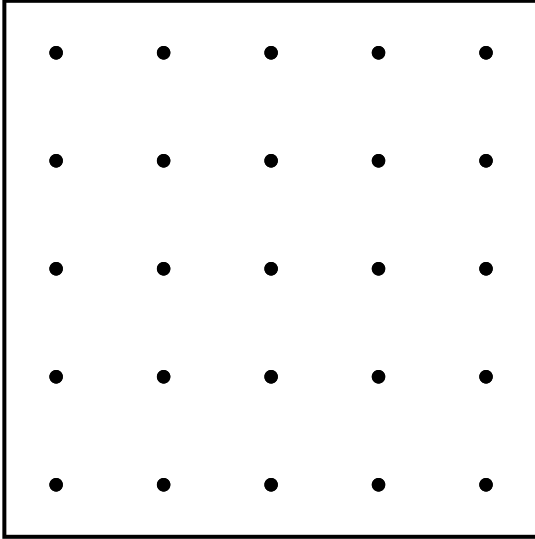
2

pentagon



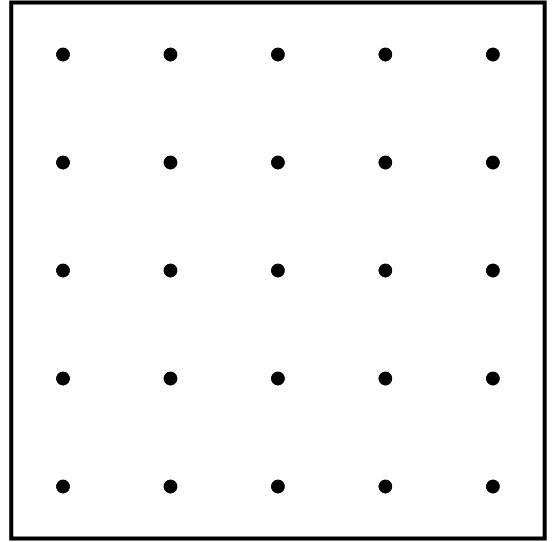
3

hexagon



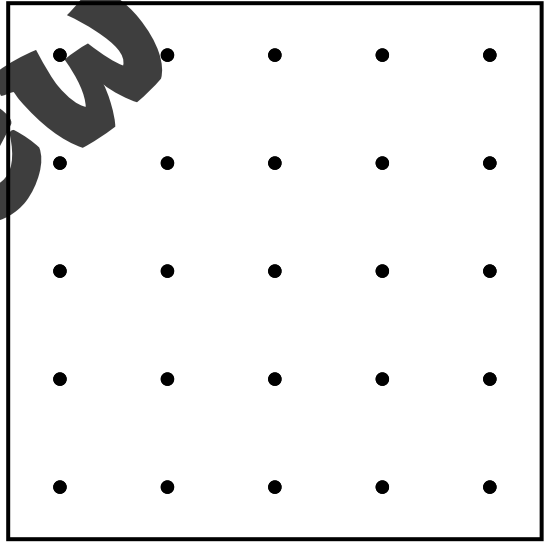
4

octagon



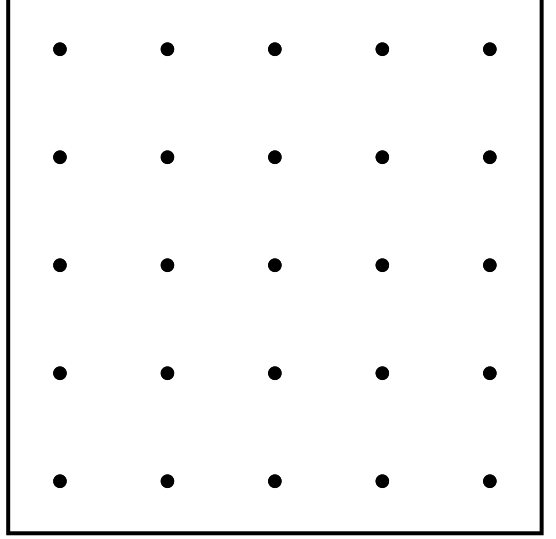
5

quadrilateral



6

any polygon



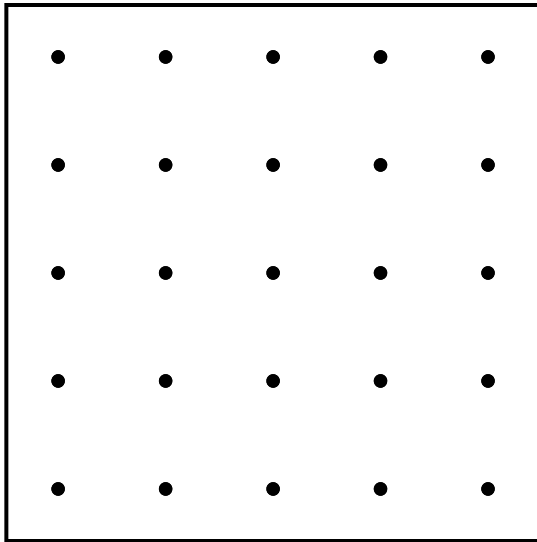
Preview

Name \_\_\_\_\_

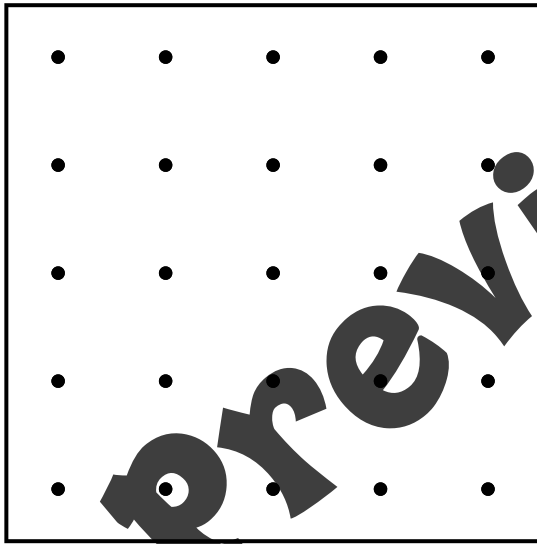
## Geoboard Practice

Directions: Create each geometric figure on your geoboard and then draw it on the dot paper.

