geo all about angles

Exploring Line and Angle

Sample Activities

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describing lines

In these activities, students explore the basic properties of different types of lines. As mentioned in the introduction to this book, the term "lines" is used in its everyday sense to describe the mathematical concepts of lines, line segments, and rays. If you wish to use the mathematically correct terminology with your students, Activity 12 provides an introduction to the concepts involved.

1. Word Wonders

ALL

Materials

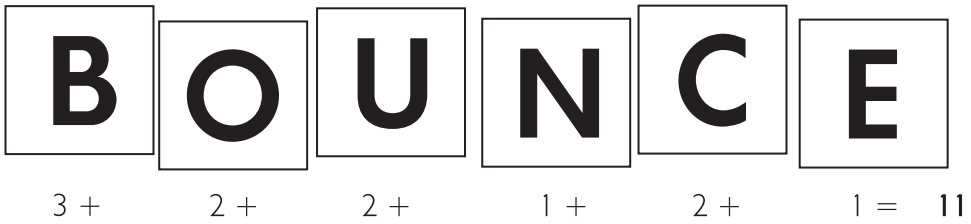
- Blackline Master 1 (page 59)

Preparation

Make three copies of Blackline Master 1 onto tagboard or light card for each group of students and cut the letter cards to size.

Activity

The students play this game in groups of two to four. The game proceeds in rounds. In each round, each player has to make a word from any of the letters. The players gain points depending on the types of lines in each letter of their word. Every letter that has only straight line segments is worth one point, letters with only curved line segments are worth two points, and letters that have curved and straight line segments are worth three points. The example below shows the points earned for the word "bounce".



Playing this game is a fun way for students to identify straight and curved lines.

2. Crossed and Separate

6–8

Materials

- Drinking straws or skewers

Preparation

No preparation is required.

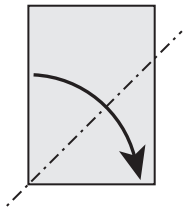
Activity

1. Arrange the students in a circle and drop the straws or skewers into the middle of the circle. Ask the students to describe how the straws are positioned. Bring out the fact that some are lying on top of each other so that they are crossed over, while others have fallen separately.
2. Invite volunteers to identify pairs of straws that either cross over each other or are separate. Remove the straws once they have been identified. Repeat the process so that all students have a turn and until all of the straws are gone.

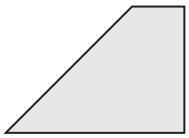
8–10 10–12

Materials

None



Fold a quarter-turn tester to make these edges meet.



▲ *An eighth-angle tester can be made by folding a quarter-angle tester as shown above.*

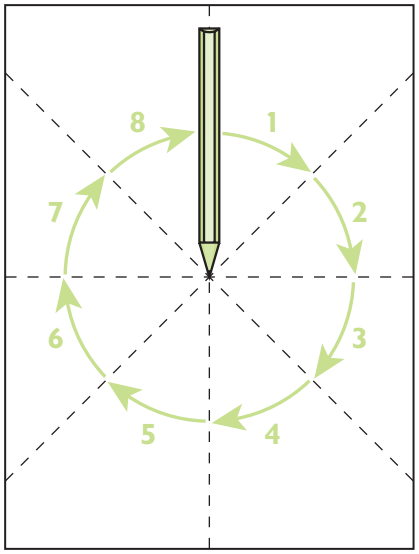
6. Eighth-Angle Tester

Preparation

No preparation is required.

Activity

1. Direct the students to make a quarter-turn tester as described in Activity 5. Have the students identify the angle arms and vertex. Each student can fold his or her tester once more as shown left. Ask the students to identify the angle arms and vertex.
2. Have the students work in threes to investigate their new testers. Pose the following questions to guide them. Ask, *How many of these testers fit into a quarter-turn tester? How many testers fit around a point without leaving any gaps between the angle arms? What amount of a full turn do you think this tester shows? How do you know?* The students will discover that two of their new testers are equal to one quarter-turn tester.
3. To help demonstrate that the tester shows an eighth of a turn, ask the students to unfold the tester and count the number of corners that they can see made by the creases (there are eight). Have one student in each group refold their tester and examine the other members' unfolded testers to check that each corner has the same amount of opening. Then instruct the students to place a pencil on one of the creases and rotate it crease by crease, counting the number of times the pencil moves to return to the starting point.



