## Triangles, Triangles, Triangles

Summary
Students will complete a variety of activities that will help them identify triangles and create their own triangles.

Main Core Tie
Mathematics Kindergarten
Strand: GEOMETRY (K.G) Standard K.G. 2
Additional Core Ties
Mathematics Kindergarten
Strand: COUNTING AND CARDINALITY (K.CC) Standard K.CC.5.
Mathematics Kindergarten
Strand: GEOMETRY (K.G) Standard K.G. 3
Materials

- Triangles

Various types of triangles
Triangle Pattern Blocks
Chart paper
Marker
Scissors
Straws
Pipe cleaners

- Triangle Hunt pdf

Crayons
Triangle Pointers
Triangular objects

- Triangle Class Book Page pdf Pencils
Additional Resources
Books
- 20 Instant Math Learning Centers Kids Will Love!
, by Traci Ferguson Geiser and Krista Pettit; ISBN 0439227291 (Scholastic)
- Bear in a Square
, by Stella Blackstone; ISBN 1846860555
- Centered on Success Grade K
, by the Mailbox; TEC 60819
- Circles
, by Jan Kottke; ISBN 051623000X
- Circles, Triangles and Squares
, by Tana Hoban; ISBN 0027448304
- Circus Shapes
, by Stuart J. Murphy; ISBN 0064467139
- Color Farm
, by Lois Ehlert; ISBN 0440847095
- Color Zoo
, by Lois Ehlert; ISBN 0397322593
- Geometric Shapes
, by Mary J. Kurth; ISBN 3055402625
- The Greedy Triangle
, by Marilyn Burns; ISBN 0590489925
- Hands-On Math: K-1
, by Virginia Johnson (Edited by Janet Bruno); ISBN 3055402600 (CTP 2600)
- Icky Bug Shapes
, by Jerry Pallotta; ISBN 0439389186
- Instant Math Centers: K-1
, by Creative Teaching Press; ISBN 1574716891 (CTP 2597)
- Learning Center Collection Math Grade K
, by The Mailbox; TEC 60863
- Math: Make It Your Way
, by Keri King, and Kari Sickman (Edited by Teri L. Fisch; ISBN 1574718991 (CTP 2576)
- Math Tub Topics: K-2
, by Creative Teaching Press; ISBN 1574719548 (CTP 2812)
- The Missing Piece
, by Shel Silverstein; ISBN 0060256710
- My First Book of Shapes
, by Eric Carle; ISBN 0399243879
- Rectangles
, by Jennifer S. Burke; ISBN 0516230026
- Round and Round and Round
, by Tana Hoban; ISBN 059033364X
- Sea Shapes
, by Suse MacDonald; ISBN 0439276683
- The Shape of Things
, by Dayle Ann Dodds; ISBN 1564026981
- Shapes and Things
, by Tana Hoban; ISBN 0027440605
- Shapes, Shapes, Shapes
, by Tana Hoban; ISBN 0688147402
- Shapes: Thematic Unit
, by Jennifer Overend Prior, M. Ed.; ISBN 1576906159
- Shape Up!
by David A. Alder; ISBN 0823416380
- Squares
, by Jennifer S. Burke; ISBN 0516230786
- Take it to Your Seat Math Centers K-1
, by Jill Norris; ISBN 1557999317
- Triangles
, by Jennifer S. Burke; ISBN 0516230050
- Ten Black Dots
, by Donald Crews; ISBN 0688135749
- What is Round?
by Rebecca Kai Dotlich; ISBN 043915944X
- What is Square?
by Rebecca Kai Dotlich; ISBN 0439159458
- What's the Shape?
by Judy Nayer.
Media
- Can A Jumbo Jet Sing the Alphabet?
by Hap Palmer; ASIN: B00000I6UA
- Colorful Shapes
, by Jr. Jukebox http://www.jrjukebox.com
- Colors, Shapes and Sizes
, by Jr. Jukebox
- Getting to Know Myself
, by Hap Palmer; ASIN: B00004TVSF
- Learning Basic Skills Through Music Vol. 2
, by Hap Palmer http://www.happalmer.com
- Jumpin' Numbers and Shakin' Shapes
, by Heidi Butkus http://www.heidisongs.net
- Math All Around Me
, by Jack Hartmann http://jackhartmann.com Item \#CD-08
- Totally Math
, by Dr. Jean Feldman http://www.drjean.org


## Background for Teachers

Geometry is the study of the property and relationships of points, lines, angles, surfaces and solids. Geometric shapes can be dated back 15,000 years. Geometric shapes were drawn on ancient artifacts and cave walls. Plane geometry is the study of two-dimensional objects in one plane. Twodimensional objects have length, width, and area but no volume.
As teachers, we need to be careful about the terminology we use when teaching children about geometric shapes. Correct vocabulary should be used especially in kindergarten. Below is a list of important words to use with kindergartners.