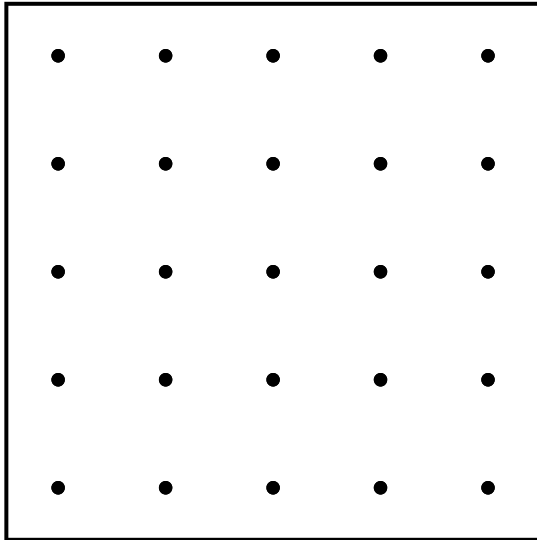
1



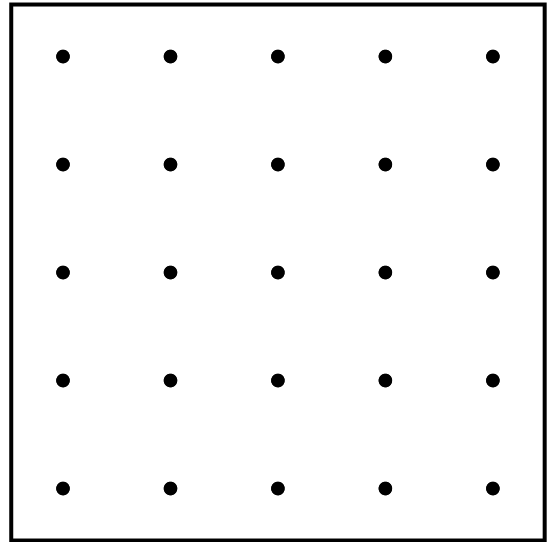
2



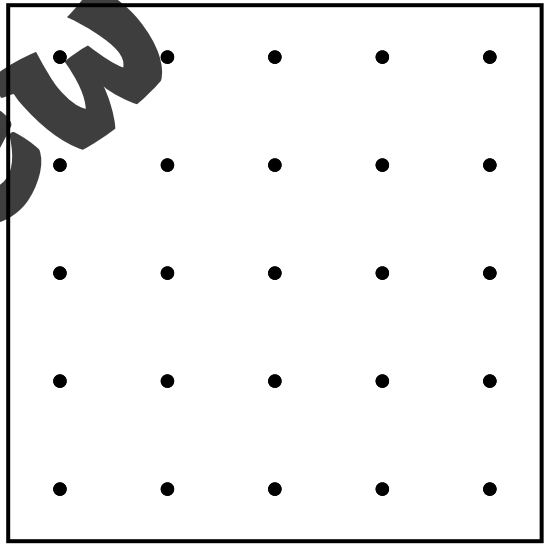
3



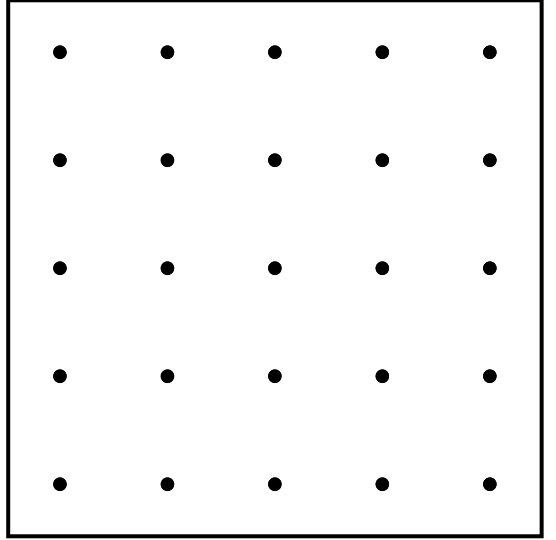
4



5



6



Preview

Name \_\_\_\_\_

# Polygon Foldable

Review

**triangle**

**quadrilateral**

**pentagon**

**hexagon**

**octagon**

# Exploring the Basics

## Review and Assess

Wouldn't it be nice if we could teach all day, every day, and never have to administer a test? Yet how would we know if our students had mastered the essential concepts without some type of assessment? This section provides several review activities and two different forms of a simple test to help you determine who has mastered the content and who still needs help.



### Mastery Learning\*

If you are familiar with Benjamin Bloom's Mastery Learning model of instruction, you'll realize that this section contains all the elements needed to ensure mastery. To implement this method, just follow the steps below:

1. Introduce and teach your geometry content as usual.
2. Administer a test (pages 34 - 35 or your own test) to determine mastery.
3. Divide your class into two groups - those who mastered the material (scoring 85% or higher on the test) and those who need more help.
4. Give those who mastered the material an enrichment activity.
5. Reteach the students who have not yet mastered the content.
6. Administer a retest (pages 36 - 37 or your own retest) to the students who scored lower than 85% on the first test.

### Review Activities

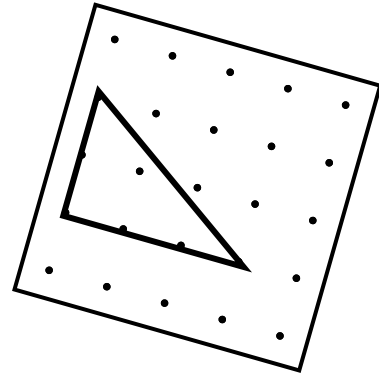
**Geoboard Showdown** (pages 28 - 29) can be used as a team activity. Review and model the Showdown directions with the class, then let them conduct the activity within their teams. **Geometry Match** (pages 30 - 31) is a quick but fun activity that can be used by the whole class. Duplicate one set of word cards and one set of illustration cards. You'll need exactly one card per person, so you may need to remove some matching sets. Give each student one card and have them mix around the room to find the student with the matching card. Ask students to stand next to their match and form a circle around the outside of the room. Check everyone's matches before redistributing the cards and playing again.

### Enrichment Activity

Students who master the content on the first test will enjoy playing **Tangram Challenge** with a partner. Give each person a set of 7 tangram puzzle pieces (page 32) and each pair a stack of Tangram Challenge cards made from the blackline master on page 33. They work together or alone to solve each problem. You can also have them draw their solutions in a journal or on paper for you to check later.

\*For more information on Mastery Learning, visit [www.lauracandler.com/masterylearning.htm](http://www.lauracandler.com/masterylearning.htm).

# Geoboard Showdown



**Number of Players:** 2 to 4

**Materials:** Geoboards and Rubber Bands  
Geoboard Showdown Cards

## Directions:

1. Before starting, shuffle the Geoboard Showdown Cards and place them face down in the middle of the play area.
2. Decide who will be the first Leader.
3. The Leader turns over the top card and reads it aloud. Then he or she places the card back in the middle where everyone can see it.
4. Everyone on the team, including the Leader, creates the geometric figure on his or her geoboard. No talking!
5. When finished, everyone places their geoboards face down in front of them.
6. When everyone is ready, the Leader says, "Showdown!"
7. Everyone flips their boards over and shows how they created the geometric figure named on the card.
8. Celebrate correct answers, and help anyone who had difficulty. If team members disagree about the correct answer, consult another source such as your math book.
9. The role of Leader rotates to the left and the game continues with the new Leader turning over the top card.
10. When you are finished, be sure to return the cards and geoboards to the proper storage location!

