Adding the Angles in a Triangle
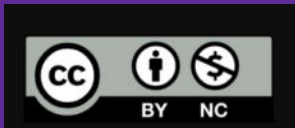
Lesson 15

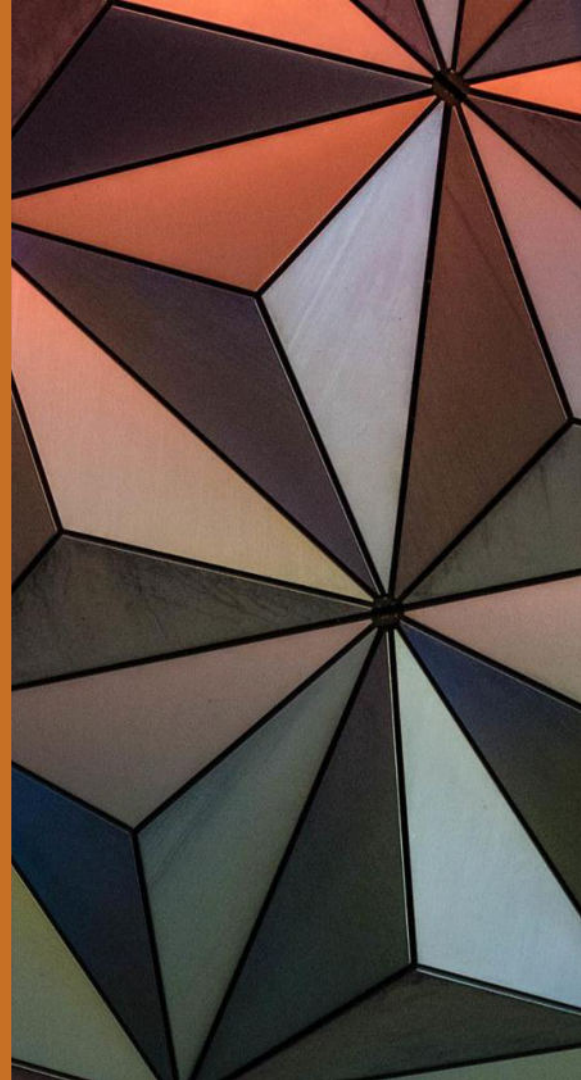| CCSS Standards: Building on	• 7.G.A.2
CCSS Standards: Addressing	• 8.G.A.2 • 8.G.A.5

Let's explore angles in triangles!

Can You Draw It?

Warm Up 15.1

Complete the table by drawing a triangle in each cell that has the properties listed for its column and row.

If you think you cannot draw a triangle with those properties, write "*impossible*" in the cell.

	acute (all angles acute)	right (has a right angle)	obtuse (has an obtuse angle)
scalene (side lengths all different)			
isosceles (at least two side lengths are equal)			
equilateral (three side lengths equal)			
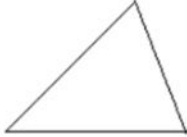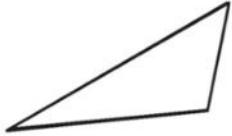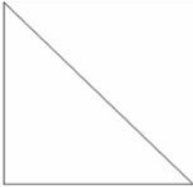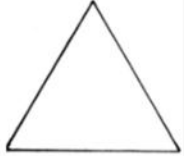
Which triangles were you able to draw?

	acute (all angles acute)	**right** (has a right angle)	**obtuse** (has an obtuse angle)
scalene (side lengths all different)			
isosceles (at least two side lengths are equal)			
equilateral (three equal side lengths)			

Which triangle were you unable to draw?

	acute (all angles acute)	**right** (has a right angle)	**obtuse** (has an obtuse angle)
scalene (side lengths all different)			
isosceles (at least two side lengths are equal)			
equilateral (three equal side lengths)			

Possible solutions:

	acute (all angles acute)	**right** (has a right angle)	**obtuse** (has an obtuse angle)
scalene (side lengths all different)			
isosceles (at least two side lengths are equal)			
equilateral (three equal side lengths)		Impossible	Impossible

Find All Three

Activity 15.2 (optional)

Your teacher will give you a card with a picture of a triangle.

