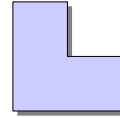# Geometry – Describing Figures

Grade: 3
Lesson: 1

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IRPs:
- Compare, contrast, sort, and classify two-dimensional shapes and three-dimensional objects using two or more attributes

Objective: (SWBAT)
- Classify two dimensional shapes using two or more attributes.

Materials:
- Envelopes with alphabetized cutout figures, overhead projector,

Introduction:
Ask the student to look around the room and find figures with straight sides and curved sides. To ensure understanding ask the students to look at the vase on your desk. Does it have curved sides or straight sides? (Curved sides) Once the students have found their figures have them share their examples with the person next to them. Then ask the students if there are any other ways of describing their figures. Use the vase as an example (circular bottom and top). As a class have the students share and describe their objects.   (10 min)

Development:
1) Tell students they will be playing a game with the person next to them.
2) Explain that each pair will be given an envelope with cutouts of figures. Taking turns, choose one of the figures to describe (keeping your choice a secret). Have your partner guess what figure you are describing.
3) Give the students an example. Place figures on overhead projector, choose a figure and begin describing it to the students. See if they can guess the figure you are describing ie: it has four sides, two sides are the same length etc.
4) Handout the envelopes and ask the students to repeat the activity at least four times each.   (10 min)
5) Now ask the students to share some of the ways they described their figures (number of sides, length of sides, curved sides, straight sides etc,).
6) Explain that figures can be described by their attributes. An attribute is just a way of describing a figure. Ask the students what are some of the attributes they used to describe their figures (number of sides, length etc)? Write the definition on the board and make a list of the attributes the students know.   (5 min)
7) Then ask the students with their partners to look at their figures and find all the figures that have lines going the same direction. Turn on the overhead and give the students an example of what you mean by "going the same direction". For example figure C has two lines that are going the same direction. These two lines will never cross. The other lines in figure C will cross eventually so they are not going the same direction.
8) Ask for examples of figures with lines going the same direction.
9) Tell the students that lines that go in the same direction are called parallel lines.
10) Write the definition of parallel on the board. Tell students that parallel lines are like train tracks they are always the same distance apart and they never cross.   (15min)

Closure:
Review with the students that figures can be described using attributes. Ask the students to name the different attributes they know. Put up a figure on the board and ask the students to describe the figures attributes.   (5min)
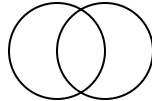
Assessment:
Self assessment:
Have the students answer these questions in their math journal:

     1. What is one thing you are unsure about so far in geometry?
     2. What is one thing you understand in geometry?
     3. How are you feeling about this new unit?

Geometry – Comparing/Contrasting Figures

Grade: 3
Lesson: 2

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IRPs:
- Compare, contrast, sort, and classify two-dimensional shapes and three-dimensional objects using two or more attributes

Objective: (SWBAT)
- Compare and contrast two dimensional-shapes using attributes.

Materials:
- Master 3.6 Cutouts in envelope, square dot paper, square dot transparency, blank paper, geoboards, and geobands, overhead projector

Introduction:
Begin with a review of what the students have already learned. Ask the students to explain what an attribute is (a way to describe a figure)? And ask them to give examples of attributes (number of sides, length of sides, parallel sides, curved sides etc). Then ask the class what are parallel lines (lines that are always the same distance apart and never cross)? Present the students with two figures and as a class list the attributes for each figure. Then as a class compare the figures using a venn diagram.   (10 min)

Development:
1) Give each student an envelope with geometric figures, blank paper and dot paper.
2) Then ask the students to answer questions these questions (write the question on the board) by looking at the figures in the envelope. Ask them to record their answers on the blank paper you gave them.

     1. Which figures have:
     a) all sides the same length? (H)
     b) some sides the same length? (A, B, D, E, H, and G)
     c) parallel sides? (D, E, and F)   (10 min)

2) Then ask the students to choose to figures from the envelope and sketch them on the dot paper, and then compare and contrast the two. Show the students using the overhead projector and square dot paper transparency how to sketch the figures using a ruler. Then compare and contrast the two figures and write down on the dot do paper how the figures are similar and how they are different. For example: Both figures have four sides. Figure D has all sides the same length. Figure F has no sides the same length etc.
            (10 min)
3) Then give each student a geoboard and geobands and ask them to experiment making figures.   (5 min)
4) Now ask the students to make a figure on the geoboard with one pair of parallel lines. Have them draw the figure on their dot paper and list the attributes.   (5min)

Closure:
Invite students to draw their figures on the dot paper transparency for the class to see. Go over the attributes as a class. Then ask the class how they can tell if a figure has parallel sides? And how does it compare to another figure? (A figure has parallel sides if the sides are always the sane distance apart and never meet. A rectangle has two pairs of parallel sides)

Assessment:
Collect the students work. Look through each student's work to see if they understand the concepts (compare/contrast figures using attributes, and parallel lines are two lines that are the same distance apart and never meet).
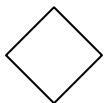
Geometry – Describing Angles
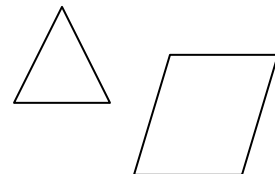
Grade: 3
Lesson: 3
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IRPs:
- Identify, count, and describe the faces, vertices, edges, sides, and angles of polygons and solids

Objective: (SWBAT)
- identify angles (right angle, less than a right angle and greater than a right angle) of two dimensional figures.