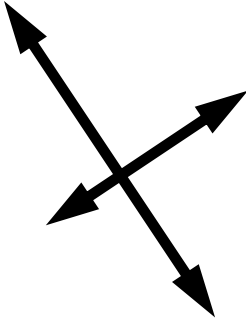



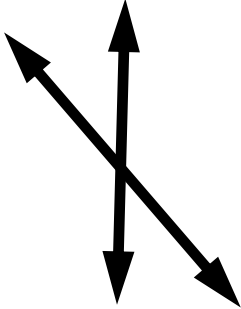
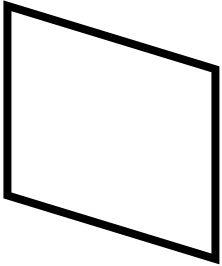
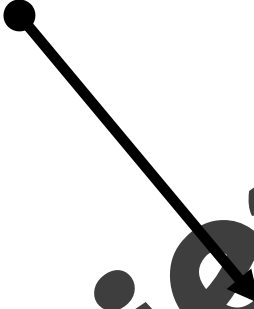
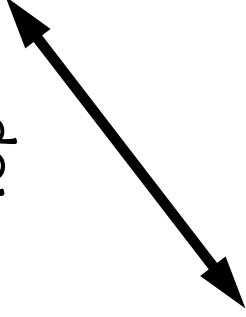
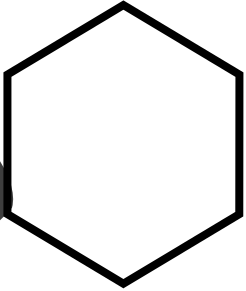

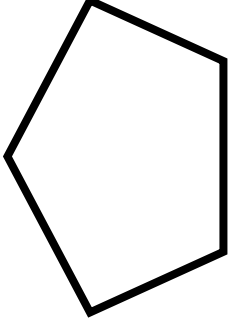
# Geoboard Showdown

<b>triangle</b>	<b>pentagon</b>
<b>quadrilateral</b>	<b>hexagon</b>
<b>octagon</b>	<b>parallel lines</b>
<b>perpendicular lines</b>	<b>intersecting lines</b>

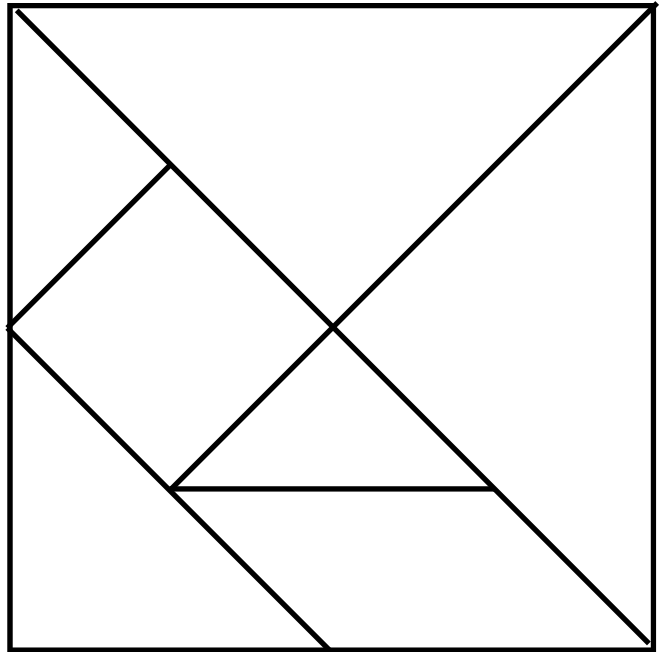
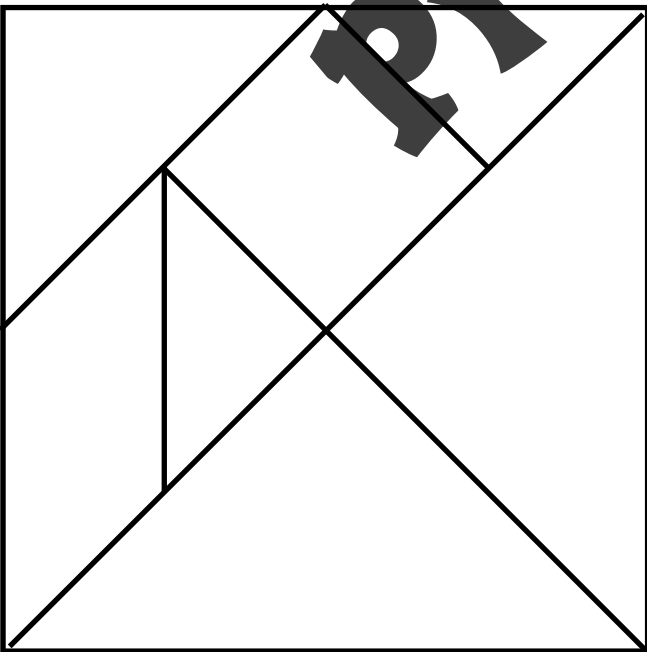
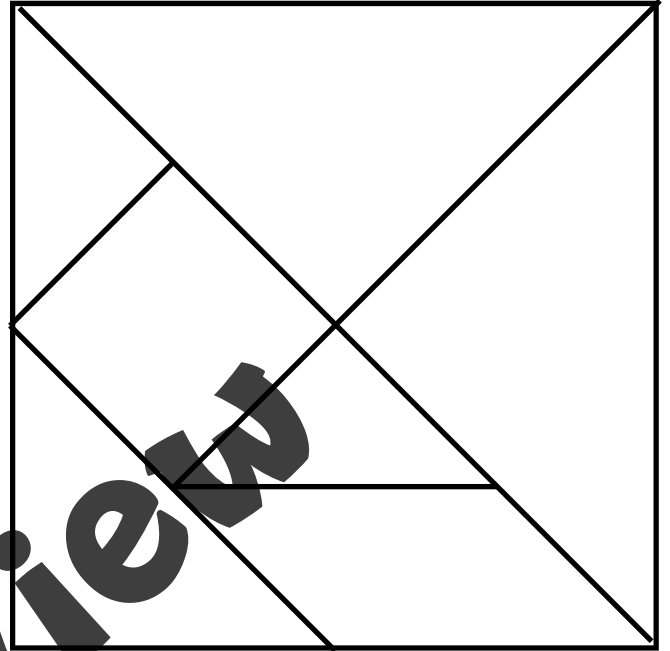
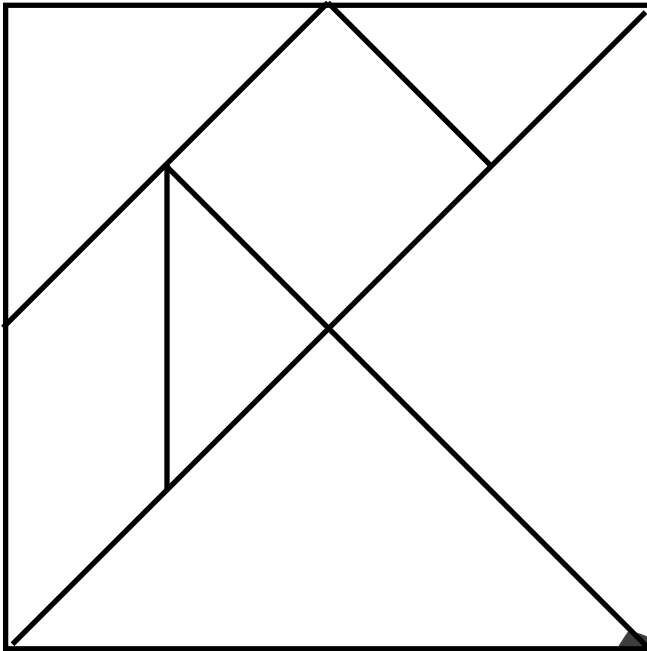
# Lines and Polygons Match (Words)

