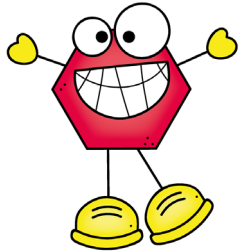


Geometry

Exploring the Basics

by Laura Candler



Geometry: Exploring the Basics includes a collection of lessons and activities designed to help students master the basic concepts of geometry. You'll find both ready-to-use and editable resources for introducing points, lines, line relationships, and simple polygons. You'll also find several review and enrichment activities and two editable tests. These resources will help your students develop a solid foundation of basic geometry concepts to build upon in the future.

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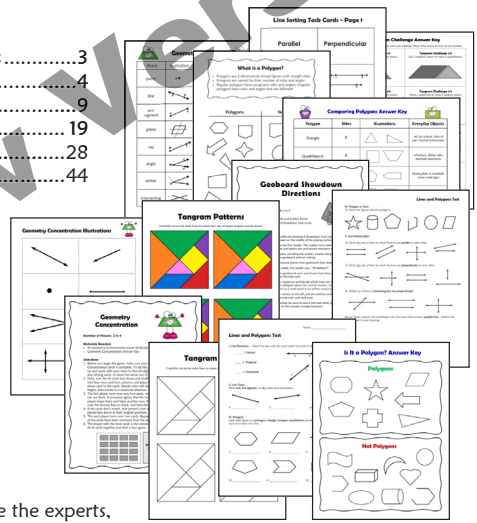
Editable Resources (Separate Folder)

- Editable Geometry Notes chart
- Editable Geoboard Activity
- Editable Polygons Foldable
- Editable Test and Retest

Creating a Foundation for Geometry

Have you ever noticed how some students perk up when you start your geometry unit? Those who struggle with abstract concepts and numbers often come alive when asked to create shapes on geoboards or solve 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.



Teaching Tips and Common Core Standards

How to Use this Resource

Most teachers introduce lines and angles first, and then move on to polygons. These activities may be introduced slowly when exploring new concepts or quickly when revisiting prior learning. Don't feel you need to teach every lesson; choose only the activities that meet your students' needs. Then use the Lines and Polygons Test to decide if more instruction is needed. Many of these resources were designed to be used in a whole group setting by displaying them on a document camera or projecting them onto an interactive whiteboard. Other activities are perfect as review games for cooperative learning teams or in math centers.

Geometry: Exploring the Basics also includes several editable PowerPoint documents, including the Geometry Notes Chart, the Geoboard Polygons printable, the Polygon Foldable, and both tests. You'll find these additional resources in a separate folder in the product file.

Boost Achievement By Increasing Active Engagement

When students are actively engaged in a lesson, they learn faster and are more likely to retain what they've learned. But keeping students actively engaged during a whole group lesson can be a challenge. One way to increase engagement is to ask your students to demonstrate their understanding throughout the lesson rather than taking a test at the end. Individual dry erase boards are ideal for showing written responses to questions. If you don't have enough dry erase boards for every student, you can substitute laminated sheets of card stock. If your students have digital tablets, you can ask them to open an interactive whiteboard app like ShowMe and to write their answers directly on their tablets. Another effective strategy is to have your students demonstrate geometric concepts using physical objects like straws or rubber bands on geoboards.



Common Core State Standards

3rd Grade - Reason with shapes and their attributes.

3.GA.1: Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.



4th Grade - Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

4.GA.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

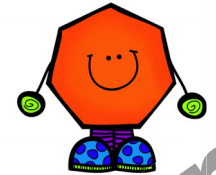
4.GA.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.



Introducing Geometry Concepts

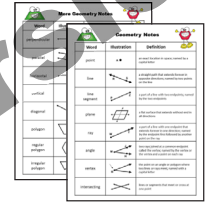
Assessing Prior Knowledge

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.



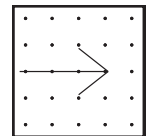
Geometry Basics and Notes

Display the **Geometry Basics** printable (page 5) and ask your students if they are familiar with any of the words in the box. Point to the different illustrations and have your students try to identify them based on their prior knowledge. As you discuss each image, refer to the definitions on the **Geometry Notes** chart (pages 6 and 7). If you'd like to customize this chart by changing the geometry terms and/or definitions, an editable PowerPoint version of this chart can be found in a separate folder within the product file.



Using Geoboards to Foster Engagement

Geoboards are a great way to engage students actively in almost any geometry lesson. Designate one person on each team to be the Geoboards Captain 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 students' 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 geometric figures such as rays and line segments and have students model them on the geoboard.

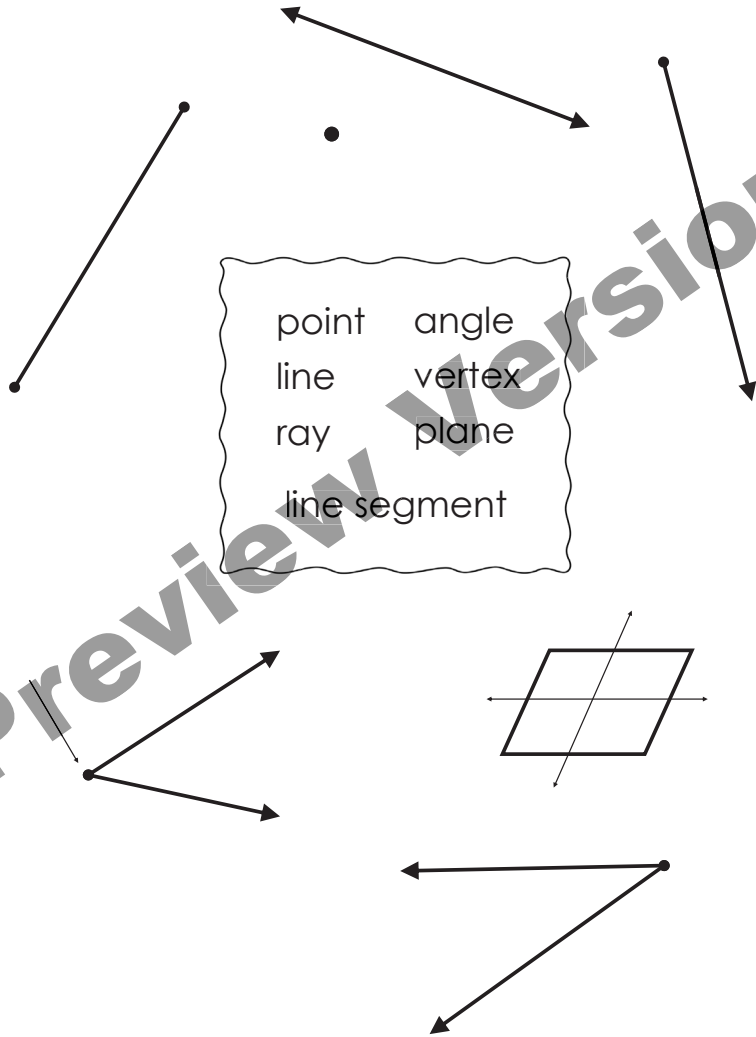


Body Geometry

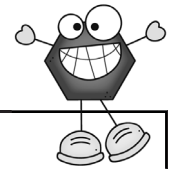
Many students learn best through kinesthetic interaction, so have them use their bodies to represent each geometric concept. Display the **Geometry Basics** teaching page and have each team create an action or pose for each word. For example, they might make a fist and punch it forward to represent the term "point," or bend their arms to show angles. Give them 5 minutes to create their representations, and then let each team demonstrate their actions or poses for the class.



Geometry Basics



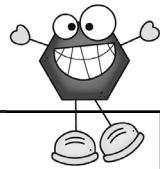
Geometry Notes



Word	Illustration	Definition
point	A ●	an exact location in space; named by a capital letter
line	R S	a straight path that extends forever in opposite directions; named by two points on the line
line segment	P Z	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	W Y	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	M J H	two rays that join at a common endpoint called the vertex; angles are named by the vertex or the vertex and a point on each ray
vertex	B	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



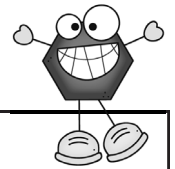
More Geometry Notes



Word	Illustration	Definition
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 all sides and angles congruent to each other
irregular polygon		a polygon with sides and angles that are not congruent



Geometry Notes



Word	Illustration	Definition

2

Introducing Lines and Angles

Lines and Line Relationships

To introduce line relationships and related terms, give each student two drinking straws. Assess their prior knowledge by asking them to hold one straw horizontally, then hold it diagonally, and then vertically. Next have them position both straws to demonstrate parallel, intersecting, and perpendicular lines. Introduce the term "right angle" if appropriate.

