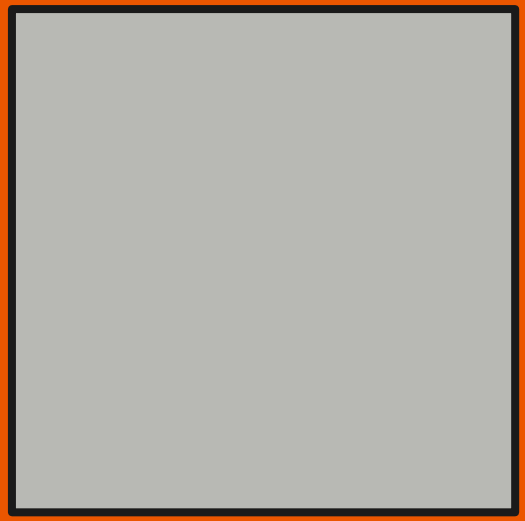
Parallel Lines and the Angles in a Triangle

Lesson 16

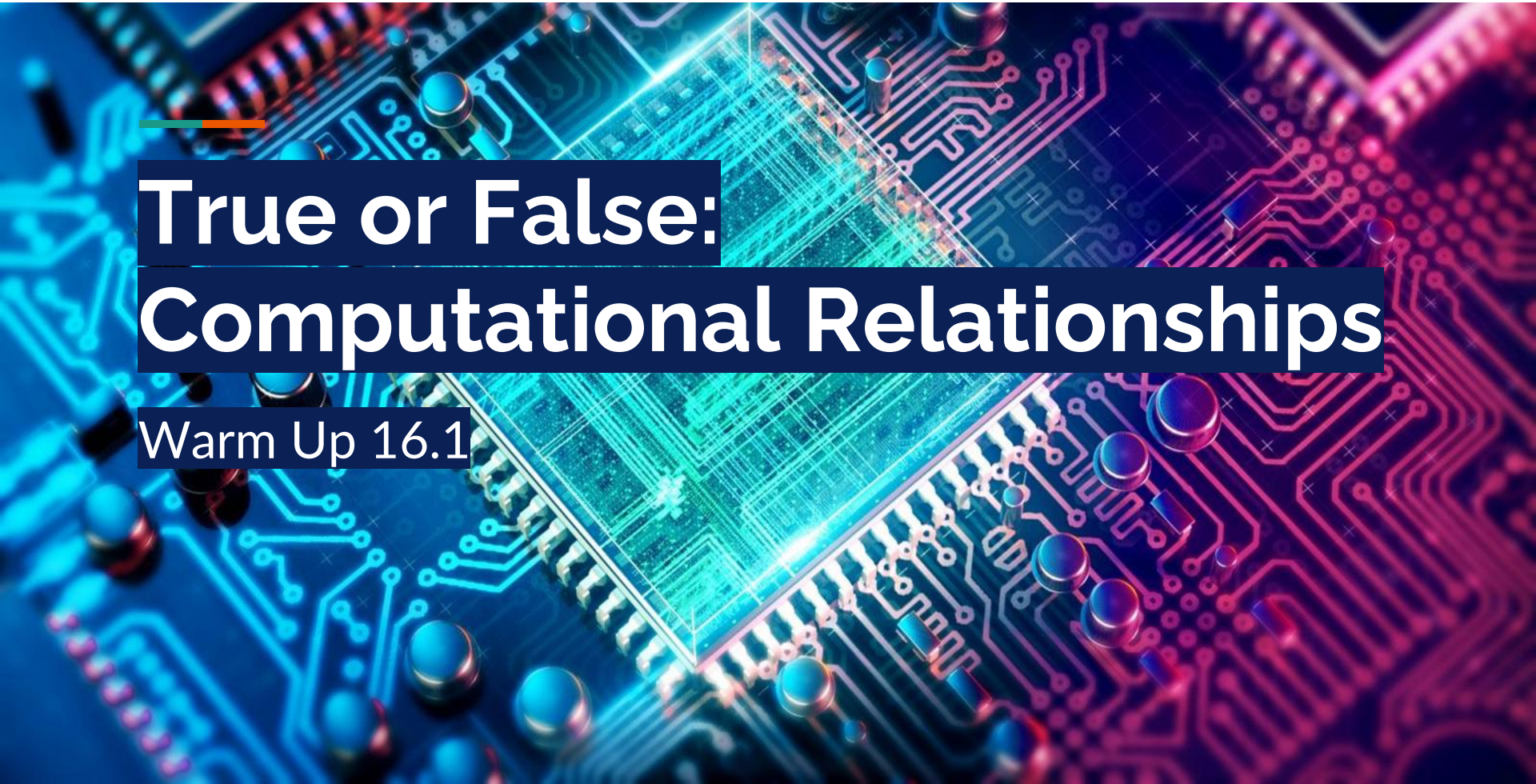
CCSS Standards: Building on	• 7.NS.A • 8.G.A.1.b
CCSS Standards: Addressing	• 8.G.A.5
CCSS Standards: Building towards	• 8.G.B.6

Let's see why angles in a triangle add to 180 degrees!