<b>perpendicular lines</b>	<b>parallel lines</b>	<b>intersecting lines</b> (not perpendicular)	<b>diagonal line</b>
<b>horizontal line</b>	<b>vertical line</b>	<b>ray</b>	<b>line</b>
<b>line segment</b>	<b>quadrilateral</b>	<b>hexagon</b>	<b>pentagon</b>

# Lines and Polygons Match (Illustrations)

	<p>Top</p> 	
 <p>Top</p>		
	<p>Top</p> 	
		

# Tangram Patterns



preview

# Tangram Challenges

## Tangram Challenge #1

Make a triangle using 2 tangram pieces

## Tangram Challenge #2

Use 2 tangram pieces to make a quadrilateral

## Tangram Challenge #3

Make a triangle using 3 tangram pieces

## Tangram Challenge #4

Make a quadrilateral using 3 tangram pieces

## Tangram Challenge #5

Make a pentagon using 3 tangram pieces

## Tangram Challenge #6

Make a quadrilateral using 4 tangram pieces

## Tangram Challenge #7

Use 4 tangram pieces to make a triangle

## Tangram Challenge #8

Use all 7 pieces to make a square

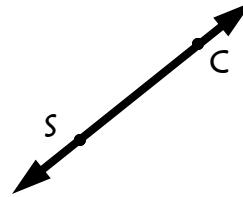
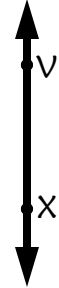
# Lines and Polygons Quiz

**I. Line Directions** - Match the line with the word which describes its direction.

\_\_\_\_ 1. Vertical

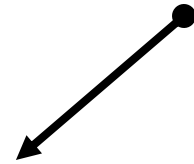
\_\_\_\_ 2. Diagonal

\_\_\_\_ 3. Horizontal



**II. Line Types**

Write **line**, **line segment**, or **ray** under each illustration:



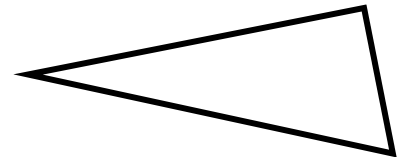
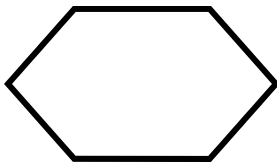
4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

**III. Polygons**

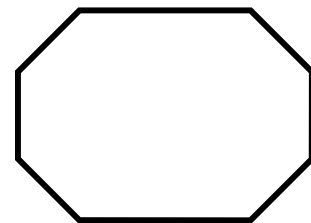
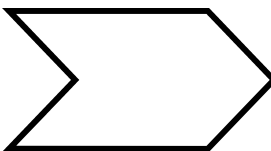
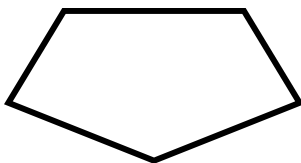
Label each figure as a **pentagon**, **triangle**, **hexagon**, **quadrilateral**, or **octagon**. Some words may be used more than one time.



7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_



10. \_\_\_\_\_

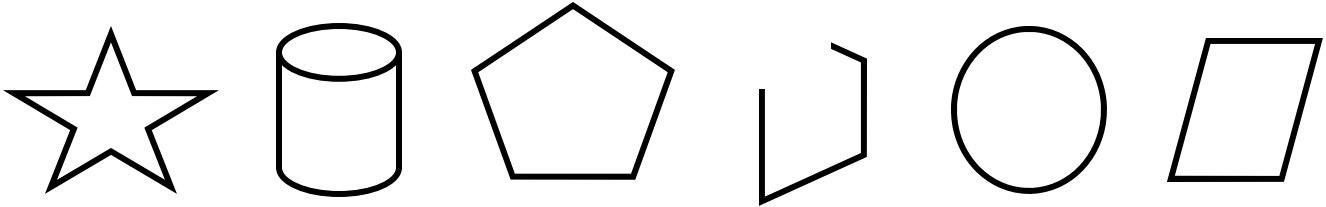
11. \_\_\_\_\_

12. \_\_\_\_\_

# Lines and Polygons Quiz

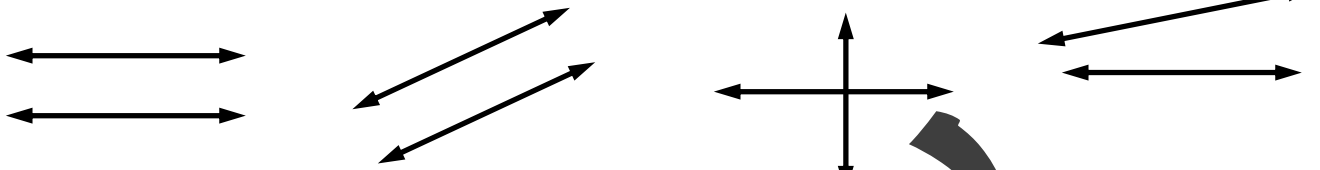
## IV. Polygon or Not?