Display **Lines and More Lines!** (page 10) and introduce the basic terms shown on the page. Demonstrate how to use the corner of a piece of paper or index card to find out if two intersecting lines are perpendicular. Finally, ask your students to look around the room to find examples of intersecting, parallel, and perpendicular lines.

Lines and Angles Search

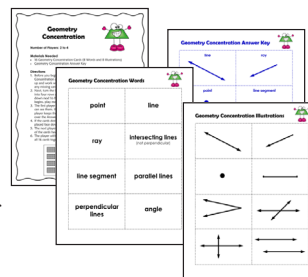
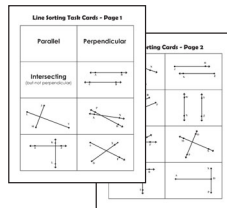
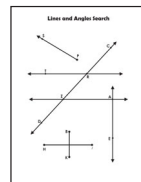
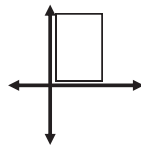
Students will need a method for displaying their work such as individual dry erase boards or tablets. Display **Lines and Angles Search** (page 11) for the class. Explain the accepted conventions for naming lines, angles, and rays. Then call out various terms that have been introduced such as line, line segment, parallel lines, etc. Have students identify each geometric figure by naming it on their dry erase board with capital letters.

Line Sorting

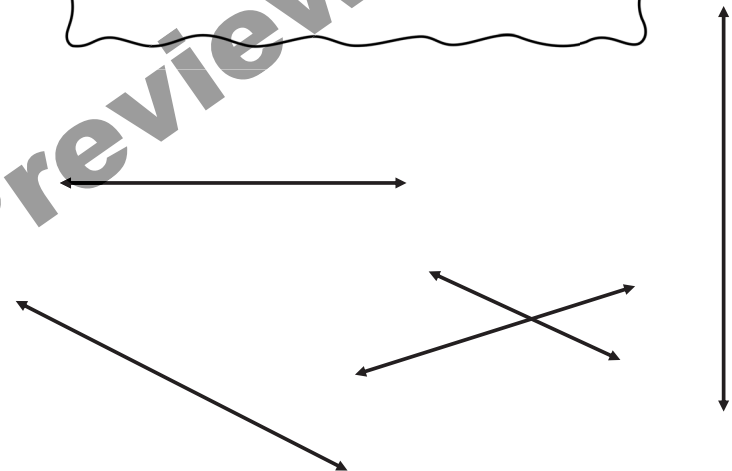
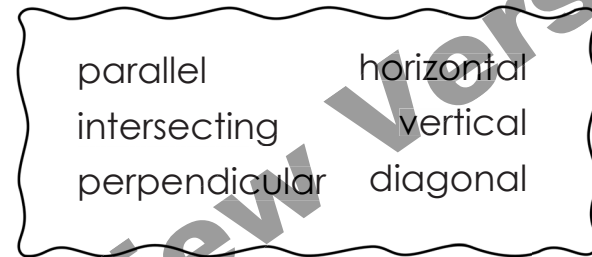
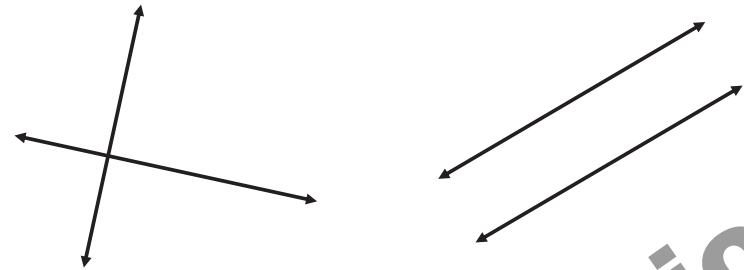
Students can practice line relationship concepts by using the **Line Sorting Cards** (pages 12-13). Print a set for each pair of students. Have them take the three topic cards and place them in a row. Then have them shuffle the remaining cards and stack them face down next to the topic cards. Students take turn flipping over a card and identifying the lines as **parallel**, **perpendicular**, or **intersecting but not perpendicular**. If their partner agrees, they place the card under the proper heading. Provide a copy of the answer key on page 14 for checking their final answers.

Geometry Concentration Game

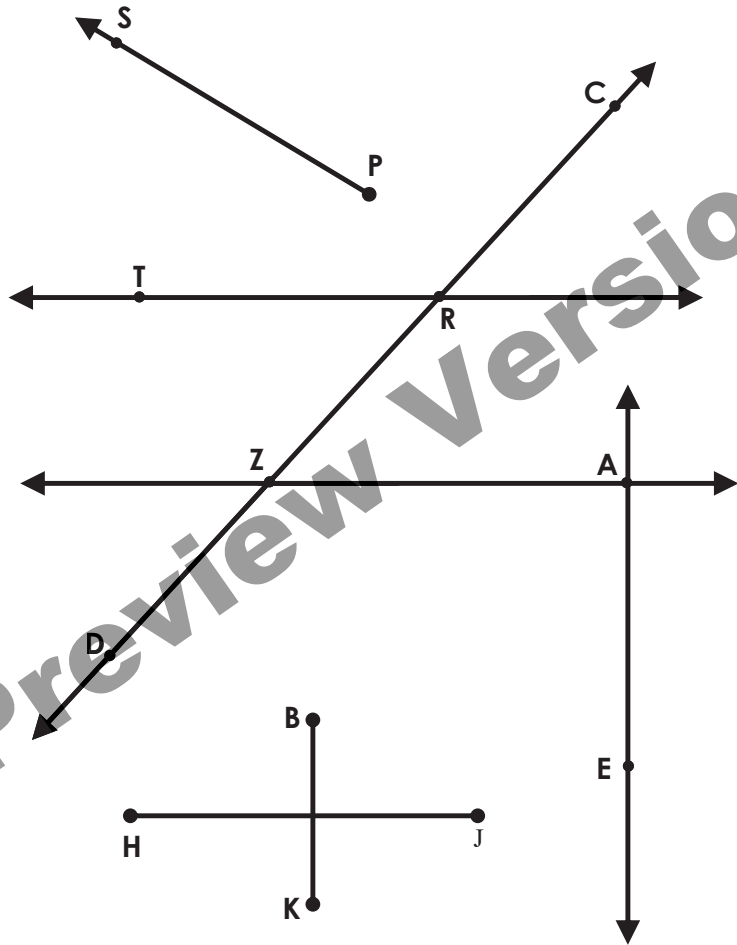
Geometry Concentration is a simple yet effective review game based on the classic memory game. This version involves matching geometry words and illustrations, and complete directions are provided on page 15. To create a math center from the materials, glue the directions onto the front of a 9 x 12" envelope. Prepare the deck of Geometry Concentration cards by printing pages 16 and 17 and cutting the cards apart. Paperclip the cards together and store them inside the envelope. To make the game self-checking, include a copy of the answer key (page 18).




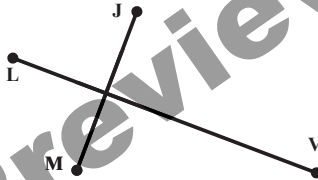
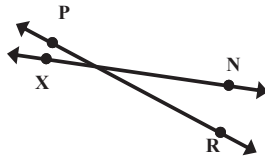
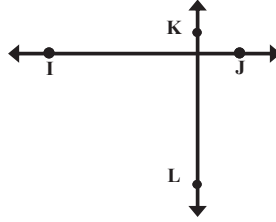
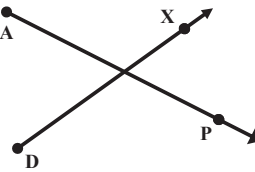
Lines and More Lines



Lines and Angles Search



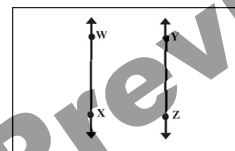
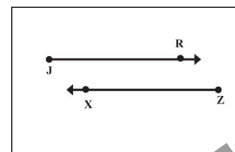
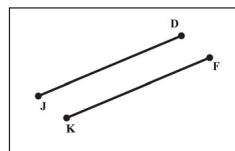
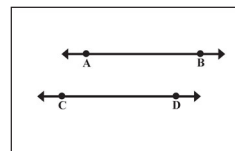
Line Sorting Task Cards - Page 1

Parallel	Perpendicular
<p>Intersecting (but not perpendicular)</p>	
	
	

