

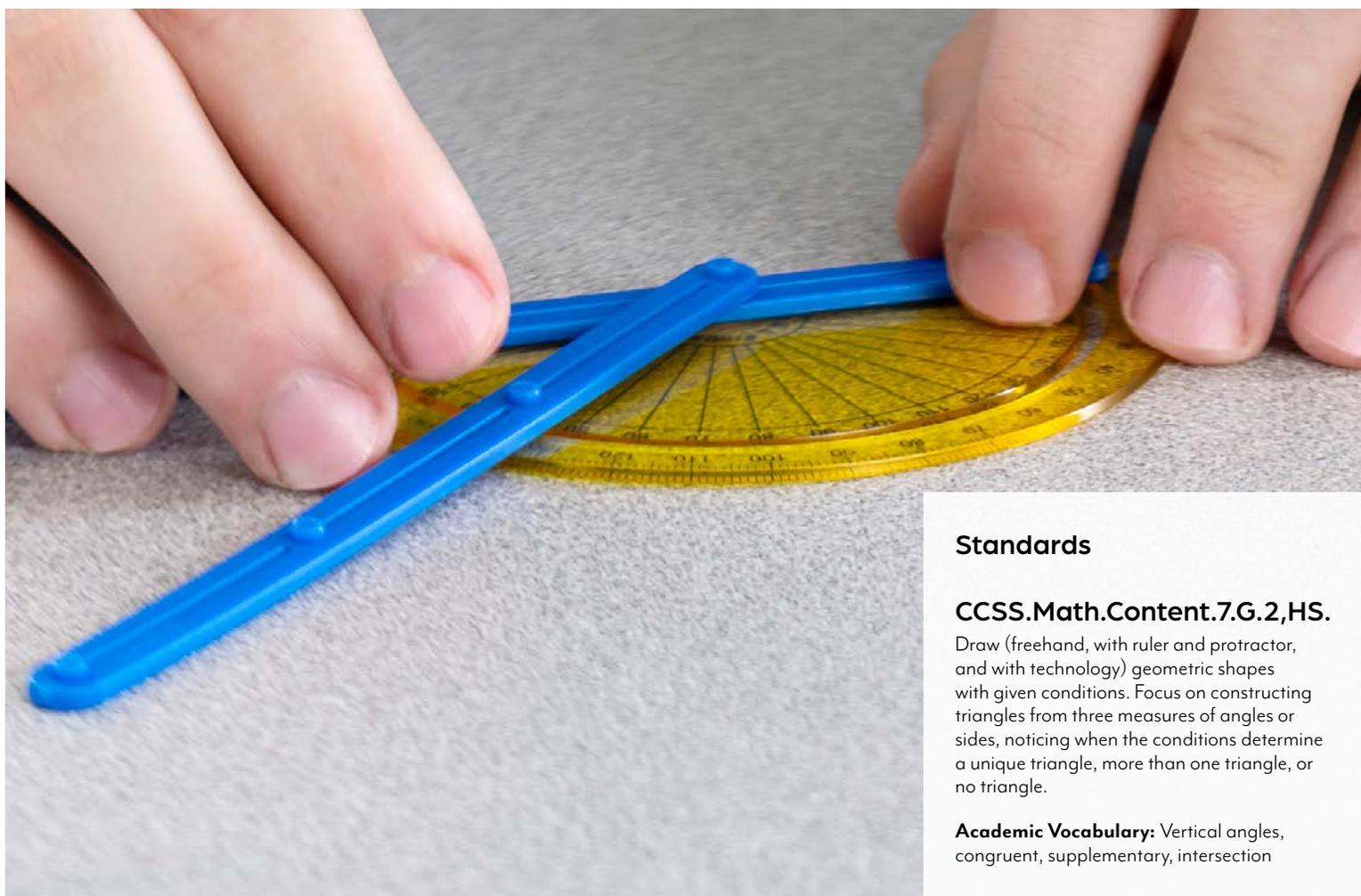


Adapted from MaTh Labs

Volume 36 | Gr. 7-10

Time: 45 minutes

Criss cross vertical angles



Standards

CCSS.Math.Content.7.G.2.HS.

Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

Academic Vocabulary: Vertical angles, congruent, supplementary, intersection



Materials list

- Nasco Geostix (1 pkg. per small group/pairs) w/protractor (**TB27053**)

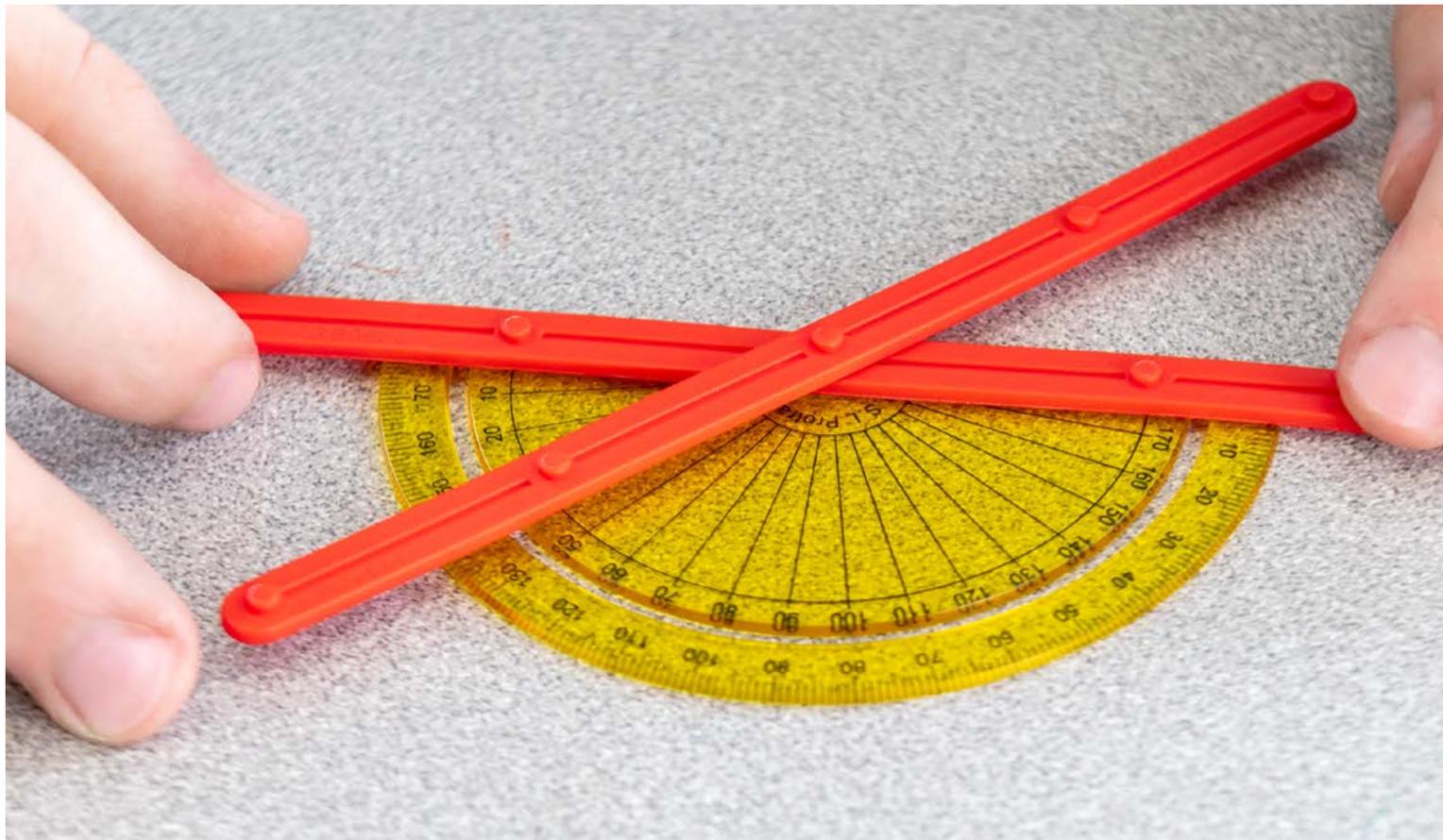
Objectives

Students will...