1. The measurement of one of the angles is labeled. Mentally estimate the measures of the other two angles.

2. Find two other students with triangles congruent to yours but with a different angle labeled. Confirm that the triangles are congruent, that each card has a different angle labeled, and that the angle measures make sense.

3. Enter the three angle measures for your triangle on the table your teacher has posted.

group	angle 1	angle 2	angle 3
A			
B			
C			
D			
E			

What were your thoughts as you set about to find your partners?

How did you know that you found a correct partner?

Is there anything you notice about the combinations of the three angle measures?

group	angle 1	angle 2	angle 3
A	40	50	90
B	40	60	80
C	50	50	80
D	20	20	140
E	20	40	120

Is there something in common for each row?

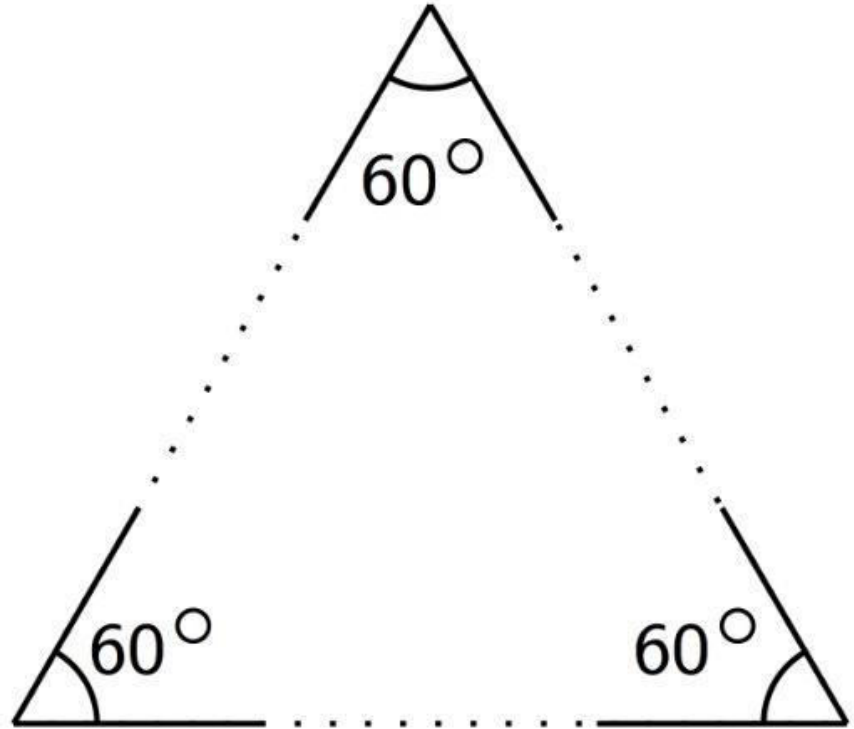| group	angle 1	angle 2	angle 3
A	40	50	90
B	40	60	80
C	50	50	80
D	20	20	140
E	20	40	120

Tear It Up

Activity 15.3
- Group Presentations

Directions:

➜ Cut the four individual pictures out
➜ Each student will work with one of the pictures
➜ If you have the blank copy, use a straightedge to divide the line into three angles (different than what others in your group have)

- Cut the four pictures out of your handout.

- Each student will work with one of the pictures.

- If you have the blank copy, use a straightedge to divide the line into three angles (different than the other images).

