“Finding Unknown Angles” Classroom Activities

Short description: Learn how to solve problems that involve finding unknown supplementary, complementary, vertical, and adjacent angles in this Math Shorts video.

Long description: In this Math Shorts video, learn how to solve problems that involve finding unknown angles of various types. In the accompanying classroom activity, students first review supplementary, complementary, vertical, and adjacent angles and then watch the video. Finally, students apply what they’ve learned by writing and solving equations that involve angle measurement, using algebraic notation to represent relationships among angles. To get the most from the lesson, students should be comfortable solving equations in the form $ax = b$.

Activity Text

Learning Outcomes

Students will be able to

- use knowledge of supplementary, complementary, adjacent, and vertical angles to write and solve equations involving angle measurement
- use variables to represent quantities in angle measurement problems
- define the mathematical terms below

Common Core State Standards: 7.G.B.5, 7.EE.B.4.a

Vocabulary: Complementary angles, supplementary angles, adjacent angles, vertical angles

Materials: One per student: pencil, paper, Find the Angles worksheet; for teachers only: Find the Angles Solutions answer key

Preparation: Make copies of the worksheet.

Procedure

1. Introduction (5 minutes, whole group)

Probe to find out what students know about *complementary angles, supplementary angles, adjacent angles,* and *vertical angles.* If these are new to students, briefly introduce each in preparation for the video.

2. Finding Unknown Angles Video (5–10 minutes, whole group and pairs)

Show students the video. Pause as follows and have pairs discuss how they would find the measurements of the relevant angles. Restart the video each time to reveal a solution strategy:

0:47 (the angle marked “?”)

0:58 (the three unlabeled angles)

1:32 (angles *ABD* and *DBC*)

If you notice students struggling to find the angles (in particular, for the algebraic approach demonstrated from 1:32 on), work through the solution shown in the video with the class.

3. Find the Angles (10 minutes, pairs)
Distribute the worksheet and review the instructions with the class.

As students work in pairs, circulate to encourage them to look for patterns that emerge in their answers. For instance, across any given row, supplementary angles are twice the complementary angles; down the supplementary column, all pairs of angles sum to 180.

If you notice some students having difficulty with algebraic modeling, call together a small group to offer guidance.

As each pair of students finishes, have them join with another pair to compare solutions.

4. Conclusion (5 minutes, whole group)
Call the whole group together to share solution strategies for selected problems, including one or more of the “impossible” problems—that is, problems that can be solved with algebraic modeling (e.g., the final problem) and the problem with more than one answer.

For each, keep the emphasis on how students solved the problem. For example, ask students, How did you figure out that the problem is impossible? Be sure to invite strategies that involve algebraic modeling and strategies involving number patterns.

Wrap up with a few questions focused on patterns and relationships that students encountered during class, for instance:

- What patterns do you notice in the chart on the worksheet?
- If you know an angle is less than 90 degrees, will its supplementary angle be more or less than 90 degrees? How do you know?

Activity Extension: Have students design a playground slide or skate park ramp on graph paper. They should include the relevant angles and distances to scale. For instance, for the slide, have them find the angle at which the stairs up the back of the slide contact the ground, the angle between the top of the stairs and the slide, and the angle between the bottom of the slide and the ground. For even more challenge, students may build a 3D scale model from cardboard.

This activity is based on work developed at TERC.