13. Circle the figures that are polygons.

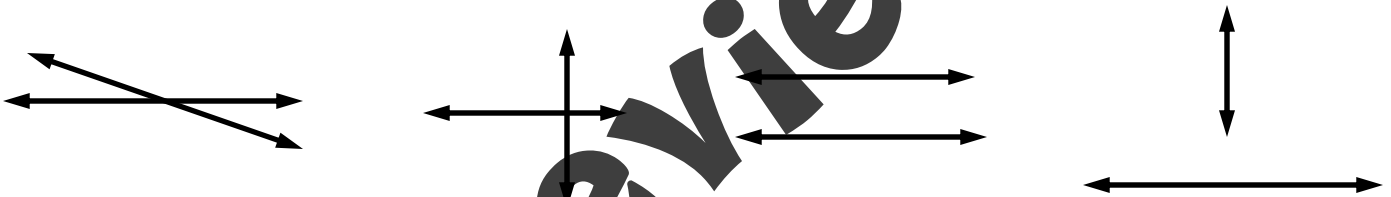


## V. Line Relationships

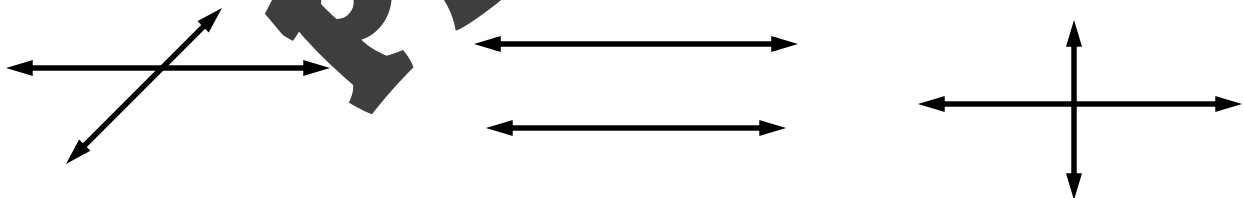
14. Circle ALL sets of lines in which the lines are **parallel** to each other.



15. Circle ALL sets of lines in which the lines are **perpendicular** to each other.



16. Which set of lines is **intersecting but not perpendicular**?



Bonus: Draw a picture of something in the classroom that contains **parallel lines**. Outline the parallel lines in your drawing.

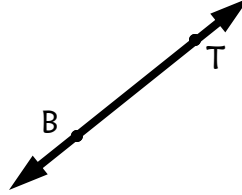
# Lines and Polygons Retest

**I. Line Directions** - Match the line with the word which describes its direction.

\_\_\_\_ 1. **Diagonal**

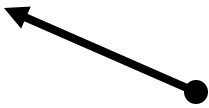
\_\_\_\_ 2. **Vertical**

\_\_\_\_ 3. **Horizontal**



## II. Line Types

Write **line**, **line segment**, or **ray** under each illustration:



4. \_\_\_\_\_



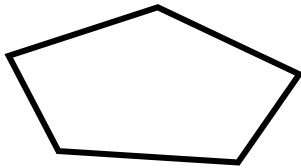
5. \_\_\_\_\_



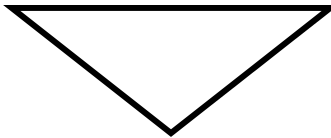
6. \_\_\_\_\_

## III. Polygons

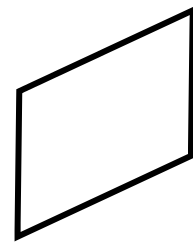
Label each figure as a **pentagon**, **triangle**, **hexagon**, **quadrilateral**, or **octagon**. Some words may be used more than one time.



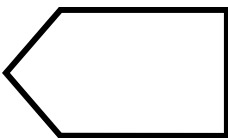
7. \_\_\_\_\_



8. \_\_\_\_\_



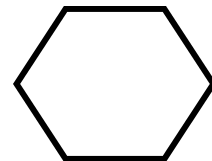
9. \_\_\_\_\_



10. \_\_\_\_\_



11. \_\_\_\_\_

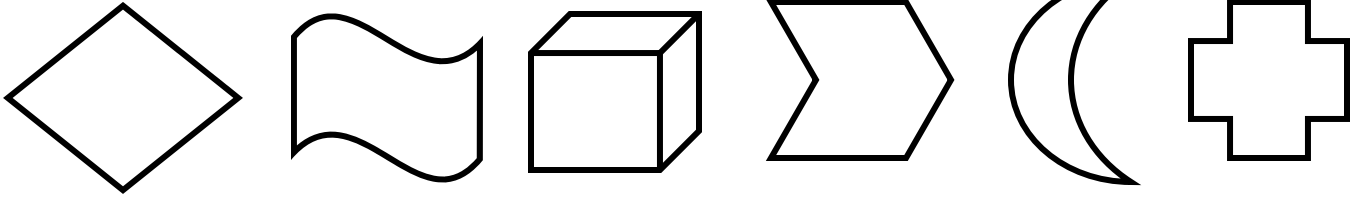


12. \_\_\_\_\_

# Lines and Polygons Retest

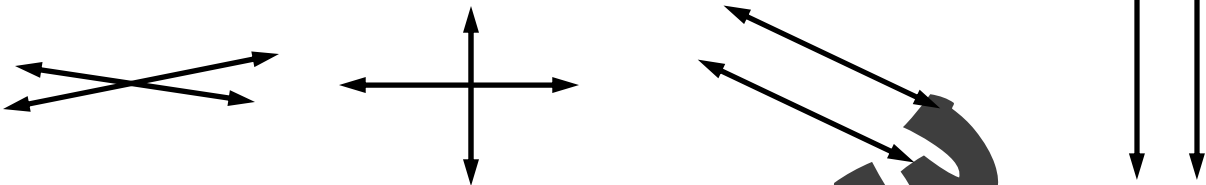
## IV. Polygon or Not?

13. Circle the figures that are polygons.

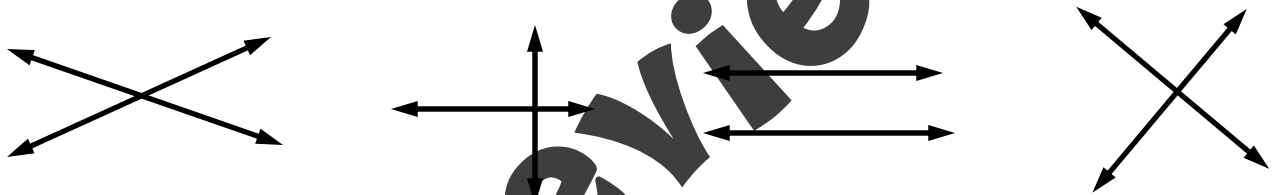


## V. Line Relationships

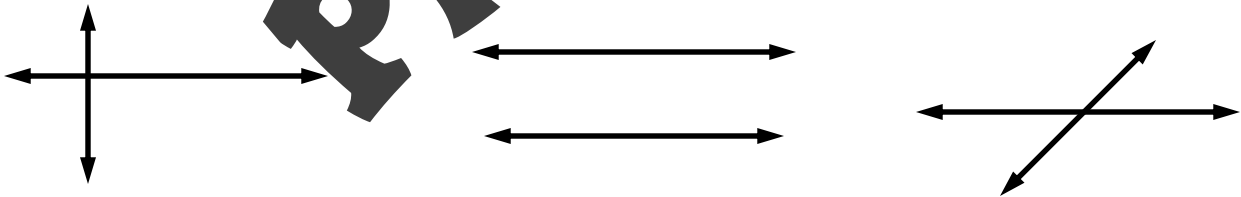
14. Circle ALL sets of lines in which the lines are **parallel** to each other.