Today's Goal

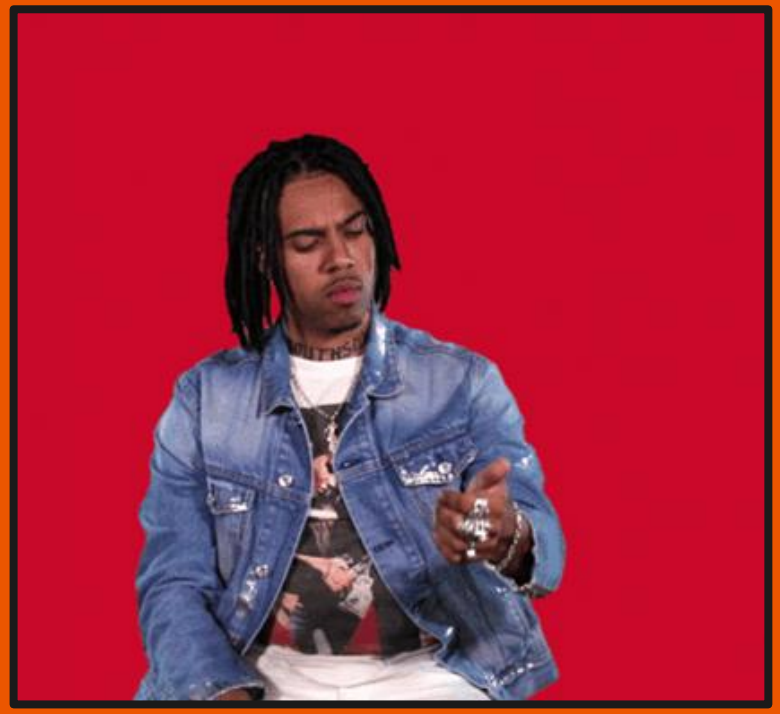
- ❑ I can explain using pictures why the sum of the angles in any triangle is 180 degrees.



True or False: Computational Relationships

Warm Up 16.1

Determine if the equation is **true or false**. Signal your answer.



Is each equation true or false?

$62 - 28 = 60 - 30$ 

How could we make this equation true?