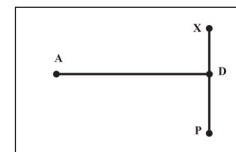
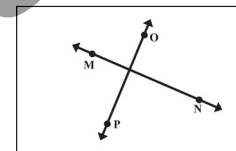
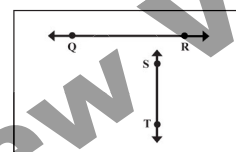
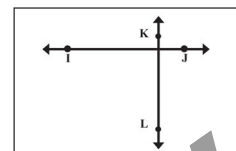
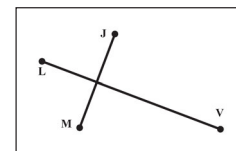
Line Sorting Cards - Page 2

Line Sorting Answer Key

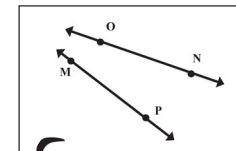
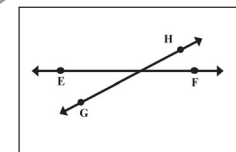
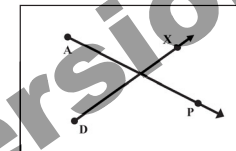
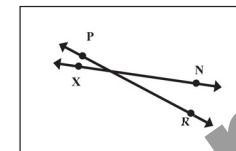
Parallel



Perpendicular



Intersecting



Note: Lines \overline{ON} and \overline{MP} both continue in a straight path in two directions. The lines aren't parallel to each other, so their paths must cross, or intersect.

Geometry Concentration



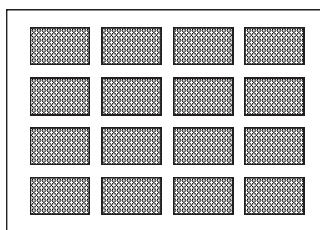
Number of Players: 2 to 4

Materials Needed

- 16 Geometry Concentration Cards (8 Words and 8 Illustrations)
- Geometry Concentration Answer Key

Directions

1. Before you begin the game, make sure your deck of Geometry Concentration cards is complete. To do this, spread the 16 cards face up and work with your team to find all eight matching sets. Locate any missing cards, or leave the extras out of the game.
2. Next, turn the 16 cards face down and shuffle them. Organize them into four rows and four columns, and place the answer key face down next to the cards. Decide who will start. After the game begins, play moves in a clockwise direction.
3. The first player turns over any two cards, making sure that all players can see them. If everyone agrees that the two cards match, the player keeps them and takes another turn. If anyone disagrees, turn over the Answer Key to check, and then discuss the answer.
4. If the cards don't match, that person's turn ends. Both cards are placed face down in their original positions.
5. The next player turns over two cards. Repeat steps 3 and 4 until all of the cards have been removed from the playing space.
6. The player with the most cards is the winner. If time allows, shuffle all 16 cards together and start a new game.



Answer Key
Face Down

Geometry Concentration Words



point

line

ray

intersecting lines
(not perpendicular)

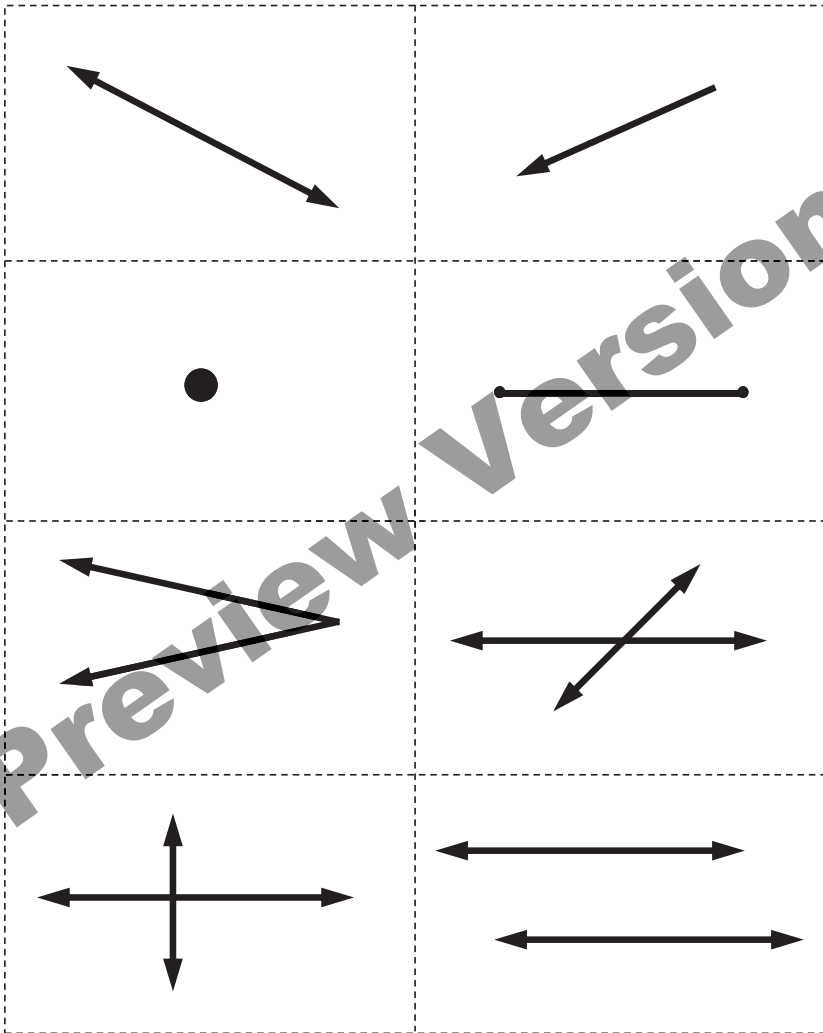
line segment

parallel lines

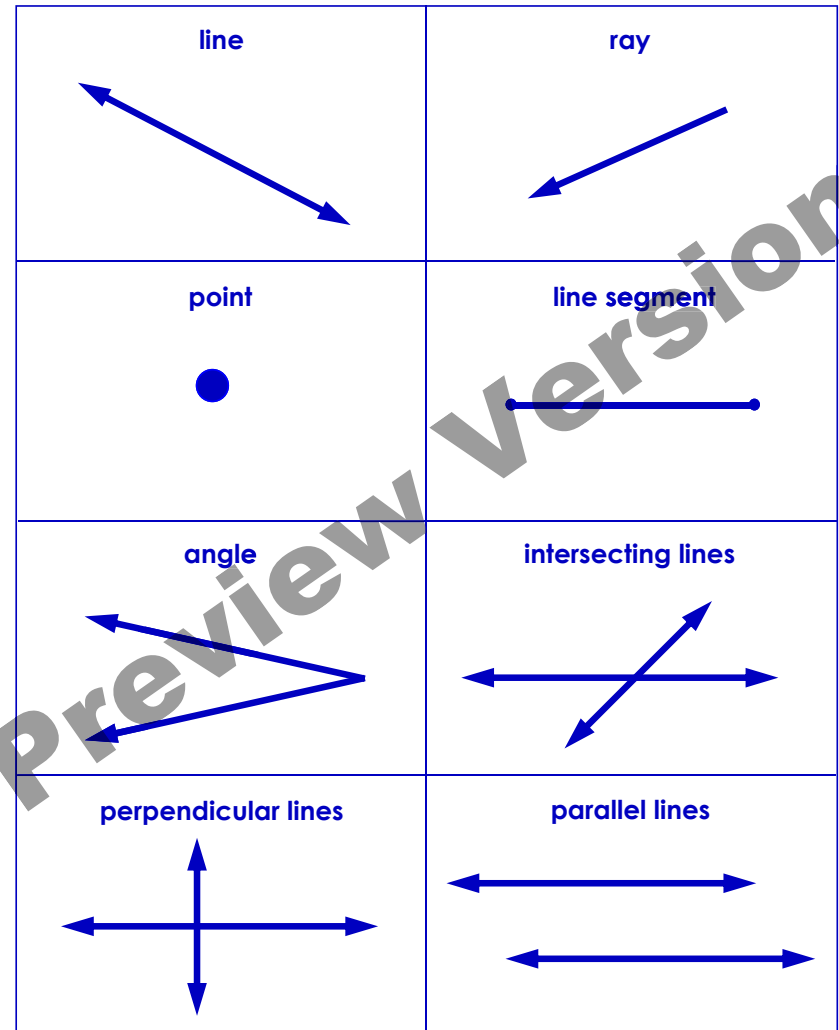
perpendicular
lines

angle

Geometry Concentration Illustrations



Geometry Concentration Answer Key

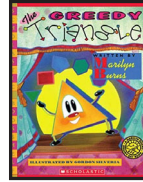


3

Introducing Simple Polygons

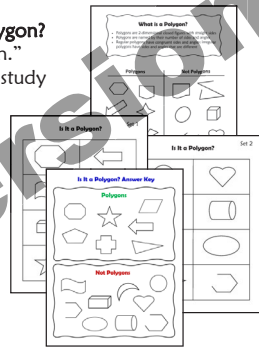
Introduce Polygons By Reading *The Greedy Triangle*

A fun way to introduce polygons is to read aloud Marilyn Burns' [The Greedy Triangle](#). In this story, a triangle is unhappy with having only 3 sides so it asks the "shapeshifter" for help. First 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 make a great introduction to polygons, it provides an important opportunity to discuss self concept.