15. Circle ALL sets of lines in which the lines are **perpendicular** to each other.



16. Which set of lines is **intersecting but not perpendicular**?



Bonus: Draw a picture of something in the classroom that contains **perpendicular lines**.  
Outline the perpendicular lines in your drawing.

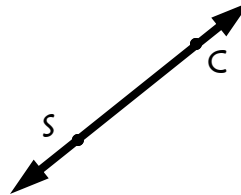
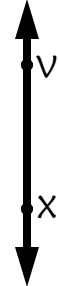
# Answer Key: Lines and Polygons Quiz

**I. Line Directions** - Match the line with the word which describes its direction.

VX 1. **Vertical**

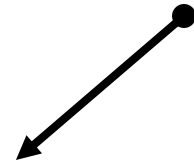
SC 2. **Diagonal**

AR 3. **Horizontal**



## II. Line Types

Write **line**, **line segment**, or **ray** under each illustration:



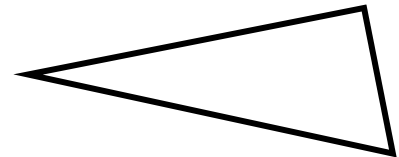
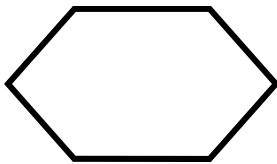
4. line segment

5. line

6. ray

## III. Polygons

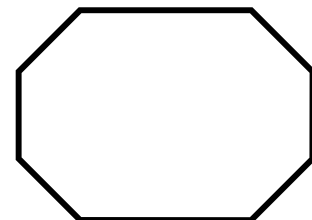
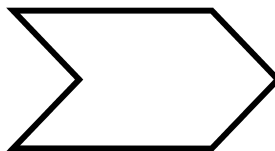
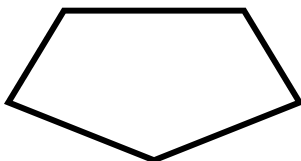
Label each figure as a **pentagon**, **triangle**, **hexagon**, **quadrilateral**, or **octagon**. Some words may be used more than one time.



7. hexagon

8. quadrilateral

9. triangle



10. pentagon

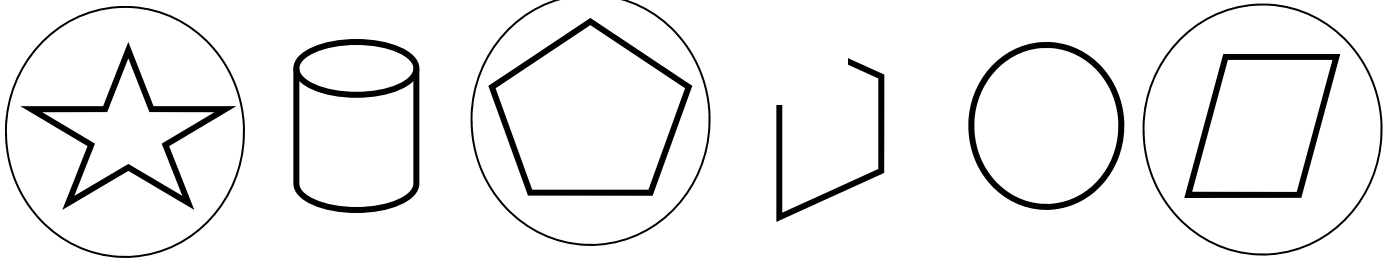
11. hexagon

12. octagon

# Quiz Answer Key

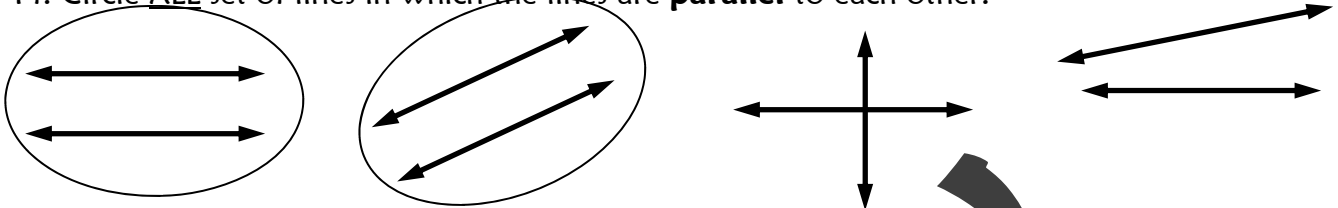
## IV. Polygon or Not?

13. Circle the figures that are polygons.

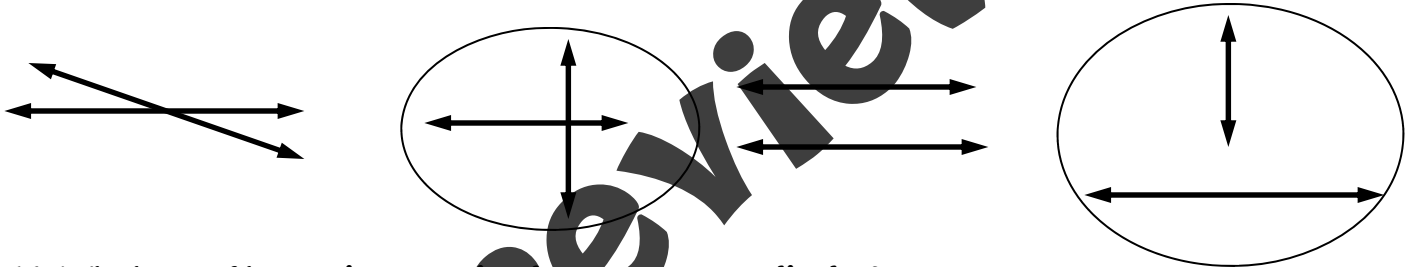


## V. Line Relationships

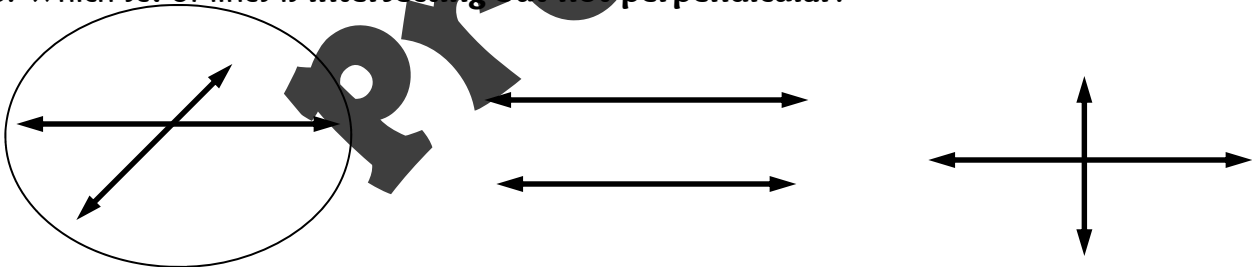
14. Circle ALL set of lines in which the lines are **parallel** to each other.