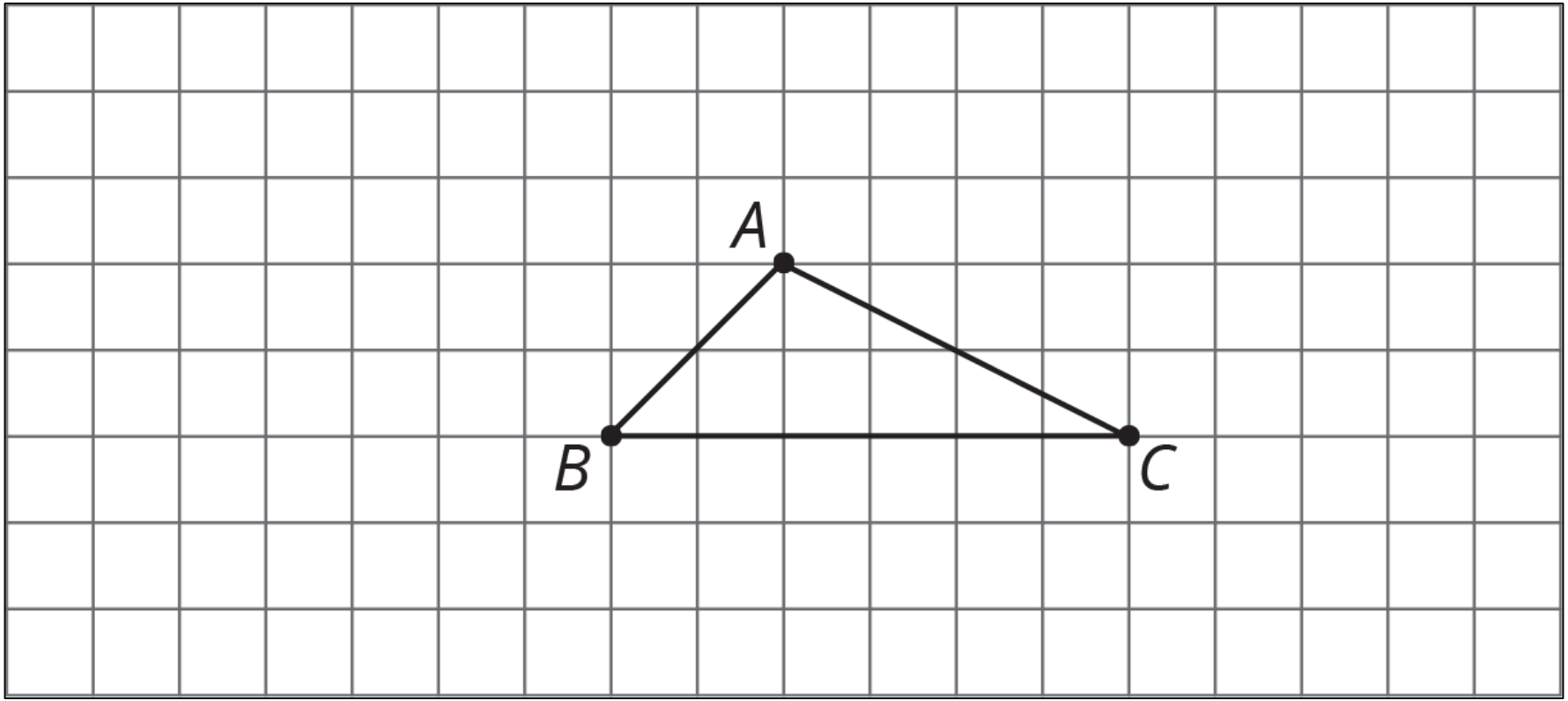
$3 \cdot -8 = (2 \cdot -8) - 8$ 

$\frac{16}{-2} + \frac{24}{-2} = \frac{40}{-2}$ 

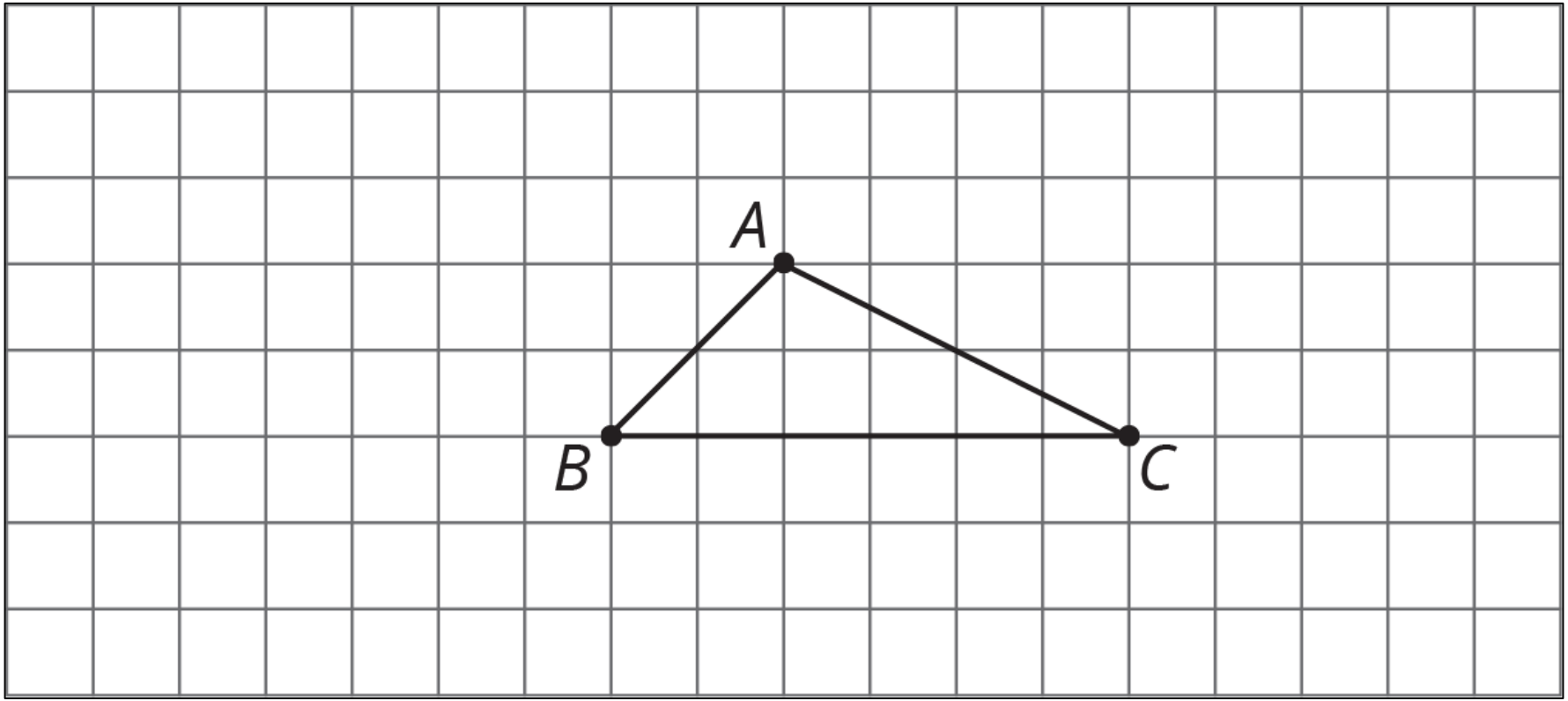
Angle Plus Two

Activity 16.2