What is a Polygon?

After reading [The Greedy Triangle](#), display a copy of **What is a Polygon?** (page 20) to introduce or review the meaning of the term "polygon." After reading 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 shape, ask your students to explain why it's placed in that category.



For extra practice, create sets of sorting cards from pages 21 and 22. **Is It a Polygon?** With your students working in teams or with a partner, have them stack the cards face down and take turns flipping the cards over. As each card is revealed, team members give a thumbs up if the shape is a polygon or a thumbs down if it's not, and they place it in the correct pile. Remind them to justify their classifications by explaining why each shape is or is not a polygon. An answer key is provided on page 23.

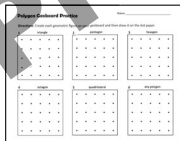
Comparing Polygons

Give each student a copy of the **Comparing Polygons** chart on page 24 to complete as you discuss common types of polygons. Work together to brainstorm everyday objects that are examples of each type of polygon and record them on the chart.

Number of Sides	Examples	Everyday Objects
3	Triangle	Sign, roof, slice of pizza
4	Quadrilateral	Window, book, table, floor tile
5	Pentagon	Home plate, sign, nail head
6	Hexagon	Nut, honeycomb, stop sign
7	Heptagon	Seven-sided die, stop sign
8	Octagon	Stop sign, octagonal nut

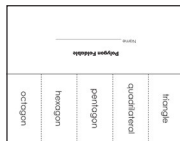
Geoboard Polygon Practice

Geoboards are a great way for students to develop their visual and tactile skills as they create polygons and transfer the representations to dot paper. Each student will need a copy of Polygon Geoboard Practice (page 26). If you don't have enough geoboards for everyone, place the activity in a center or allow partners to work together, taking turns as they create polygons and draw them on dot paper.



Polygon Foldable

If your students need a study guide to help them learn the polygon names, have them create a foldable using the printable on page 27. Ask them to fold it on the solid line and cut each dotted line to form five flaps. Under each flap they write the polygon's definition and two different illustrations for that polygon. Check their work for accuracy.

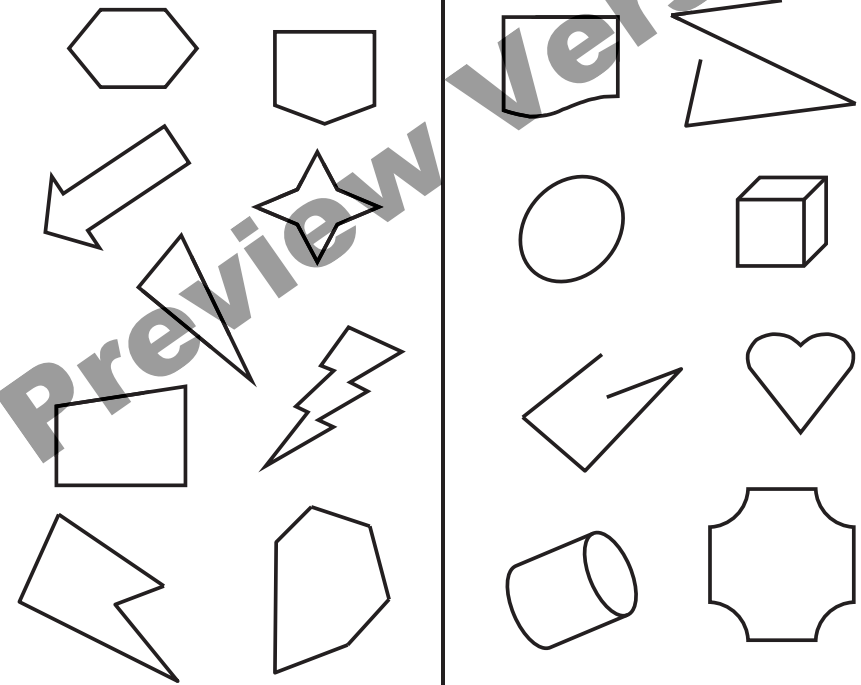


What is a Polygon?

- 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

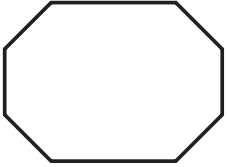
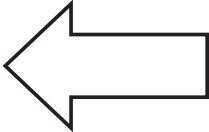
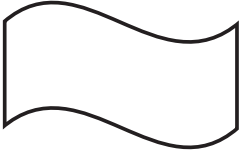


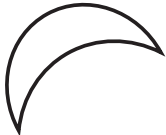
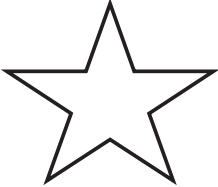
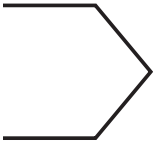
Polygons

Not Polygons



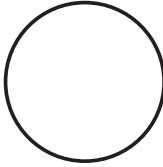
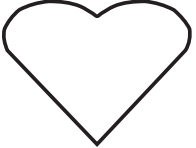
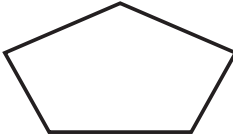

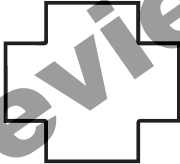
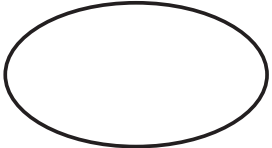
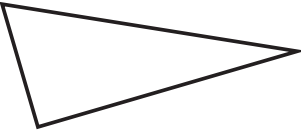
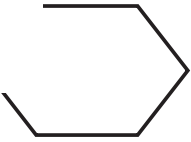
Is It a Polygon?

Set 1

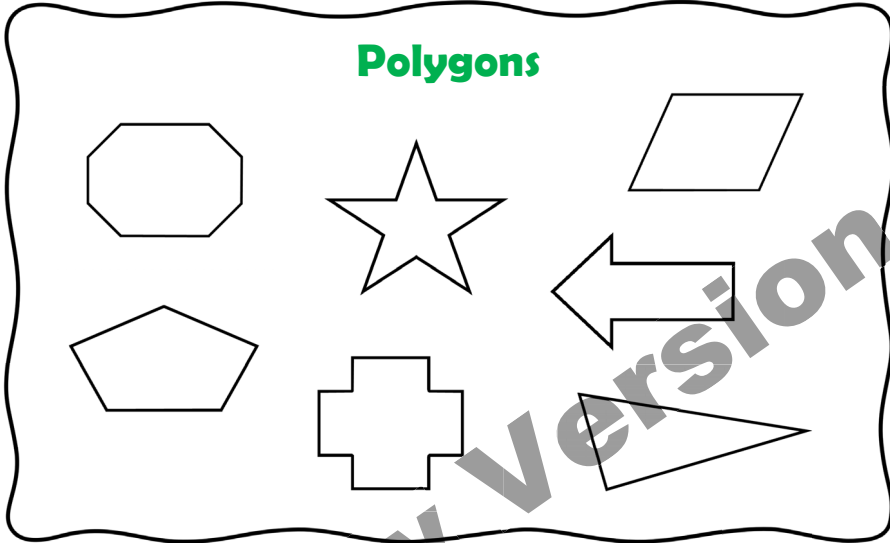
Is It a Polygon?