## Circle

--a round figure where each point is the same distance from the center
Equilateral Triangle--a type of triangle where all sides are the same length Isosceles Triangle--a type of triangle where two sides are the same length
Plane shape--a figure that lies flat on a flat surface; also known as two-dimensional objects
Quadrilateral--plane shape with four sides and four points
Rectangle--a special quadrilateral with four points, four right angels, and four sides where two sides are parallel with each other of the same length and the other two sides are parallel with each other of the same length
Scalene Triangle--a type of triangle where all sides are a different length
Square--a special quadrilateral with four points and four sides where all four sides are the same length and form four right angles
Triangle--plane shape with three sides and three points
Definitions adapted from: Cavanagh, M.C., (2000). Math To Know: A Mathematics Handbook. Great Source Education Group: Wilmington, MA.

Teachers need to use examples of all kinds of triangles (equilateral, scalene, and isosceles) and rectangles, in many different sizes and orientations. Students in kindergarten will be able to identify shapes of all different forms and sizes if we teach them about the many different ways they will see shapes all around them. The majority of teacher supplies available only offer equilateral triangles and vertical rectangles. As teachers, we may need to make additional examples of triangles and rectangles to use during teaching. This lesson is written for triangles. This same lesson could be adapted for rectangles, squares and circles also. This lesson is not the only lesson you would use to teach triangles but would be a part of several lessons on triangles. Below, there is a list of attributes (along with a few misconceptions of rectangles) for each of the four shapes kindergartners must be able to identify, name and draw (the list of attributes and misconceptions about triangles are included in the lesson on triangles).
A few examples of attributes for squares are as follows:
Squares have four equal sides
Squares have four points or corners which form right angles
Squares can be turned many different ways
Squares are rectangles A few examples of attributes of circles are as follows:
A round figure where each point is the same distance from the center
A circle is formed by one continuous line which is connected A few examples of attributes for rectangles are as follows:
Rectangles have four sides
Rectangles have four points, corners, or angles
Rectangles have four right angles
Rectangles opposite sides are the same length (congruent)
All sides of a rectangle are straight
All four sides of a rectangle are connected
Rectangles can be turned many different ways
Some of the common misconceptions of rectangles are as follows:
Rectangles are always long
Rectangles have two long sides and two short sides

## Intended Learning Outcomes

1. Demonstrate a positive learning attitude.
2. Understand and use basic concepts and skills.
3. Communicate clearly in oral, artistic, written and nonverbal form.

Instructional Procedures
Invitation to Learn
Read the book Triangles (or another book about Triangles). While reading, have the students identify triangles throughout the book and discuss their attributes.
Instructional Procedures
Gather students together and display several different types of triangles on the board. Provide each child or pair of students a triangle pattern block manipulative to examine. After students have had a few minutes to look at their triangle, have them discuss with a partner the things they have noticed about triangles.
As a class, discuss the attributes of a triangle. As students offer suggestions, record the attributes on a chart paper entitled "Triangles." Be sure to use correct verbiage when discussing the attributes of triangles. A few examples of attributes for triangles are as follows:

- Triangles have three sides
- Triangles have three points, corners, or angles
- All sides of a triangle are straight
- All three sides of a triangle are connected
- Triangles can be turned many different ways

Some of the common misconceptions of triangles are as follows:

- Triangles have one point at the top and two points at the bottom
- The bottom of a triangle is flat
- Triangles have a point on top

Give each child one straw. Have them cut their straw in two places (so they have three pieces), which will form the sides of their triangle. Next, give each child three 11/2-inch pieces of pipe cleaner that can be bent to form the angles of their triangle. Encourage students to make triangles with their straws and pipe cleaners.
Give each student a Triangle Hunt worksheet to complete.
After discussing and reviewing again the attributes of triangles written on the chart paper, give each child a small magnifying glass or Triangle Pointer. (A Triangle Pointer can be made by gluing a small triangle made from paper or craft foam to the end of a tongue depressor or Popsicle stick or could be drawn on with a marker for students to use as a reference.) Send students on a Shape Search for triangles around the classroom. Encourage the students to name each triangle they see as they circulate around the classroom. You may want to hang up additional triangles (of all different types, sizes and orientations) around the room so the students will have plenty to find. You will also want to make sure there are several objects and pictures, which include triangles and triangular shapes for students to find. (Please note that many of your triangular objects are going to be three-dimensional solid geometric figures. Just encourage the students to look for triangular shapes on the three-dimensional objects.) After the students have searched the room for triangles, call them back to the meeting area and allow students time to tell a partner all the places they found a triangle.
Give each child a Triangle Class Book Page to record what triangles they found. Students will need to write the word triangle on their paper. You can either write it on the board for them to copy in their book or encourage the students to write it on their own. Students will also need to record what a triangle is. Collect papers and bind into a class book for the classroom library. After students complete their Triangle Class Book Page, you could set up a variety of centers focusing on Shapes they could choose until your math time is over (suggestions for centers are found in the Curriculum Extensions/Adaptations/Integration section of this lesson).