15. Circle ALL set of lines in which the lines are **perpendicular** to each other.



16. Which set of lines is **intersecting but not perpendicular**?



Bonus: Draw a picture of something in the classroom that contains **parallel lines**. Outline the parallel lines in your drawing.

Answers will vary.

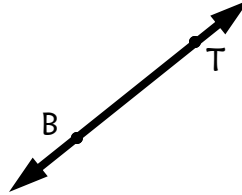
# Answer Key: Lines and Polygons Retest

**I. Line Directions** - Match the line with the word which describes its direction.

BT 1. **Diagonal**

CN 2. **Vertical**

ZX 3. **Horizontal**



## II. Line Types

Write **line**, **line segment**, or **ray** under each illustration:



4. ray



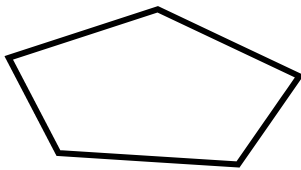
5. line



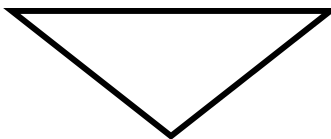
6. line segment

## III. Polygons

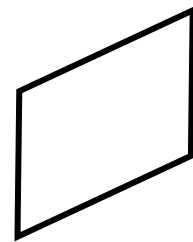
Label each figure as a **pentagon**, **triangle**, **hexagon**, **quadrilateral**, or **octagon**. Some words may be used more than one time.



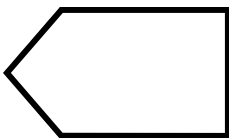
7. pentagon



8. triangle



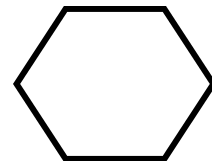
9. quadrilateral



10. pentagon



11. octagon

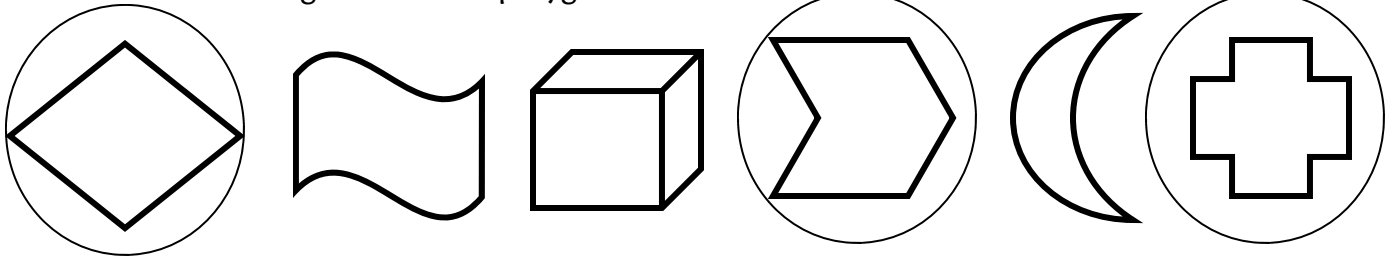


12. hexagon

# Retest Answer Key

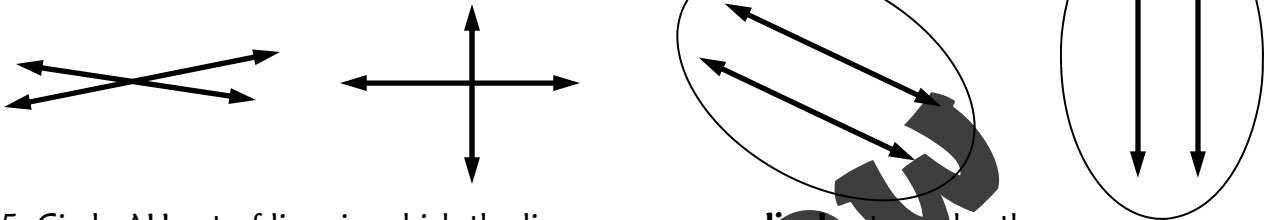
## IV. Polygon or Not?

13. Circle the figures that are polygons.

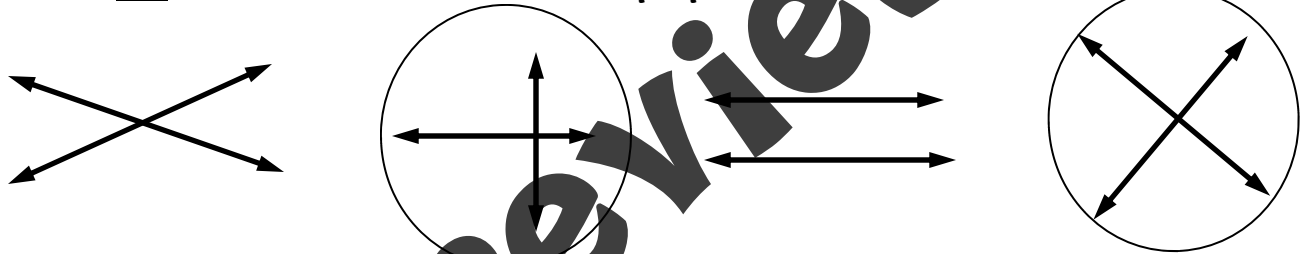


## V. Line Relationships

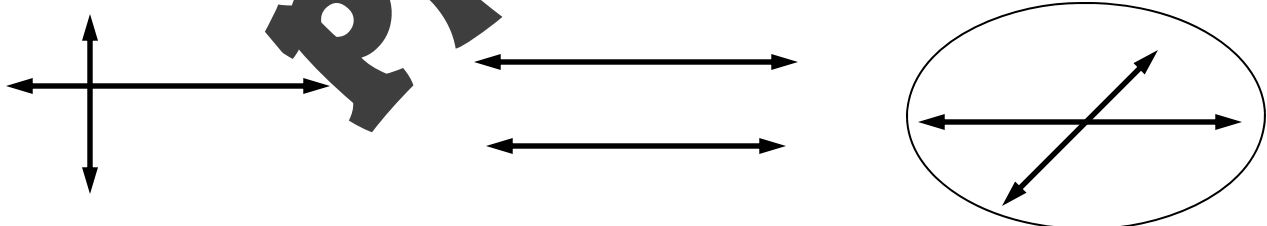
14. Circle ALL set of lines in which the lines are **parallel** to each other.