Set 2

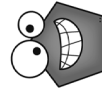
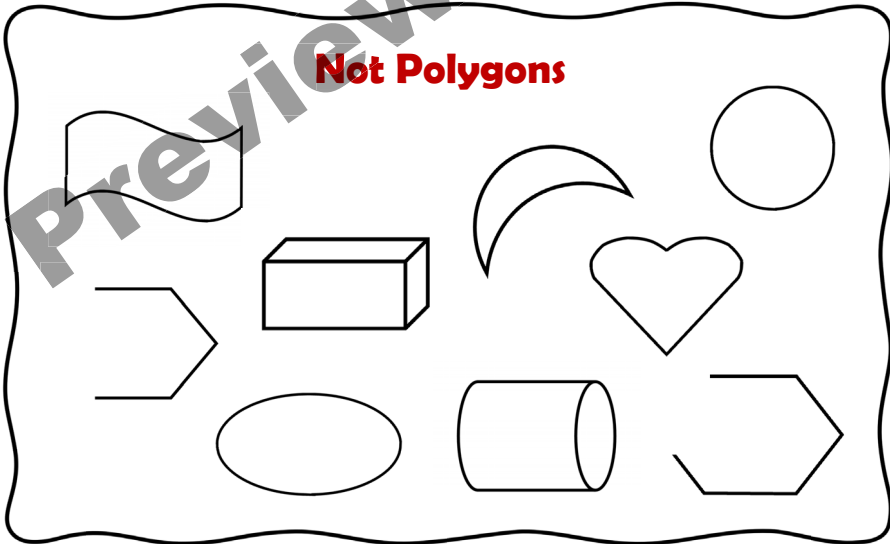
	
	
	
	

Is It a Polygon? Answer Key

Polygons



Not Polygons



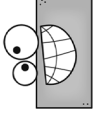
Comparing Polygons



Polygon	Sides	Illustrations	Everyday Objects
Triangle			
Quadrilateral			
Pentagon			
Hexagon			
Octagon			



Comparing Polygons Answer Key

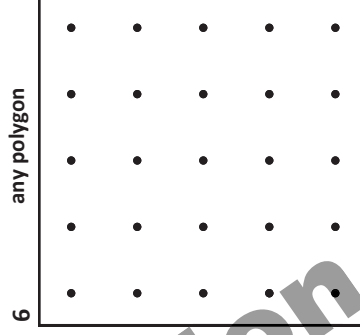
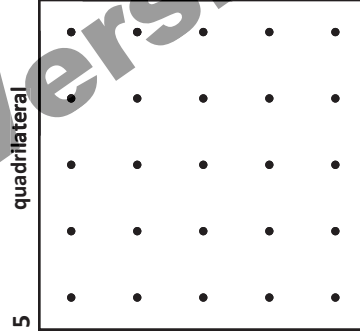
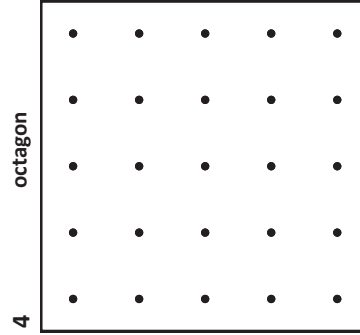
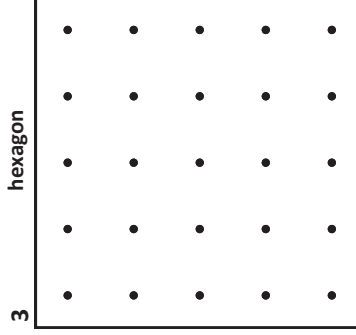
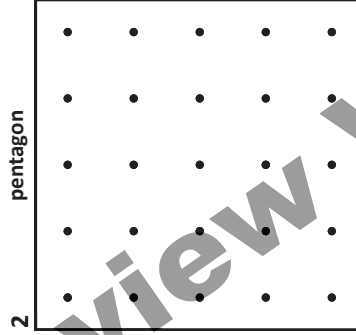
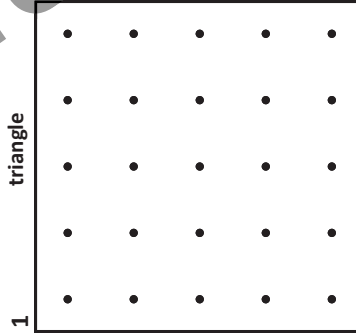


Polygon	Sides	Illustrations	Everyday Objects
Triangle	3		sail on a boat, slice of pie, musical instrument
Quadrilateral	4		windows, dollar bills, baseball diamonds
Pentagon	5		home plate in baseball, some road signs
Hexagon	6		floor tiles, cell in a beehive, top of a bolt
Octagon	8		some road signs,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

Polygon Geoboard Practice

Name _____

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



Name _____

Polygon Foldable

triangle

quadrilateral

pentagon

hexagon

octagon



Review and Enrichment

As you start to wrap up your geometry unit, you may realize that some students need extra practice with these concepts. The review activities in this chapter can be used to help them develop a more solid foundation for geometry. The enrichment activities can be offered to students who understand the basics and need a challenge. If you already have math centers set up in your classroom, you can easily create geometry centers from the activities in this chapter. If you choose to work with small groups during this time, establish clear guidelines for students who are working on their own or with others. Remind them that they must work quietly and without your help because you won't be available to answer questions.

Geometry Review Suggestions

Almost any of the activities in the previous chapters can be used as review activities. For example, students who need to review lines and angles can do the Line Sorting Activity with a partner or play Geometry Concentration with a small group. Students who need to review polygons can quiz each other using their Polygon Foldables. In addition, the two activities below are fun ways to review basic geometry concepts.

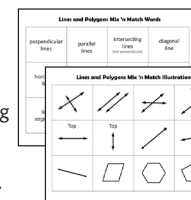
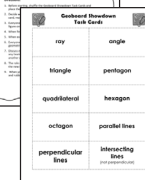
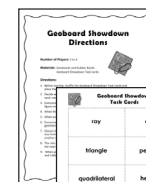
Geoboard Showdown

Geoboard Showdown is a fun, hands-on activity that works well for reviewing lines, angles, and simple polygons. The activity can be conducted in a whole-class setting, in small guided math groups, or in cooperative learning teams. Each student will need his or her own geoboard and several rubber bands. Each pair of students or team will need a set of 10 Geoboard Showdown Task Cards (page 31).

Introduce the activity to your class in a whole group setting or in a small guided math group. Display the directions on page 30, and demonstrate what to do using a geoboard and a set of Geoboard Showdown Task Cards. An answer key is not provided because there are many ways to represent the phrases on the task cards. Encourage your students to justify their answers during each round of the game.

Lines and Polygons Mix 'n Match

This engaging activity will have your students up and moving as they review basic geometry terms. For a class of 24 students, you'll need one copy of pages 32 and 33. Cut the cards apart and create matching sets to be sure you have all the cards. If you have fewer students, remove matching sets as needed. If you have more students, print a second copy of each page and add a few extra matching sets of cards. Shuffle the cards and give one card to each student. On a signal from you, students mix around the room and look for the word or illustration that matches their card. When they find it, ask them to stand next to the person with the matching card and form a circle around the outside of the room. Quickly check each set of matching, and then collect them and play again. An answer key is located on page 34.



Geometry Enrichment Suggestions

Students who have already mastered the basics will benefit from working on challenging math tasks while the others review. Enrichment activities can range from project-based learning lessons to strategy games that require mathematical thinking and reasoning. Partner activities work well because students have someone to consult if they need help.

Tangram Challenge Enrichment Activity

Tangram Challenge is a terrific enrichment activity and can be used in a math center, with a partner, in teams, or by students working independently.

Advanced Preparation

You'll need enough tangrams for each student to have a complete set, and one deck of Tangram Challenge Task Cards (page 40) for each group. If you don't have plastic or wooden tangrams, create paper tangrams by printing one of the tangram patterns (page 35 or 36) on cardstock. The black and white pattern can be printed on different colors of paper which makes it easier for students to identify their own puzzle pieces. The multi-color tangrams may be helpful for demonstration purposes.

Introducing Tangram Challenge

Begin by giving each student one set of tangrams and ask them to be sure they have all seven pieces. Each set should have two large triangles, one medium triangle, two small triangles, one parallelogram, and one square.

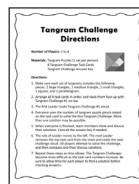
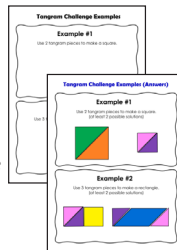
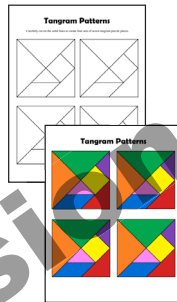
Then present the first Tangram Challenge Example on page 37. Walk around and observe your students to make sure everyone understands the task. After everyone has solved the first challenge, present the second example. This one has at least two different solutions. (See answer key on page 38.) Point out that some challenges have more than one correct solution, and model how to justify why a particular solution is correct.