Use a straightedge to create three of your own angles
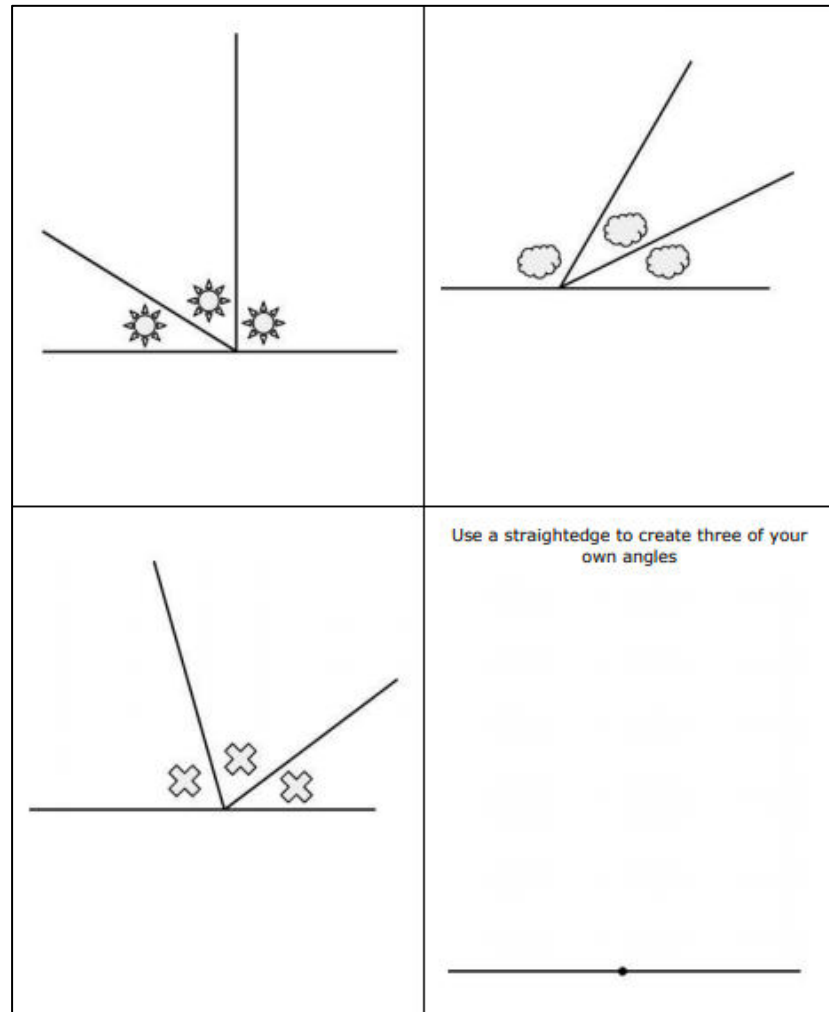
Your paper has 3 sets of angles and a blank space.

Cut out each of the 3 angles.