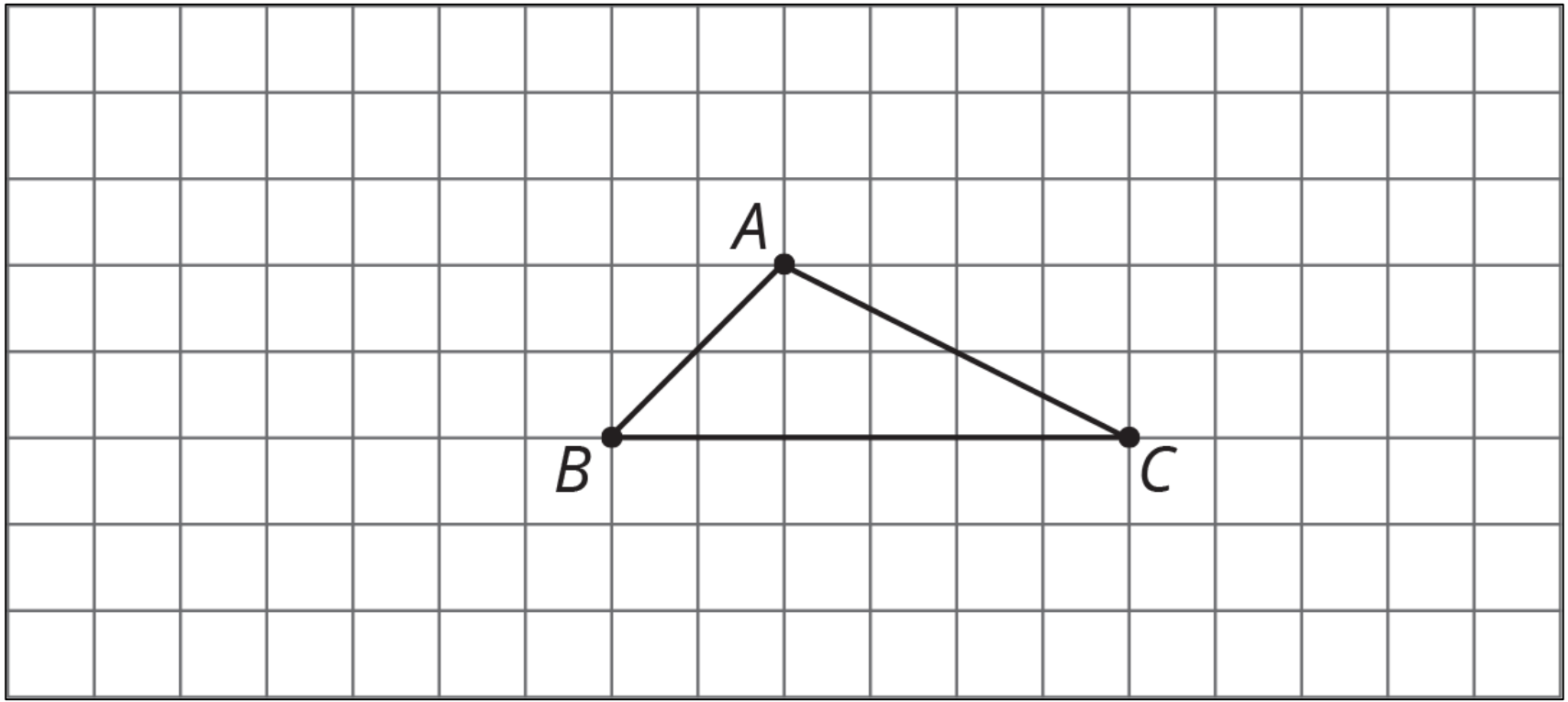
Work as a team, then we'll check in as a class! (5 min)



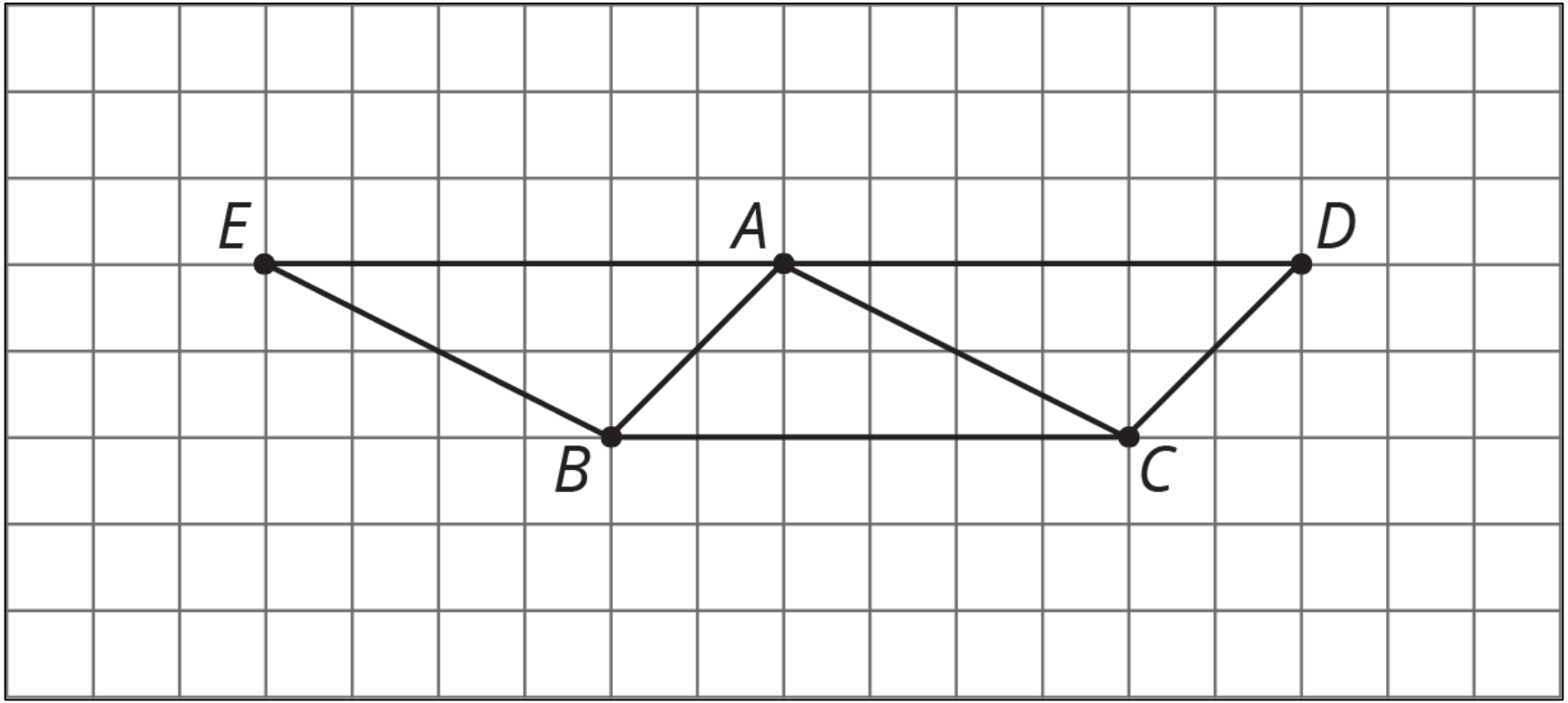
Finish up your work, then we'll check in again!