Tangram Challenge Directions for Partners or Teams

Divide your students into partners or teams, and give each group a set of the Tangram Challenge Task Cards on page 40. Display the Tangram Challenge Directions on page 39 and read them aloud as you model the steps. Encourage your students to try to solve each challenge alone before they discuss their solutions with their partner or the group. Remind them to solve the challenges in order because they become more difficult as the task card numbers increase. The directions do not require students to record their solutions on paper, but if you would like them to do so, use the recording page described below.

Tangram Challenge Directions for Independent Assignments

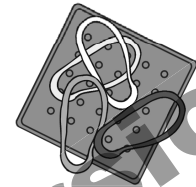
To assign the Tangram Challenge for independent seatwork, give each student a copy of the Tangram Challenge Recording Page (page 41). As students solve each challenge, they should illustrate at least one solution on their recording form. An answer key that shows at least one possible solution for each challenge is provided on pages 42 (color) and 43 (black and white).



Geoboard Showdown Directions

Number of Players: 2 to 4

Materials: Geoboards and Rubber Bands
Geoboard Showdown Task Cards

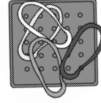


Directions:

1. Before starting, shuffle the Geoboard Showdown Task Cards and place them face down on the middle of the playing surface.
2. Decide who will be the first Leader. The Leader turns over the top card, reads it aloud, and places the card where everyone can see it.
3. Everyone on the team, including the Leader, creates the geometric figure on his or her geoboard without talking.
4. When finished, everyone places their geoboards face down.
5. When everyone is ready, the Leader says, "Showdown!"
6. Everyone flips their geoboards over and shows how they created the geometric figure on the task card.
7. Discuss everyone's responses and decide which ones are correct. If any team members disagree about the correct answer, consult another source such as a math book or an online resource.
8. The role of Leader rotates to the left, and the activity continues with the new Leader turning over next task card.
9. When you are finished, be sure to return the task cards, geoboards, and rubber bands to their proper storage locations.



Geoboard Showdown Task Cards

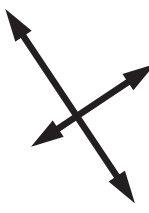



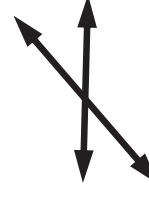
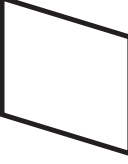
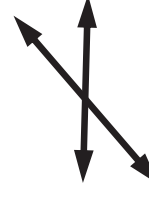
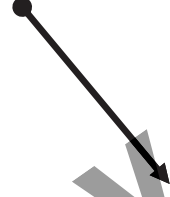

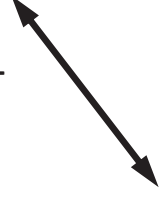




ray	angle
triangle	pentagon
quadrilateral	hexagon
octagon	parallel lines
perpendicular lines	intersecting lines (not perpendicular)

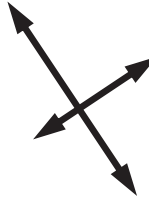




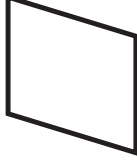
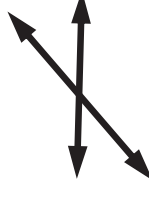
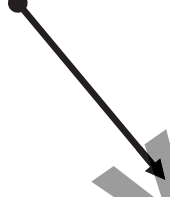

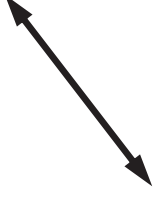

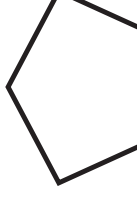
Lines and Polygons Mix 'n Match Words

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

Lines and Polygons Mix 'n Match Illustrations

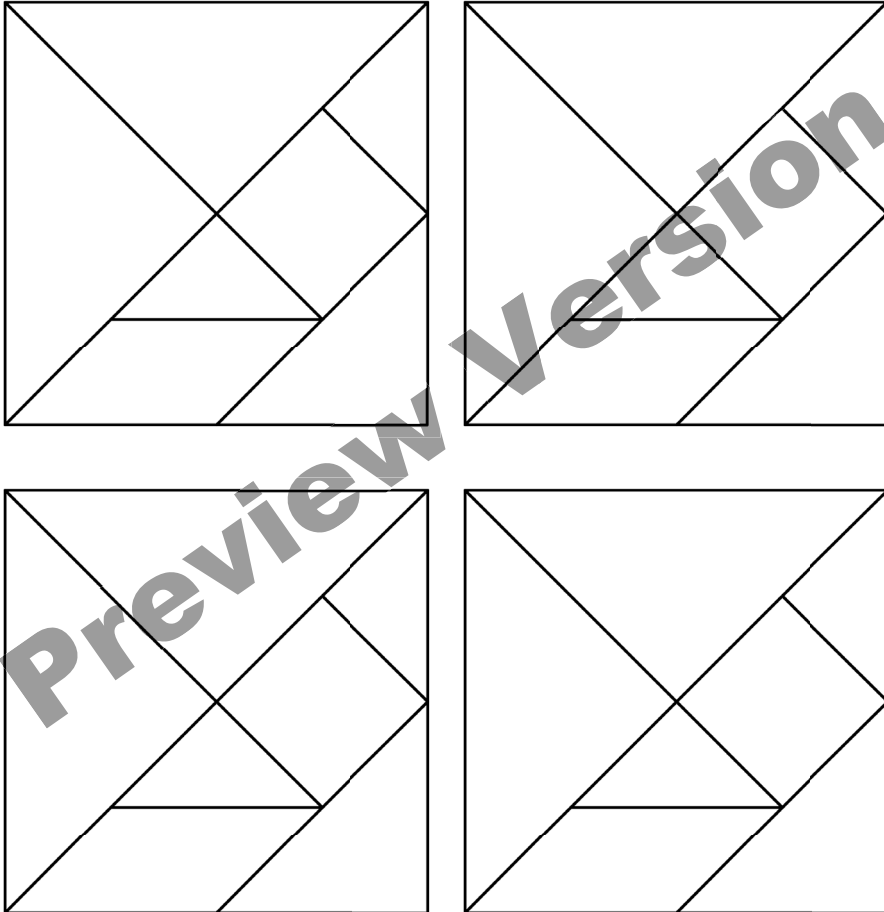
	Top 	
	Top 	
		
Top 		

Lines and Polygons Mix 'n Match Answer Key

	perpendicular lines Top 	horizontal line 
	parallel lines Top 	vertical line 
	intersecting lines 	ray 
Top 	diagonal line 	line 

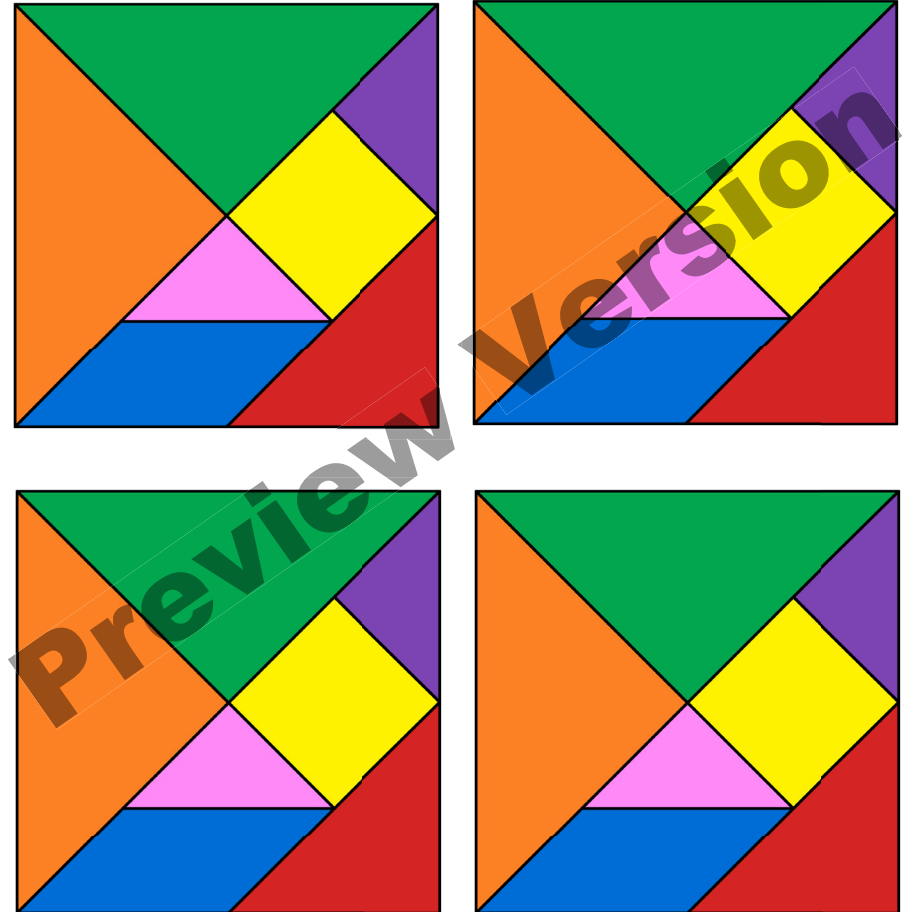
Tangram Patterns

Carefully cut on the solid lines to create four sets of seven tangram puzzle pieces.