- Understand angles formed by intersecting lines
- Determine unknown angles of vertical angles and understand their congruency
- Identify supplementary angles from intersecting lines and find supplements

Background

Students may have explored relationships with angles of triangles. In this lesson, they will explore a relationship of vertical angles and supplementary angles formed by intersecting lines/segments.



Question

What types of angles are formed by two intersecting lines?

Launch (8–10 minutes)

Have students explore the Geostix by taking two and intersecting them. Connect them. Have students create different angles.

Explore activity (15–20 minutes)

Students will begin by intersecting two Geostix (see above). They will record the measurement of the four angles created. Students should notice the angles directly across are the same (congruent). They may also note the angles that make a straight angle are 180° (supplementary). During closure, the teacher can introduce the words vertical angles, congruent and supplementary as students share what they notice. It's okay if students are not fluent with the academic vocabulary right away, the most important idea is they recognize congruency and supplementary angles.

Summarize (10–15 minutes)

As a class, discuss what students noticed and the questions they asked. Spend about 10 minutes discussing their ideas and observations/conclusions. During closure ask:

- What did you and your partner notice?
- How are angles “a” and “b” related?
- How are angles “c” and “d” related?
- What questions are you curious about?

Check for understanding

1. Have pairs or small groups explain their thinking as the teacher circulates and facilitates the exploration.
2. Have students explain how they can ensure their four angles are correct.
Why might they not be exact?
3. Have students share any other ideas they want to investigate.

Extension

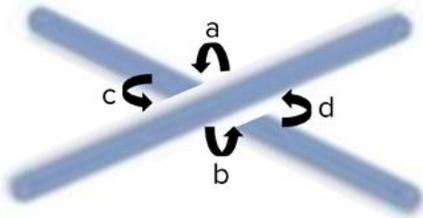
The teacher may ask students to speculate what would happen if two parallel lines are intersected by a third. This will set students up for angle relationships with transversals.

Criss cross vertical angles

Name: _____ Date: _____

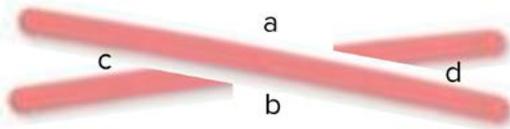
1. Use two blue Geostix that intersect and create four angles like below. Using a protractor, record the measurement of angles:

a _____ b _____ c _____ d _____



2. Use two red Geostix that intersect and create four angles like below. Using the protractor, record the measurement of angles:

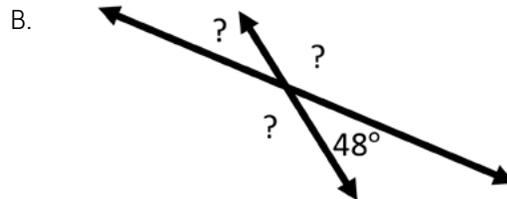
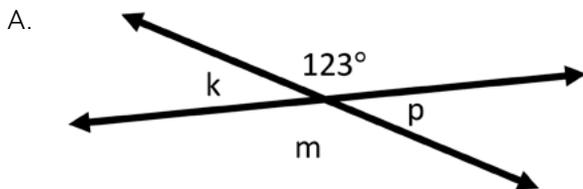
a _____ b _____ c _____ d _____



3. What do you notice about the angles?

4. What are you curious about? Do you have any questions related to the investigation?

Check for understanding: Fill in the missing values for the triangle's angles



For question A, explain how you found the three missing angles m, p and k.