How did the grid lines help to show that the sum of the angles in this triangle is 180°?



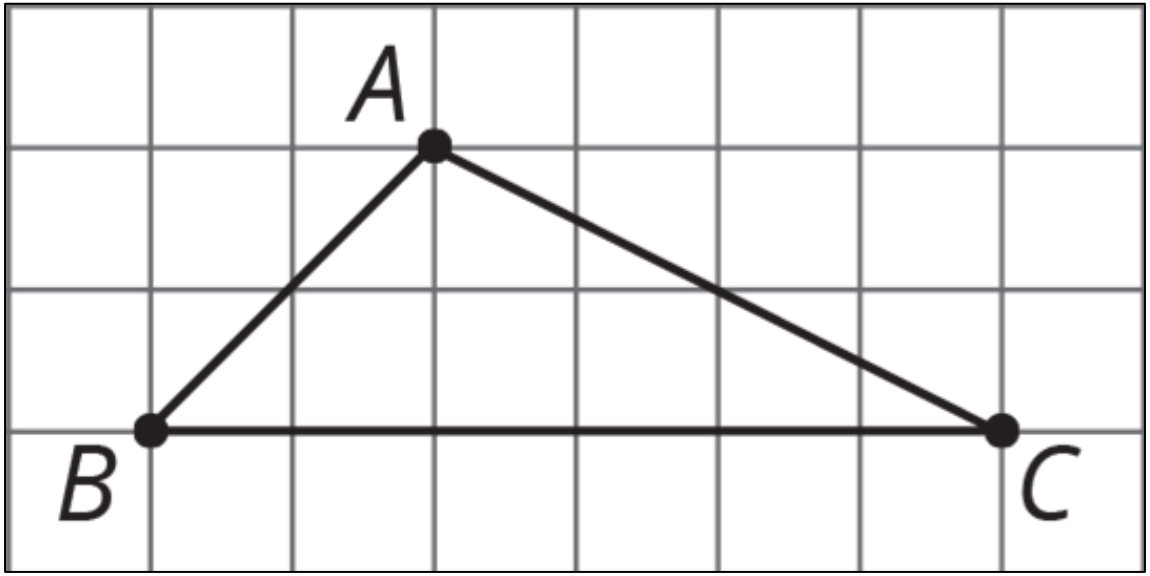
Is it always true that the sum of the angles in a triangle is 180°?