Tangram Patterns

Carefully cut on the solid lines to create four sets of seven tangram puzzle pieces.



Tangram Challenge Examples

Example #1

Use 2 tangram pieces to make a square.

Tangram Challenge Examples (Answers)

Example #1

Use 2 tangram pieces to make a square.
(at least 2 possible solutions)

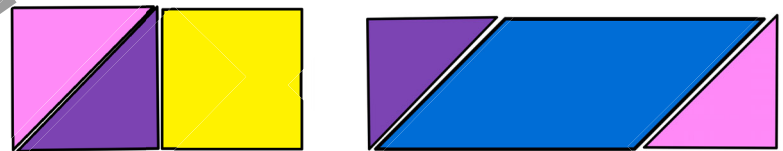


Example #2

Use 3 tangram pieces to make a rectangle.

Example #2

Use 3 tangram pieces to make a rectangle.
(at least 2 possible solutions)

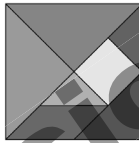


Tangram Challenge

Directions

Number of Players: 2 to 4

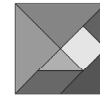
Materials: Tangrams (1 set per person)
8 Tangram Challenge Task Cards
Tangram Challenge Answer Key



Directions:

1. Make sure each set of tangrams includes the following pieces: 2 large triangles, 1 medium triangle, 2 small triangles, 1 square, and 1 parallelogram.
2. Arrange all 8 task cards in order, and stack them face up with Tangram Challenge #1 on top.
3. The first Leader reads Tangram Challenge #1 aloud.
4. Everyone uses the number of tangram puzzle pieces stated on the task card to solve the first Tangram Challenge. More than one solution may be possible.
5. When everyone is finished, team members show and discuss their solutions. Consult the answer key if needed.
6. The role of Leader moves to the left. The next Leader removes the top task card from the stack and reads the next challenge aloud. All players attempt to solve the challenge, and then compare and their discuss solutions.
7. Repeat these steps as time allows. The Tangram Challenges become more difficult as the task card numbers increase. Be sure to allow time for each player to find a solution before checking answers.

Tangram Challenge



Use a set of seven tangram puzzle pieces to solve the challenges below.



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.

Tangram Challenge Recording Page



Directions: Create each polygon below using the designated number tangram puzzle pieces. Then illustrate each solution and show how you arranged the pieces to solve the challenge.

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.

Tangram Challenge Answer Key

The answers below show ONE way to solve each challenge. Many other correct answers are also possible.

Tangram Challenge #1

Make a triangle using 2 tangram pieces.



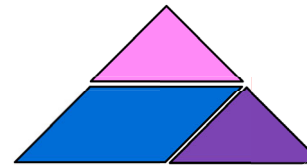
Tangram Challenge #2

Use 2 tangram pieces to make a quadrilateral.



Tangram Challenge #3

Make a triangle using 3 tangram pieces.



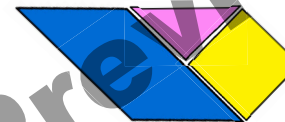
Tangram Challenge #4

Make a quadrilateral using 3 tangram pieces.



Tangram Challenge #5

Make a pentagon using 3 tangram pieces.



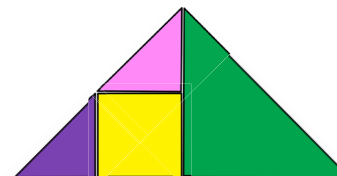
Tangram Challenge #6

Make a quadrilateral using 4 tangram pieces.



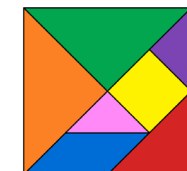
Tangram Challenge #7

Use 4 tangram pieces to make a triangle.



Tangram Challenge #8

Use all 7 pieces to make a square.

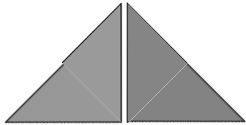


Tangram Challenge Answer Key

The answers below show ONE way to solve each challenge. Many other correct answers are also possible.

Tangram Challenge #1

Make a triangle using 2 tangram pieces.



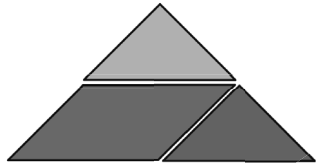
Tangram Challenge #2

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.



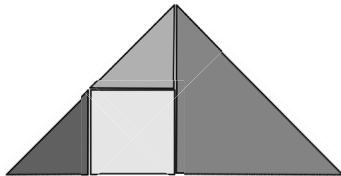
Tangram Challenge #6

Make a quadrilateral using 4 tangram pieces.



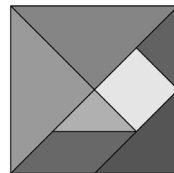
Tangram Challenge #7

Use 4 tangram pieces to make a triangle.



Tangram Challenge #8

Use all 7 pieces to make a square.



Assessment Strategies



Throughout this unit you've been informally assessing your students as you observe them working on the activities each lesson. Now it's important to administer a formal assessment to find out who has actually mastered the content and skills. You'll also want to provide additional instruction for those who need additional practice with basic geometry concepts.

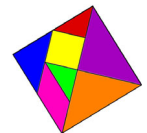
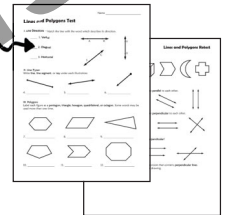
Following the "Mastery Learning" approach described will ensure that ALL of your students master these concepts. In a nutshell, the process consists of the four steps below. Step-by-step directions are provided to make the process both easy and effective.

Teach Unit → Administer Test → Reteach and/or Enrich → Administer Retest

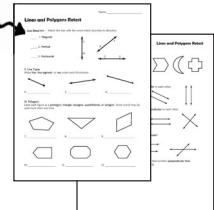
Mastery Learning, Step-by-Step

- After completing the unit, administer the **Lines and Polygons Test** on pages 45 and 46 to all students. If you'd like to customize the test, an editable version is located in the Editable Resources product folder.
- Score the test and divide your class into two groups:
 - Enrichment** - Students who demonstrated mastery by scoring 85% or higher.
 - Reteaching** - Students who scored lower than 85% correct and need more work with these concepts.
- Assign an enrichment activity to students in the Enrichment group who will complete this assignment while you work with the other students. Refer to the suggestions in Enrichment suggestions in Chapter 4.
- Reteach basic geometry concepts and skills to the students who scored below 85%. Analyze their test results to decide which skills and concepts to reteach. Then use the review activities described in Chapter 4 to provide additional instruction on those concepts. Work with students in small groups using hands-on activities when possible.
- Finally, administer the **Lines and Polygons Retest** on pages 49 and 50 to students who didn't demonstrate mastery on the first test. You can also offer this option to any other students who want to take the retest. If you'd like to customize the retest, an editable version is located in the Editable Resources folder.
- Score the retest, and record that score next to the first score in your gradebook. Keep both scores for your records, but use the highest score when determining the final grade for the unit.

Lines and Polygons Test



Lines and Polygons Retest



Name _____

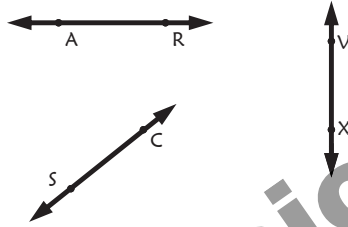
Lines and Polygons Test

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

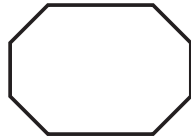
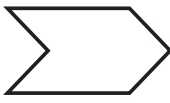
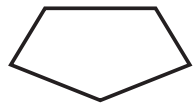
Label each figure as a **pentagon**, **triangle**, **hexagon**, **quadrilateral**, or **octagon**. Some words may be used more than one time.