Can you make a triangle from each set that has these same 3 angles?
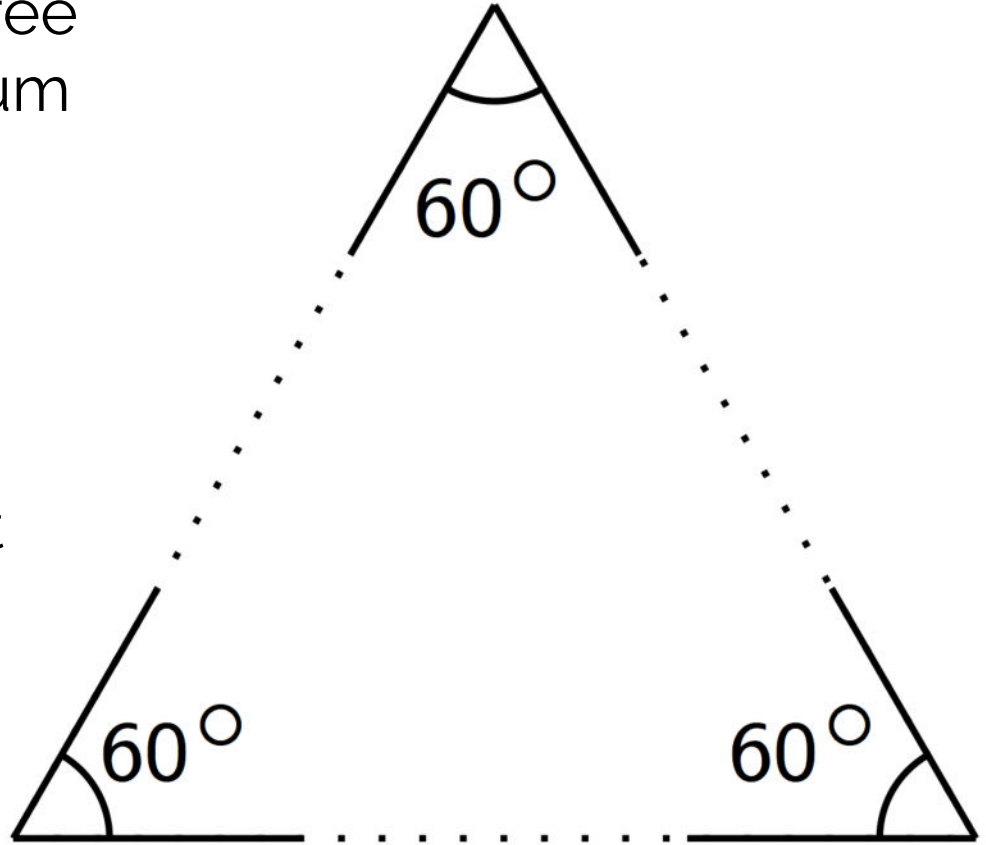
60°