▲ *One method to demonstrate that a full turn around a point can be divided into eight equal amounts of turn or openings.*

Did you know?

One full turn around a point can be divided into any number of smaller, equal amounts. "Degree" is the word used to describe an amount that is 1/360 of a full turn.

4. Say, *This tester shows eight equal corners around a point. One tester is an eighth of the total number of testers. The tester also measures one-eighth of a full turn around a point. Both amounts of turn and openings we see in corners can be described using the word "angle" so we call this tester an "eighth-angle tester". Similarly, the quarter-turn tester can be called a "quarter-angle tester".*
5. Have the student groups use their testers to draw examples of shapes that have a corner that is a one-eighth angle. Discuss the examples afterward.

4. Angles in Triangles

8–10

Preparation

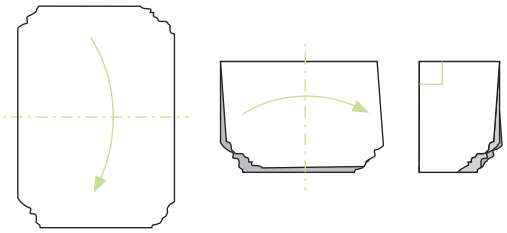
Make a copy of Blackline Master 19 for each student.

Materials

- Blackline Master 19 (page 77)

Activity

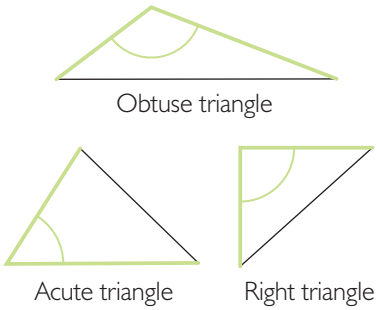
1. For this activity, the students will need to make a quarter-angle tester (see below).



2. Have the students use their tester to examine the interior angles of the triangles on Blackline Master 19. Tell them to record the size of each angle using "A" for acute, "O" for obtuse, and "R" for right.

3. Discuss the students' answers and say, *Look at the angles in each of the triangles. What do all the triangles have in common?* (They all have at least two acute angles.)

4. Say, *We can name different types of triangles according to the size of their largest interior angle. An acute triangle has an acute angle as its largest angle. An obtuse triangle has an obtuse angle as its largest angle. A right triangle has a right angle as its largest angle. Use these names to label each triangle.*



▲ *Explain that triangles can be named according to their largest interior angle.*

5. Angles in Quadrilaterals

8–10

Preparation

No preparation is required.

Materials

- Students' copies of Blackline Master 19 from the previous activity
- Students' quarter-angle testers from the previous activity

Activity

1. Direct the students to examine the quadrilaterals on the bottom of Blackline Master 19. Instruct them to label all the interior angles as in the previous activity. This time also using "RF" to record any reflex angles.

▲ *The students can mark reflex angles with the letters "RF".*

2. Ask, *What patterns can you see when you look at the type of angles in the shapes?* Have students work in pairs to discuss their thoughts.

3. Discuss the students' ideas and ask the following questions. During the class discussion, encourage the students to sketch diagrams to find exceptions or examples for a statement or question:

- *If a quadrilateral has three right angles, what will the fourth angle be?* (A right angle.)
- *If a shape has only two right angles, what will the other two be?* (One will be acute and one will be obtuse.)
- *Can you make a quadrilateral with two reflex angles? Why not?*
- *Can you name different types of quadrilaterals by the size of their largest angle like you can with triangles? What problems will there be?*

Did You Know?

An interior angle is an angle inside the perimeter of a polygon. Its angle arms are two adjacent sides of the polygon.