7. _____

8. _____

9. _____



10. _____

11. _____

12. _____

Lines and Polygons Test

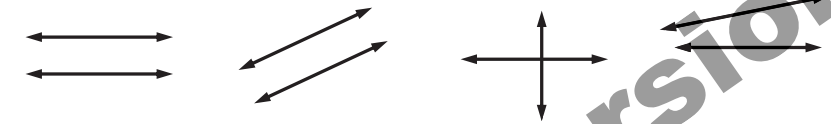
IV. Polygon or Not?

13. Circle the figures that are polygons.

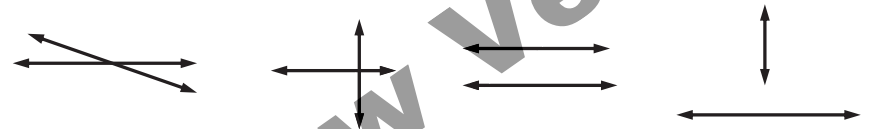


V. Line Relationships

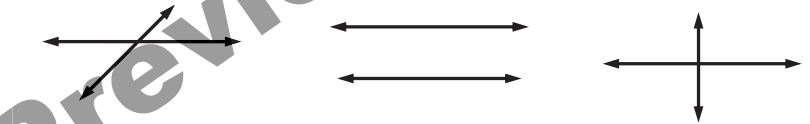
14. Circle ALL sets of lines in which the lines are **parallel** to each other.



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 or highlight the parallel lines in your drawing.

Name _____

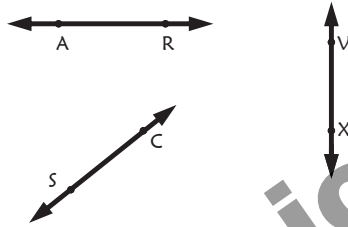
Lines and Polygons Test Answer Key

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

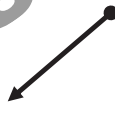
Write **line**, **line segment**, or **ray** under each illustration:



4. line segment



5. line



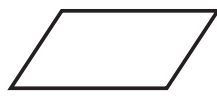
6. ray

III. Polygons

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



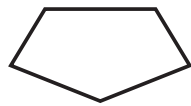
7. hexagon



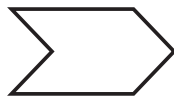
8. quadrilateral



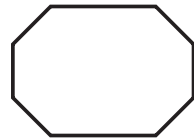
9. triangle



10. pentagon



11. hexagon



12. octagon

Lines and Polygons Test Answer Key

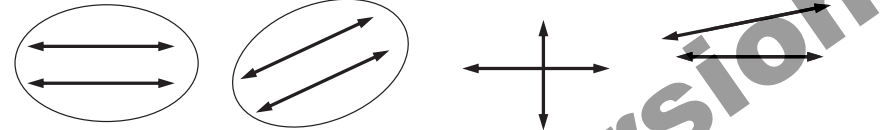
IV. Polygon or Not?

13. Circle the figures that are polygons.

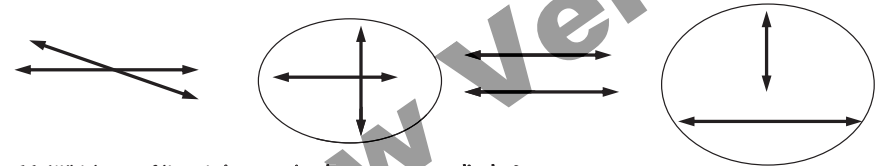


V. Line Relationships

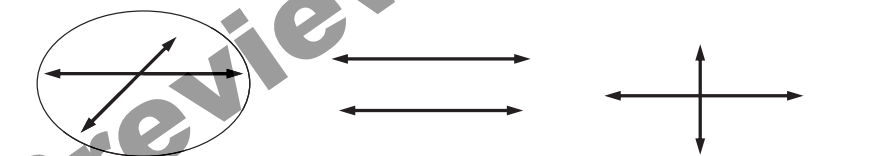
14. Circle ALL set of lines in which the lines are **parallel** to each other.



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 or highlight the parallel lines in your drawing.

Answers will vary.

Name _____

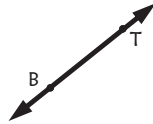
Lines and Polygons Retest

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:



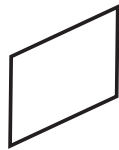
4. _____

5. _____

6. _____

III. Polygons

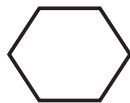
Label each figure as a **pentagon**, **triangle**, **hexagon**, **quadrilateral**, or **octagon**. Some words may be used more than one time.



7. _____

8. _____

9. _____



10. _____

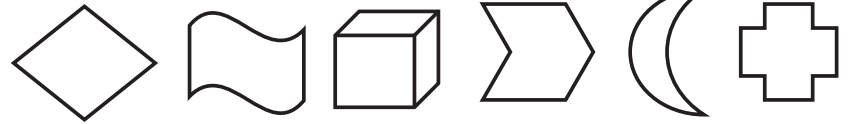
11. _____

12. _____

Lines and Polygons Retest

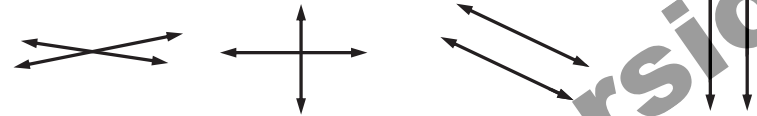
IV. Polygon or Not?

13. Circle the figures that are polygons.

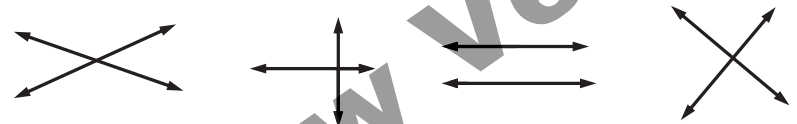


V. Line Relationships

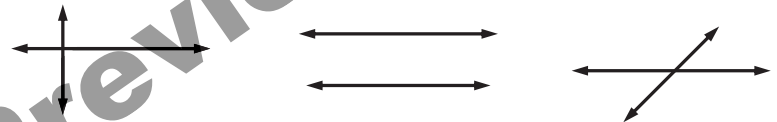
14. Circle ALL sets of lines in which the lines are **parallel** to each other.



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 or highlight the perpendicular lines in your drawing.

Name _____

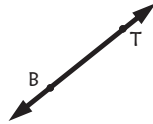
Lines and Polygons Retest Answer Key

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

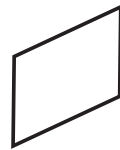
Label each figure as a **pentagon**, **triangle**, **hexagon**, **quadrilateral**, or **octagon**. Some words may be used more than one time.



7. pentagon



8. triangle



9. quadrilateral



10. pentagon



11. octagon

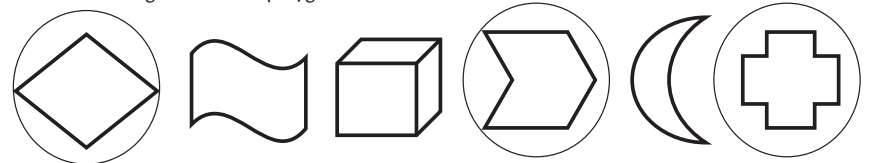


12. hexagon

Lines and Polygons Retest Answer Key

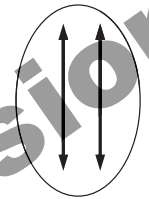
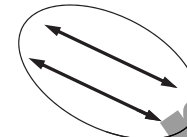
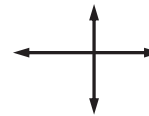
IV. Polygon or Not?

13. Circle the figures that are polygons.

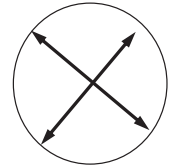
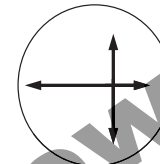


V. Line Relationships

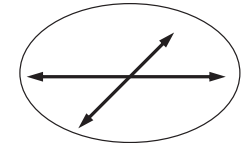
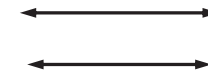
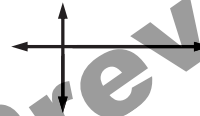
14. Circle ALL set of lines in which the lines are **parallel** to each other.



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 or highlight the perpendicular lines in your drawing.

Answers will vary.