

Supplementary and Vertical Angles



The interactive white board DreamBox Teacher Tool for this lesson is available on our website under Resources or using www.dreambox.com/teachertools.

Students use this interactive tool to reason deductively about supplementary, vertical, and adjacent angles as they make rotations, aim for targets, and determine angle measurements.

Sample Lesson

Objective: Students find unknown angles using supplementary, adjacent, and vertical angle relationships.

Background: Prior to completing this lesson, students should understand that angles are a measurement of rotation, know that one full rotation measures 360° , and recognize angle measure as additive.

Lesson:

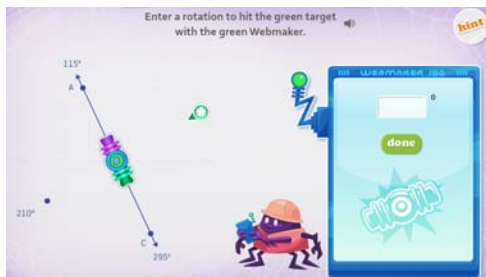
1. Bring up the DreamBox interactive white board lesson.



2. Begin by stating, "We need to rotate the Webmaker so that the purple laser will hit the purple target." Ask, "How could we figure this out? Take a moment to draw this problem on your scrap paper. Record the lines and locations of the given point and purple target. Then solve the problem and record your strategy for finding the number to enter into the Webmaker and share with your partner." Once students have discussed their strategies with their partners, ask a volunteer to provide a solution.

Possible responses:

- "We know that the measure of the opposite point across from the purple target is 295° . That point is 65° from 0° because $295 + 65 = 360$. That means the purple target is 65° less than 180° . $180 - 65 = 115$, so 115° ."
- " 295° is 115° more than 180° . So we need to rotate 115° to the purple target."
- "We know that 295° is 25° more than 270° , and 270° is directly across from 90° . So we can add 25° to 90° and rotate 115° . This is our answer."
- " 65° is the answer because $360 - 295 = 65$. That's how many degrees the laser is from the 180° line." (If students provide this answer, allow them to plug in that number. Discuss the reference angles, 0° , 90° , and 180° and ask them how 65° can help them with finding the full measure.)



3. Ask, "In this problem, our answer was 115° . Many of you used 65° to help find the answer. This pair of angles - 115° and 65° - is an example of a special pair of angles called "Supplementary Angles." What is special enough about 115° and 65° that we would give pairs like this one and others a special name?"

Possible responses:

- When you rotate 115° and then 65° , you've rotated one half of the circle. Supplementary angles must be two angles that combine to make one half.
- $115^\circ + 65^\circ = 180^\circ$. A pair angles is supplementary if they add up to 180° .

4. State, "Now we need to determine how far the green laser needs to rotate to hit the green target. Are there any supplementary angle relationships that can help us hit the target?"

Possible responses:

- "The opposite point from the green target is 210° which is 30° more than 180° . That means that the target is at 30° . $210 - 30$ makes 180 , so they are supplementary." (Allow the students to plug in that angle. Discuss where the laser landed. It only traveled 30° from 295° so it landed at 325° . What other information do we need to move it to the target? Why aren't 210 and 30 supplementary?)
- " $210 - 115 = 95$. So rotate 95° to hit the green target. The supplementary angle for 95° is 85° , but it's easier to use the 95° in this situation.
- " $360 - 295 = 65$ and $210 - 180 = 30$. If we add 65° and 30° , we get 95° . That's the rotation to hit the target."



5. "Now we see how those two 95° measures are labeled and are across from each other where the two lines intersect. Those congruent angles are called Vertical Angles. The problem now asks about the rotation measure of the angle for the green target. Point A is at 115° , Point D is at 210° , and point C is at 295° . Where is point E?"

Possible responses:

- "We know $360 - 295 = 65$, so $95 - 65 = 30^\circ$. That's how far the green target is from 0° ."
- " $210 - 180 = 30$. That's the measure of the vertical angle across from point E and 0° . So 30° is the answer."
- "We know $180 - 115 = 65$. $95 - 65 = 30$. So it's at 30° ."

6. One extension problem would be to ask about the measure of the non-labeled vertical angles in the problem. Here, 95° is labeled, and the other pair of vertical angles both measure 85° . Discuss how $2(95^\circ) + 2(85^\circ) = 360^\circ$. Repeat the questions above with future problems.