Every Triangle in the World

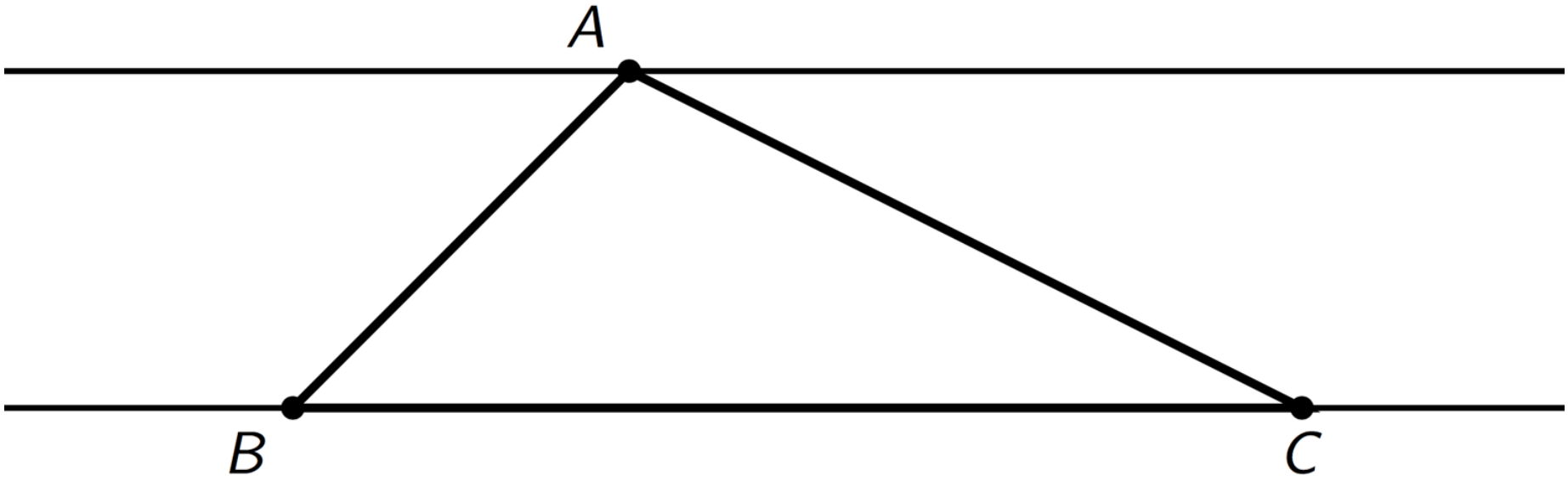
Activity 16.3

Reminder: The notation $m\angle ABC$ is shorthand for "the measure of angle *DBA*."

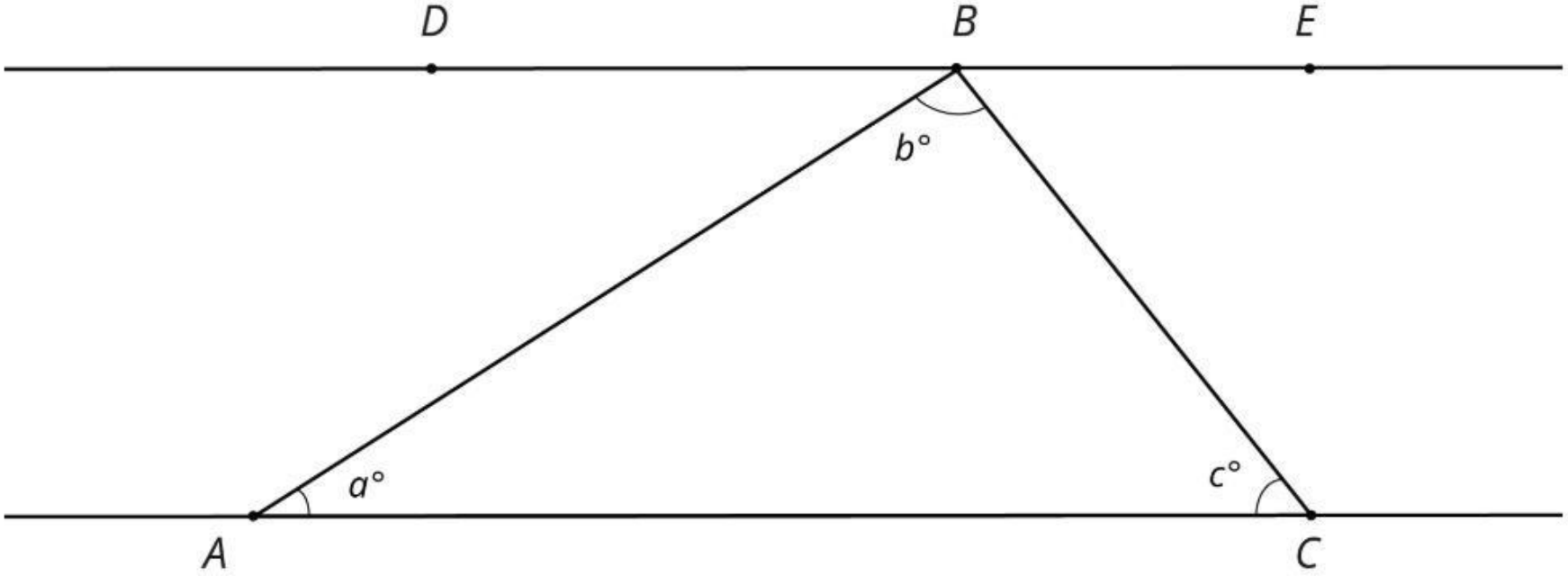


Begin with Quiet Work Time. (5 min)

How does this activity differ from the previous activity, where $\triangle ABC$ had a horizontal side lying on a grid line.



Line DE is often called an **auxiliary construction** because we are trying to show something about $\triangle ABC$ and this line happens to be very helpful in achieving that goal.



“Are you ready for more?”

