

The TAKS Tutor
6th Grade
6.6A

Objective 6.6(A): Use angle measurements to classify angles as acute, obtuse, or right.



Lesson 6.6A

This objective will focus on the following ideas:

- Basic geometric terms and symbols;
 - Classifying acute, obtuse, right, and straight angles.
- Each part will be addressed in a separate lesson.

Mathematics
Vocabulary

point, line, line segment, ray, plane, angle, endpoint, vertex, acute angle, obtuse angle, straight angle, or right angle, intersecting lines, horizontal lines, vertical lines, parallel lines, perpendicular lines, diagonal, congruent, protractor, degree

Materials

- Index cards
- Protractors
- Brads
- Markers
- Sticky Notes
- Rays (stock paper cut-outs)
- Board protractor
- Activity Master 1, Classifying Angles Activity (These masters can be found in the Activity set packet.)
- Transparencies 1 - 4, Lesson 6.6A
- Practice Sheets 1 - 2, Lesson 6.6A; Student Practice Book Pages 157 – 161
- Activity Sheet 1, Lesson 6.6A; Student Practice Book Pages 157 – 161

Time Required

5 Days

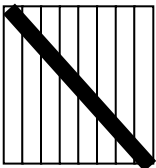
Teaching Notes Getting Started

Instructional Focus:

1. The following lessons present ways in which students use angle measurements to classify angles as acute, obtuse, or right. Explain that all geometric figures are composed of one or more of the following basic figures: point, line segment, line, plane, ray and angle. It is helpful to know these basic figures in order to classify angles.

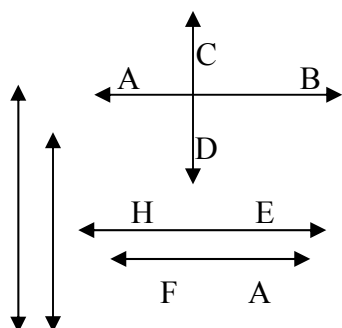
Basic Geometric Terms and Symbols

2. Display Transparency 1, Lesson 6.6A. Introduce the lesson by presenting the basic geometric terms and symbols. Discuss each basic figure one at a time, pausing to discuss the definition and symbol for each. Emphasize the following points from the transparency:
 - Help students understand that there is no specific position for each drawing.
 - Ask students what is the difference between a line and a line segment.
 - [A line segment has 2 endpoints; a line has none.]
 - Caution students to pay attention to the symbols that indicate a line, line segment, and ray. Point out that a line and a line segment can be named two ways. A ray can be named one way, from the end point.
 - Tell students that they can use clue words to help them remember features of a line, ray, and line segment. For example, a clue word for line is endless, ray, one endpoint; and line segment, double endpoint.
 - Have a student volunteer to draw each figure on the overhead or board and its notation as another student volunteer reads the definition of each. Ask questions after presenting each and suggest real-world examples of each.
 - Stress that geometric figures are defined by points:
Two points define lines, line segments, and rays; three points define planes and angles.
 - Ask students, how many ways the angle is named. [3]
 - Point out to students that the angles can be named as follows: ABC, CBA, ABD, DBA, B. ABC and CBA name the same angle as does ABD and DBA.
 - Have students practice writing each geometric figure and the symbol used to represent each.
 - Review again how to draw and label each geometric figure presented on the transparency.
 - Emphasize that a line segment has two endpoints; a line is drawn with two arrowheads; a ray has one endpoint. Point out the use of symbols to name these figures.
3. Write the words diagonal, horizontal and vertical on the board. Ask an artistic student to draw a sketch of a gate on the board. Have students identify diagonal lines, and pairs of horizontal lines and vertical lines in the drawing. Display Transparency 2, Lesson 6.6A. Discuss each vocabulary word one at a time. Emphasize the following ideas from the transparency:



- Ask students how many points parallel lines have in common. [none]
- Next, ask how many points intersecting lines have in common. [one] Ask students to identify the common point of the intersecting lines on the transparency. [Point E]
- Have students identify perpendicular, parallel, and intersecting lines in the classroom. Have volunteers go to the board and draw examples of each.
- Help students find objects that are congruent in the classroom. Have students describe the symbol for congruent. [\cong Looks like an equal sign with a sideways “s”.]
- Have students draw and name each kind of geometric figure and the symbol used to represent each.
- Say the following items and have students give an oral description of each, using the words, parallel, perpendicular, vertical, horizontal, intersecting, and diagonal.
 - a. roof beams [perpendicular]
 - b. sides of a bulletin board; [parallel lines; perpendicular lines]
 - c. corduroy pants. [vertical; parallel]
 - d. a plaid skirt [horizontal; vertical; parallel]
- Ask students if all intersecting lines are perpendicular and vice versa. [No, not all lines intersect to form right angles. Yes, all perpendicular lines intersect to form right angles.]
- Ask students what shapes perpendicular line segments make. [squares and rectangles]
- Call on volunteers to go to the board to draw the following:
Remind volunteers that they are working with lines, not line segments and that any number of lines can be drawn through a point.

a. $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ b. $\overleftrightarrow{AC} \perp \overleftrightarrow{DE}$ c. $\overleftrightarrow{HE} \parallel \overleftrightarrow{FA}$ d. $\overleftrightarrow{TR} \parallel \overleftrightarrow{YU}$



[Example of perpendicular lines, Examples a and b. Lines can intersect anywhere on the other line to form right angles.]

[Examples of parallel lines, Examples c and d]

Have students identify features in the classroom that suggest the intersection of two lines, such as the edges of the chalkboard. Students should identify the kinds of angles formed when the two lines meet. They should note that many of the lines intersect to form right angles. Guide students to differentiate between parallel and intersecting lines by providing the following examples:

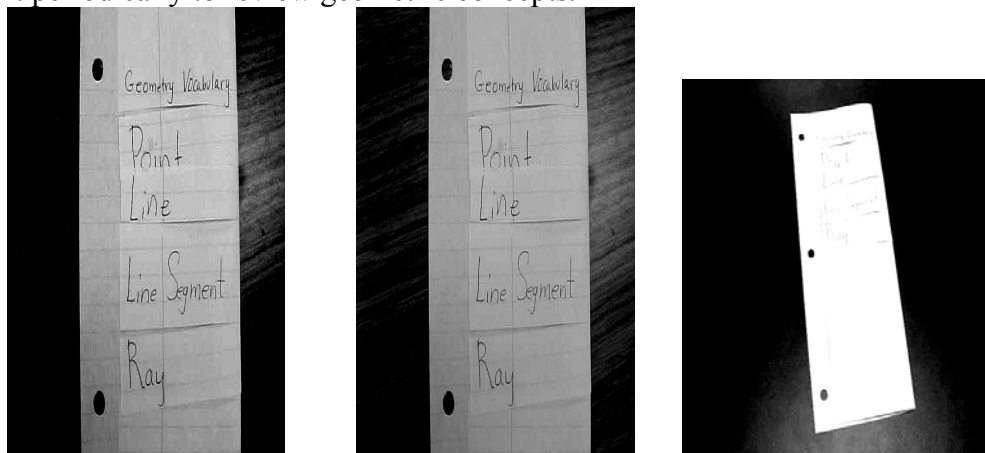
- Two roads meet at an intersection; two lines that meet intersect.
- Traffic lanes, which never meet, are parallel.
- Lines on notebook paper are parallel.

Conclude by asking students how are lines in the same plane classified. [perpendicular: intersecting lines that form right angles; parallel lines: lines that never meet; intersecting lines: lines that meet.]

Assign Practice Sheet 1, Lesson 6.A. Monitor students' workmanship. Check for understanding by asking guiding questions.

Extra Practice Activities

- Have students fold a sheet of notebook paper lengthwise. Do not cover the holes in the notebook paper as the paper can be placed in a notebook for later review. On sides opposite holes, write the title, Geometry Vocabulary at the top as shown below. Have students write the geometry vocabulary from this lesson under the title. Then cut every third line to form flaps. On the inside of each flap, tell students that for each vocabulary word, they should copy the figure, definition, symbol, and name. Have students keep the Geometry Vocabulary sheet in their notebooks and refer to it periodically to review geometric concepts.