15. Circle ALL set of lines in which the lines are **perpendicular** to each other.



16. Which set of lines is **intersecting but not perpendicular**?



Bonus: Draw a picture of something in the classroom that contains **perpendicular lines**.  
Outline the perpendicular lines in your drawing.

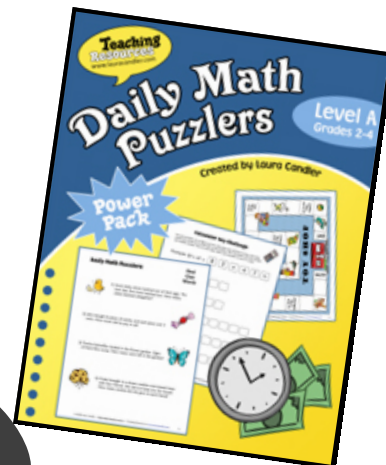
Answers will vary.

# More Teaching Resources from Laura Candler

## Daily Math Puzzler Program (Levels A - D)

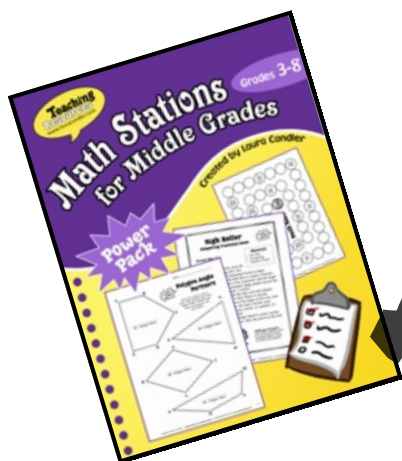
I just implemented Laura's Math Puzzlers, and after two weeks I can already see changes in my class. They are picking up good habits like underlining key words, and writing complete answers already! Each day when we take out the sheet, they know what to do and enjoy doing it. I think part of the fun comes from the program's title "Math Puzzlers". Somehow, they seem to think puzzles are way more fun than math word problems. I also have to say that the breadth of topics and strategies covered in just one weekly sheet is impressive. It is a great way to keep math topics fresh, and have kids apply them to real situations. Each problem could be solved using different strategies, so it has been great for my kids to see all the different ways they could have approached the problem.

~ Dawn, Minnesota



## Math Stations for Middle Grades

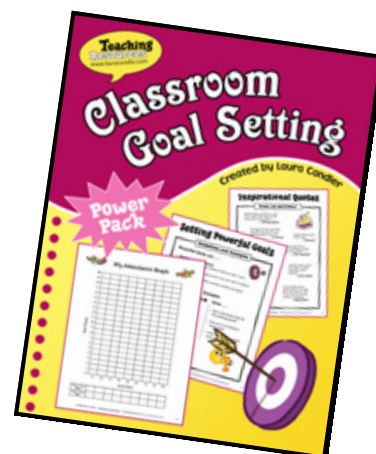
I just downloaded your Math Stations for Middle Grades, and it is EXACTLY what I was looking for! This is my second year teaching math, after eleven years as a communications teacher. I don't feel I made math fun or interesting for my students last year, which means they didn't learn the things I wanted them to learn about setting goals for themselves and enjoying the challenge for its own sake. Now I finally know how to do that, and I will be able to not only use your activities but build from them and tailor them to my own students' specific needs. Your math stations provide exactly that element of fun practice and social sharing that I hoped to add this year. I can't wait to get started! ~ Shari Miller, Texas



## Classroom Goal Setting

WOW! Thank you so MUCH! I just downloaded your Goal Setting Power Pack and I LOVE it! I was most pleasantly surprised because I teach a combination class of grades 6-7-8, and wasn't sure if your pack would be "old" enough for my students! No need to worry....it's perfect! Thank you for a wonderful, quality product!

~ Nancy Berner, Pennsylvania



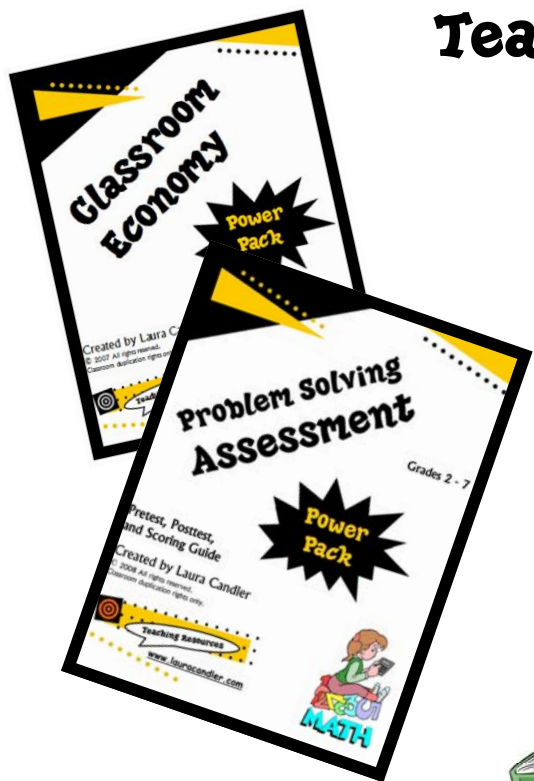
Visit [www.lauracandler.com](http://www.lauracandler.com) to learn more!

# Teaching Resources Website

[www.lauracandler.com](http://www.lauracandler.com)

## Ready-to-use Resources for Teachers!

- Free blackline masters and printables
- Lesson plans and teaching strategies
- Cooperative learning methods
- Classroom management and motivation
- Literacy and Literature Circle strategies
- Mathematics instructional resources
- Candler's Classroom Connections



Receive the **Classroom Economy** and **Problem Solving Assessment Power Pack** for FREE when you sign up for Laura Candler's bi-weekly newsletters at [www.lauracandler.com](http://www.lauracandler.com)!

## Workshop Information

- Invite Laura to your school or district to energize your teachers with powerful strategies!
- Workshops available:
  - \* The Dynamic Duo:
    - Putting the Punch in Math Instruction
    - \* Innovative Approaches to Literacy Instruction
- Teachers walk away with specific strategies to implement in their classrooms the next day.



Contact Laura for more information: [lauracandler@att.net](mailto:lauracandler@att.net)