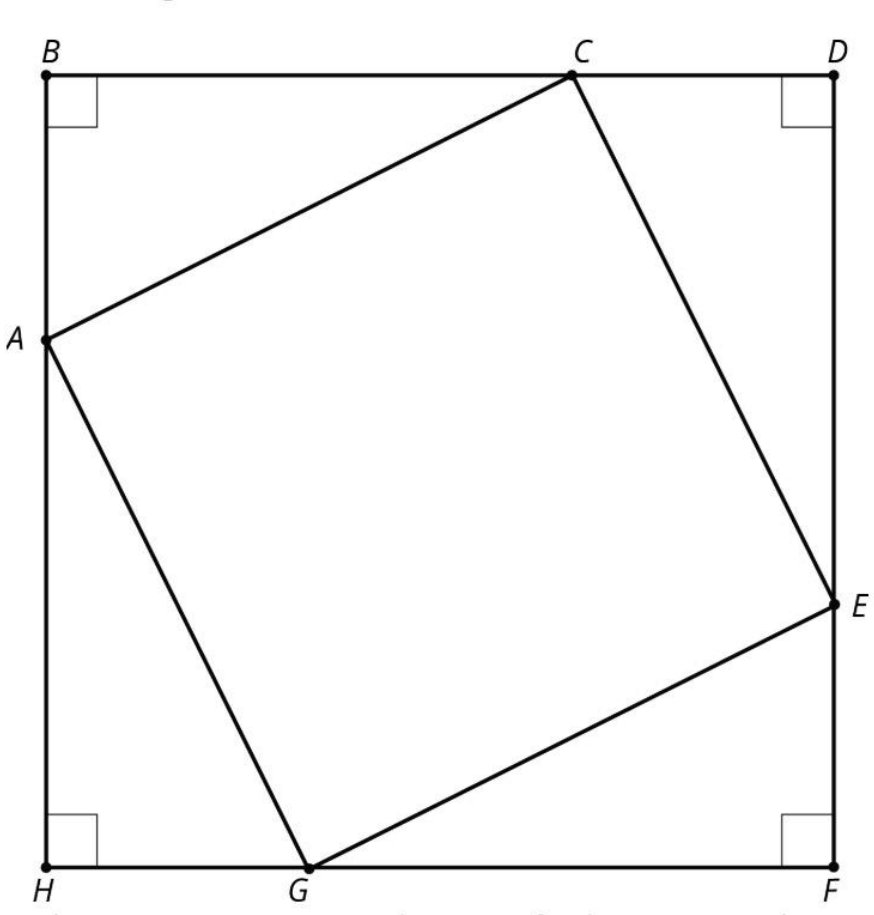
1. Using a ruler, create a few quadrilaterals. Use a protractor to measure the four angles inside the quadrilaterals. What is the sum of these four angle measures?
2. Come up with an explanation for why anything you notice must be true (hint: draw one diagonal in each quadrilateral).

Four Triangles Revisited

Activity 16.4 (optional)

How did you calculate one of the other unknown angles?

Note that angles ACE, CEG, EGA, and GAC are all right angles.

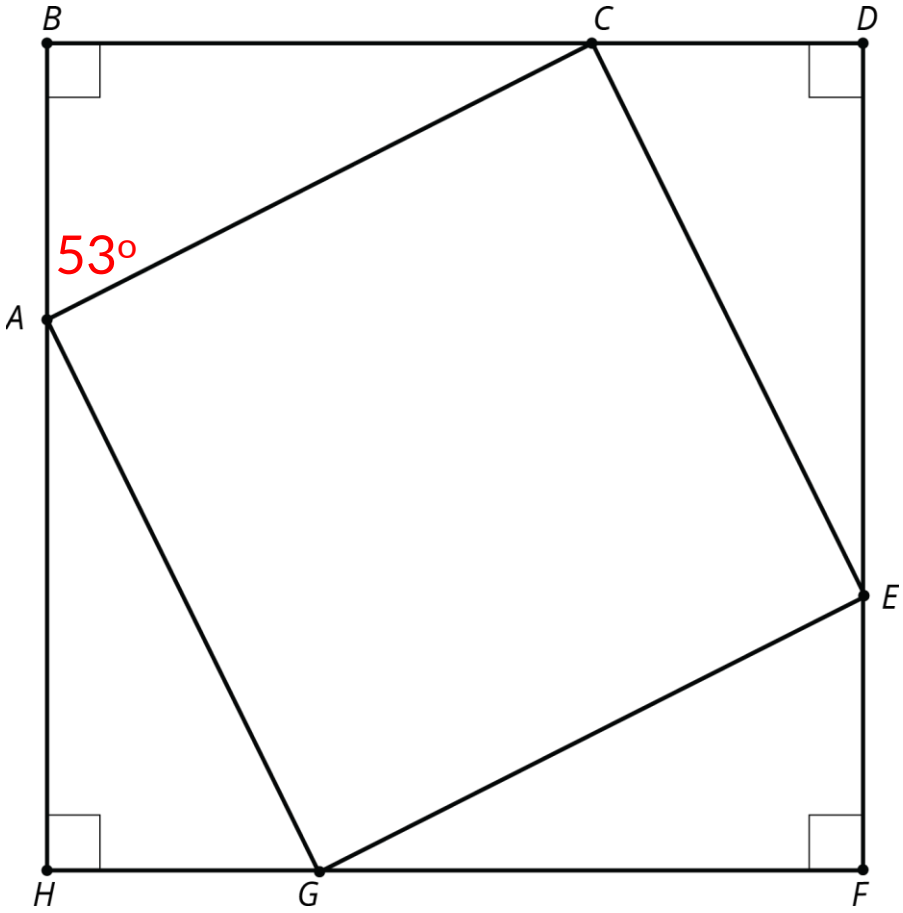


Get started with Quiet Work Time. (3 min)