Extra Practice Activities

- Have students work in groups of four. Distribute 10 index cards to each group. Each group is to prepare index cards, each with a labeled diagram of one of the following geometric figures: a line segment, a line, a ray, a point, perpendicular lines, parallel lines, intersecting lines, angle, diagonal, and a plane. Place the 10 terms in a box that is displayed in front of the class. Call on a volunteer from each group to pick a vocabulary word from the box. The student should then draw and label their group's diagram of the term on the overhead or board. The class should confirm if the geometric term is drawn correctly. Call on another volunteer and continue the process until the class has discussed each figure.
- Assign Activity Sheet 1, Lesson 6.A for extra practice. Allow students to work with a learning-buddy to complete this sheet. When students finish, have them exchange papers with another pair of students. Pairs should work together to compare and discuss solutions.

Classifying Angles

7. Display Transparency 3, Lesson 6.A. Have students read the information on the transparency and have students to write 5 complete sentences about what they have read. Ask questions to help them understand the information. Call on several students to read what they wrote. Pause to allow volunteers to go to the board and draw various symbols featured on the transparency. Emphasize that acute angles are less than 90° and obtuse angles are greater than 90° and less than 180° .
8. Display Transparency 4, Lesson 6.A. Instruct students to draw a table like the one on the transparency. Have students study Examples 1 – 6 on the transparency then complete the table. Make sure students understand how to classify each angle. Guide students through the last three examples. Volunteers should write answers on the transparency for all to see and check their work for accuracy.

Next, give the following oral test to students:

ORAL TEST

Have students classify the following angles as acute, obtuse, straight, or right.

1. 105° [obtuse]
2. An angle formed on a clock when the time is 1 o'clock [acute]
3. The angle made by twice the corners of your math book [straight]
4. 2° [acute]
5. 98° [obtuse]
6. The angle's measure that is half of a right angle [acute]
7. An angle measure that is 35° less than a straight angle [obtuse]
8. An angle formed on a clock when the time is 8 o'clock [obtuse]
9. The angle's measure that is half that of a straight angle [right]
10. An angle's measure that is the same as 3 dozen [acute]

Assign students to create 5 angle classification riddles for homework. Have them pick another student to solve them.

Assign Practice Sheet 2, Lesson 6.A. Have students classify each of the angles as acute, right, obtuse, or straight.

Extra Practice Activities

9. Distribute the Classifying Angles cards to each pair of students. Have pairs place the header cards at the top of their workspace. Students should shuffle cards and place them face down. Students should take turns drawing a card and placing them under the correct header.
10. Distribute a pair of scissors, a brad, and 2 card stock rays to each student. Have students cut out the rays and connect them with the brad to form an angle. These rays can be used to estimate the angles in the box that follows. Teacher says the measures in the box allowing enough time for everyone to make and show their angle. Students should classify angles as teacher says the measures aloud. From

time to time, have students explain why they classified the angles as acute, obtuse, straight, or right. *Accept reasonable estimates.*

Estimating Angles Activity

| | | | |
|----------------|-------------------|-----------------|----------------|
| 1. 12° | 2. straight angle | 3. 38° | 4. 120° |
| 5. 5° | 6. 89° | 7. 72° | 8. 175° |
| 9. right angle | 10. 96° | 11. 115° | 12. 20° |

11. Assign students to groups of four. Students in the group should take turns making an angle with their card stock angle. Group members should estimate the measure of the angle and classify the angle as acute, obtuse, straight, or right.
12. Have students write a written explanation with pictures and symbols of the different types of angles in a letter to their parents.
13. Provide old or reproduced maps that have angles in them. Have students use highlighters to outline the angles and then classify them as acute, obtuse, straight, or right.
14. Use the current adopted textbook for additional practice on classifying angles.
15. The Skills Review Sheet Student in Practice Book, page 161 can be used to review the vocabulary, concepts, and skills learned in this lesson. Students should keep all skills sheets in a folder for continuous review and retention of concepts throughout the school year.
16. Use *Working Through the TAKS* in Student Practice Book, pages 162 – 163 for formatted practice problems on Lesson 6.6A to test students on the concepts and skills presented in this lesson.