Materials:
- Overhead transparency of Geoboard, overhead, Geoboards and geobands

Introduction:
Show students a large square and ask the following questions:
   1. How can you describe this square? (It has 4 equal sides and 2 pairs of parallel sides)

2. What do you notice about the corners of the square? (There are 4 corners. All the corners are square)
3. What other objects in the classroom have square corners? (blackboard, desk-tops, bulletin board, window, posters etc.)   (10 min)

Development:
1. Using the transparent geoboard show students a square and ask them:
   a. Are all the corners in this square the same size?
2. Make other shapes such as triangles, pentagons and hexagons that have angles greater than and less than 90°. For each figure ask them:
   a. Tell me which corner is smaller than the corners in a square.
   b. Tell me which corner is larger than the corners in a square.
   c. How many different types of corners does this figure have?
   d. Are there any corners in this figure that match the size of the corners in a square?   (10min)
3. Give each student a geoboard and geobands.
4. Have a student read the instructions from the text "Make each figure on a geoboard." Let them know that today we will not be drawing the figures.
5. Have students make the following figures:
   a. A figure that has a corner smaller than the corners in a square
   b. A figure that has a corner larger than the corners in a square
   c. A figure that has a corner that matches the corners in a square

Note: ask students to fit all figures onto the geoboard at the same time so that they can compare the sizes of the corners. When they have completed all the shapes ask them to share their created figures with their neighbor.   (10min)

6. Ask students:
   a. Which figures have all the same corners?
   b. Which figures have more than one type of corner?
   c. Did any figure have three types of corners?
   d. Show me which corner is smaller than the corners in a square.
   e. Show me which corner is larger than the corners in a square?

Note: Watch for students who do not recognize a square corner that is oriented on a slant. Have students rotate their geoboards or dot paper until the sides of the figures are horizontal and vertical.   (5min)

Closure:
Invite students to create on their figures on the overhead geoboard. Discuss the angles of each with the class (smaller than, larger than, or equal to the corners of a square). Use these shapes to introduce the terms vertex, angle and right angle.   (5min)

Assessment:
Observation through Conversation:
As the lesson progresses students are asked to answer questions regarding the types of angles shown and engage with the idea that angles can be smaller than, larger than and equal to a right angle. Students should be able to demonstrate through conversation that they understand that angles are created by two lines coming together to create a corner, this corner is an angle.

Geometry – Describing Angles

Grade: 3
Lesson: 4

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IRPs:
- Identify, count, and describe the faces, vertices, edges, sides, and angles of polygons and solids

Objective: (SWBAT)
- Identify, count and describe vertices, sides, and angles of two-dimensional shapes.

Materials:
- Cardboard cutouts of various shapes, Index cards, Construction paper, Scissors and Book: *The Greedy Triangle*

Introduction:
Review the vocabulary introduced in the last lesson (vertex, angle and right angle) using the cardboard shapes. Read the story *The Greedy Triangle* and ask students to use the vocabulary and any other knowledge they have to describe each shape's attributes.

(10 min)

Development:
1. Using the cardboard cutouts, ask students to show you an angle that is smaller than, greater than and equal to a right angle, using the corner of the index card to check the size of the angle.
2. Ask them to trade their shapes with a partner and repeat the activity.
3. With the partner they traded with, get students to describe all the attributes of their shapes and explain why they know the angles are smaller than, larger than and equal to a right angle.   (10min)
4. Using construction paper have students use their pencil and ruler and draw their own shapes. They must have one shape for each kind of angle. Challenge: create a shape that uses all the different types of angles in one shape.   (10min)

Closure:
1. Complete Journal Activity "Who Am I?":
   a. Students must make at least two riddles that give three clues each using the shapes attributes. Each riddle must contain at least two different vocabulary words. Students may not use the all same vocabulary in both riddles.
   b. Ie. I have two sets of parallel sides. I have four right angles. One set of parallel sides is longer than the other set. Who Am I? Ans. *Rectangle*
   c. Share with a partner
2. Hand in journals   (15min)

Assessment:
Journal Activity:
Students are asked to complete a riddle that must show they understand and can use the vocabulary they have learned in the unit up to this point.   This form of assessment leaves room for creativity and students are free to choose what shape they will describe. After students' journals have been handed in students can write a good copy with a construction paper flap to cover the answer and have these displayed on a bulletin board.