## Extensions

For students who are having difficulty drawing a triangle, the teacher could draw three dots on their paper and encourage the student to connect the dots. As time goes on, children can draw their own dots before drawing a triangle, if needed.
Provide several centers focusing on shapes.
Geoboard Shapes--Provide the center with Geoboards, rubber bands, Geoboard papers and shape cards (circle, square, rectangle and triangle). Have students make each shape on their Geoboard and record their shapes on Geoboard papers.
Shape Dominos--Provide center with Shape Dominos. Using a 3" x 6" sheet of black construction paper, create dominos by adding two shapes to each sheet. Make a wide variety of dominos using circles, squares, rectangles and triangles. Allow students to draw a certain amount of dominos and have them take turns matching like shapes together. Sand Drawings--Provide the center with small bowls (like the Ziploc Throw Away Sandwich bowls 5" X 5" X 1") with a thin layer of sand or salt in the bottom, shape cards, paper, crayons and pencils. Encourage students to draw a card and then using their finger, draw the shape in the sand. Have students record their drawings on their paper.

Textured Shape Rubbings--Provide the center with textured shape cards (shapes cut out of corrugated paper, sandpaper, corduroy fabric, textured wallpaper, etc.), unwrapped crayons and $1 / 4$ sheets of paper. Have students make rubbings, using the side of a crayon, of several different shapes. Students can label each of their shapes with their correct name. Pages can be stamped into a little book to take home.
Shape Sorting--Provide center with a Shape Sorting Mat, shapes to sort (die cut paper shapes, foam shapes, or manipulative shapes), paper, and crayons. Have students sort shapes according to circle, square, rectangle, or triangle. Have students draw a picture using several shapes.

## Family Connections

Send home a letter to parents encouraging families to go on a Family Shape Hunt together. Family members can all draw pictures of the things they find on the Family Shape Hunt. While learning about shapes, teach your class a simple song about each shape. Encourage students to teach the songs to their families. Many simple songs can be found on the Internet. Several songs for each shape can be found at www.littlegiraffes.com/shapes.html Allow students to take turns taking home the Triangle Class Book to share with their families.

## Assessment Plan

During the Shape Search, observe students as they identify triangles. Are they able to find them quickly and correctly on their own? Are they looking at their classmates for help? Are they misidentifying shapes? Make a note of any students who are struggling to find triangles. During Math Centers, walk around and make notes of student behaviors, conversations and any thought processes you observe. Note any areas of difficulty or mastery of shapes. Student's Triangle Hunt sheets can be collected for assessment and placed in a portfolio. Observe students and listen to the interaction and conversation they are having during the whole group discussion on shapes.

## Bibliography

## Research Basis

Clements, D.H., \& Sarama, J., (2000). Young children's ideas about geometric shapes. Teaching Children Mathematics, 6(8), 482-488.
Clement and Sarama identified three levels of geometric shape understanding in young children. In the prerecognition level, children are "unable to identify and distinguish among many shapes." When children are able to identify a shape by the way it looks, they are in the visual level. The final level, the descriptive level, students are able to identify and communicate the specific properties that make up individual shapes. Teachers need to provide examples of all types and kinds of squares, rectangles, triangles and circles when teaching shapes.
Clements, D.H., Wilson, D.C., \& Sarama, J. (2004). Young children's composition of geometric figures: a learning trajectory. Mathematical Thinking and Learning, 6(2), 163-184.
Young children have been found to follow a developmental path in their thinking as they learn about two-dimensional geometric shapes through hands on experiences. This developmental sequence begins with children unable to create shapes. Next, children learn to combine shapes by trial and error first and then they begin to combine shapes to make pictures through an understanding of the shape's attributes. Finally, children are able to use a grouping of shapes to create a new shape. Hannibal, M.A., (1999). Young children's developing understanding of geometric shapes. Teaching Children Mathematics, 5(6), 353-357.
Students need to be able to identify and verbalize key attributes of basic shapes. Students need to be taught the difference between and a point and side. Teachers need to use correct terms and vocabulary when teaching geometric shapes to young children. A variety of sizes and types of
triangles and rectangles need to be used when teaching shapes so students will be able to identify each shape in its various forms.

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