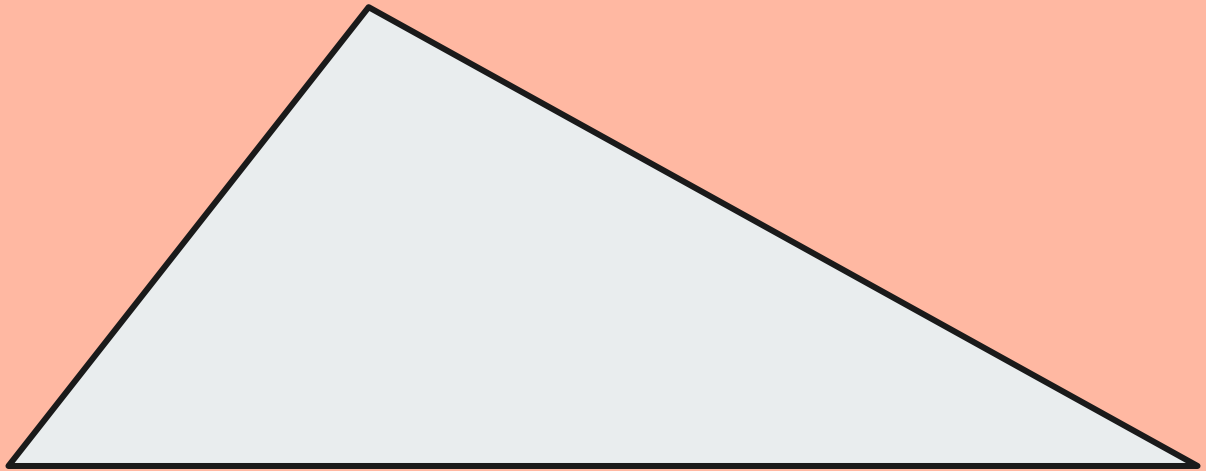
Then we'll discuss as a whole class!

How did you calculate an unknown angle in the image?

Angles *ACE*, *CEG*, *EGA*, and *GAC* are all right angles!

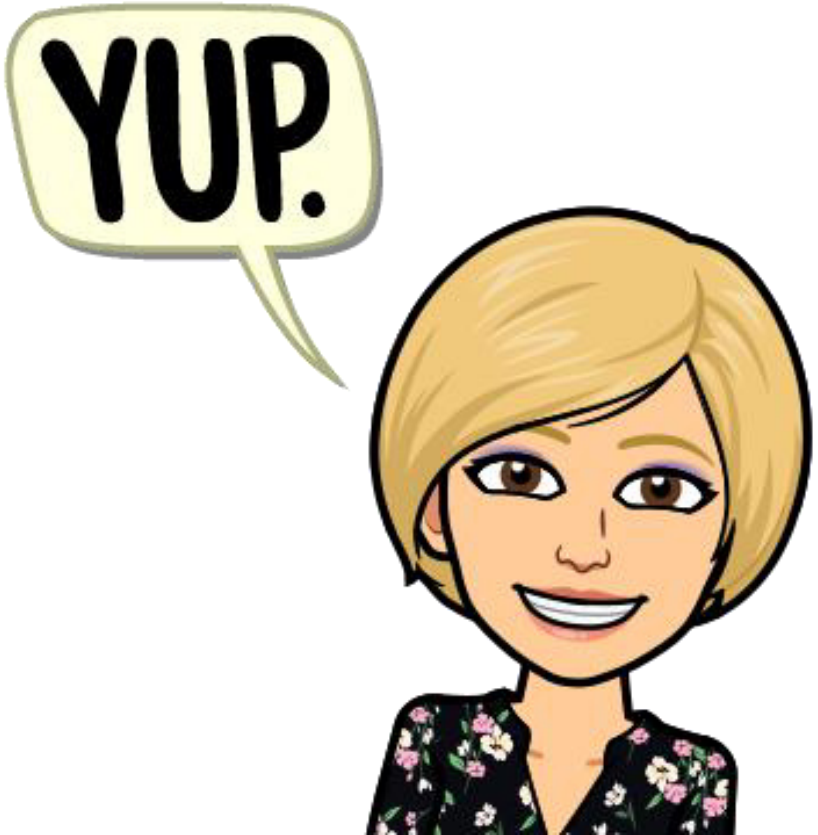


How can we prove that the sum of the angles in a triangle are 180°?



Today's Goal

- ❏ I can explain using pictures why the sum of the angles in any triangle is 180^{o}.



Angle Sizes

Cool Down 16.5