60°

60°
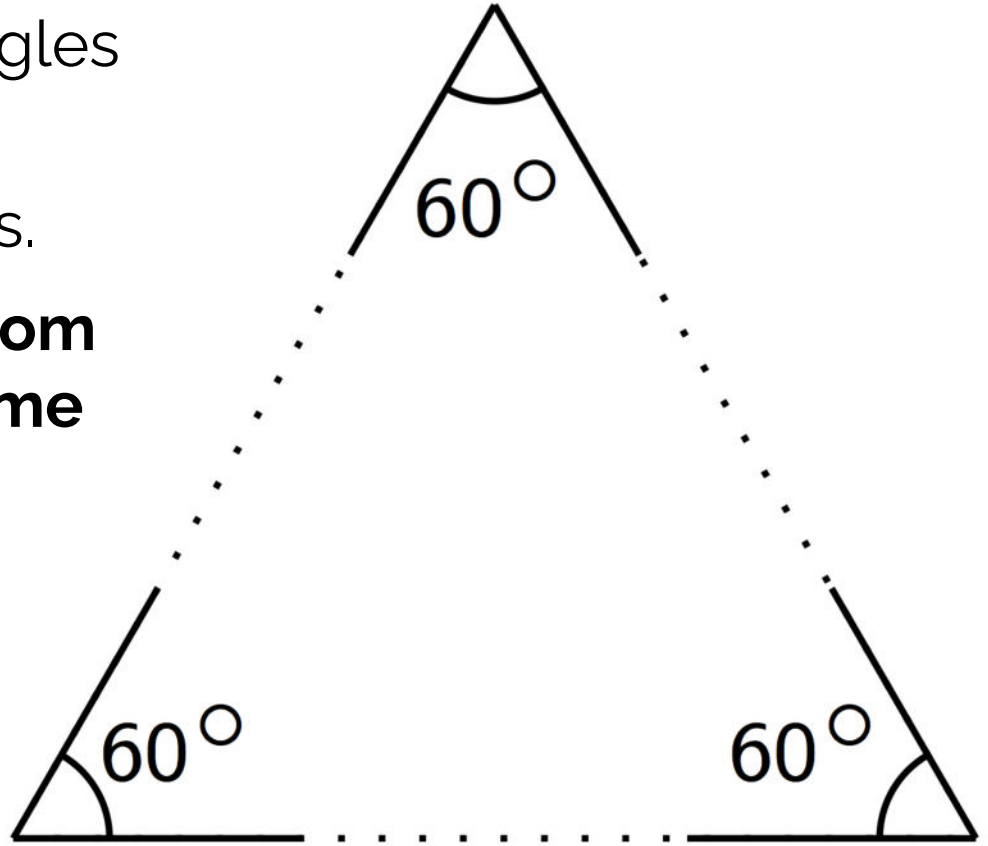
Compare the triangle you made to the other triangles made from the same angles.
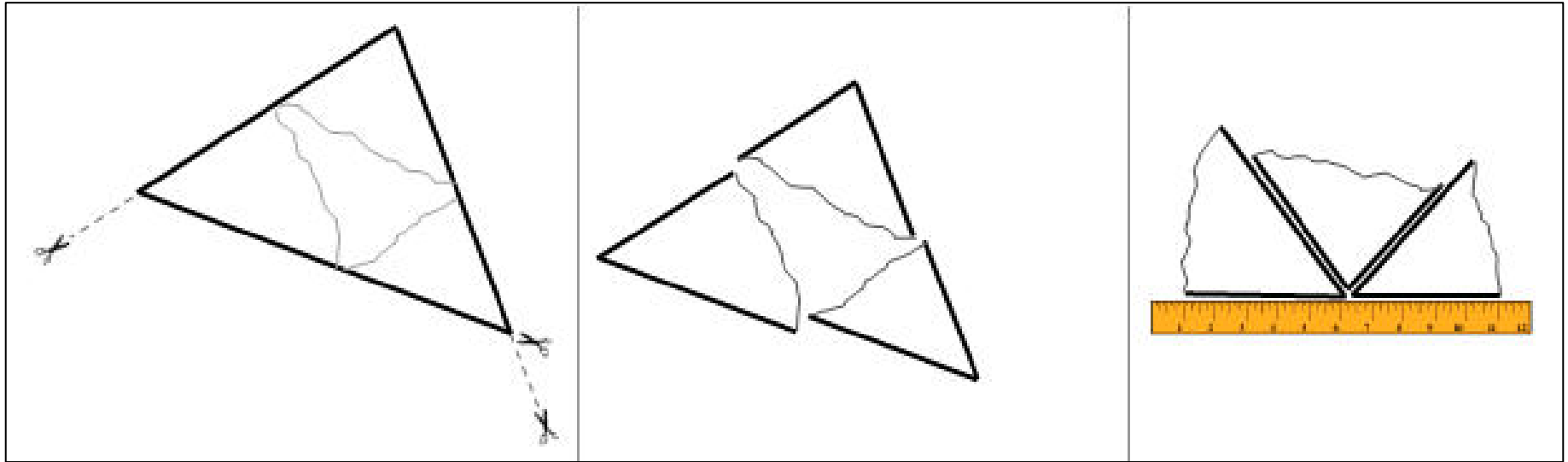
Be prepared to share what you notice!

- How do you know the three angles you were given sum to 180°?

- How do you know these can be three angles of a triangle?

- What do you know about the three angles of the triangle you made and why?

Do you think you can make a triangle with *any* set of three angles that form a line?

This works the opposite way as well!

If you start with a triangle and tear off the angles, then can be arranged to make a straight line, or 180°!

"180 Degrees In a Triangle Experiment." *Helping with Math*, 7 Feb. 2012, www.helpingwithmath.com/printables/worksheets/geometry/8g5angle-experiment01.htm.

"Are you ready for more?"

1. Draw a quadrilateral. Cut it out, tear off its angles, and line them up. What do you notice?

2. Repeat this for several more quadrilaterals. Do you have a conjecture about the angles?

What did we observe about the sum of the angles inside a triangle?

The sum of the angles inside a triangle seem to always add up to 180 degrees.

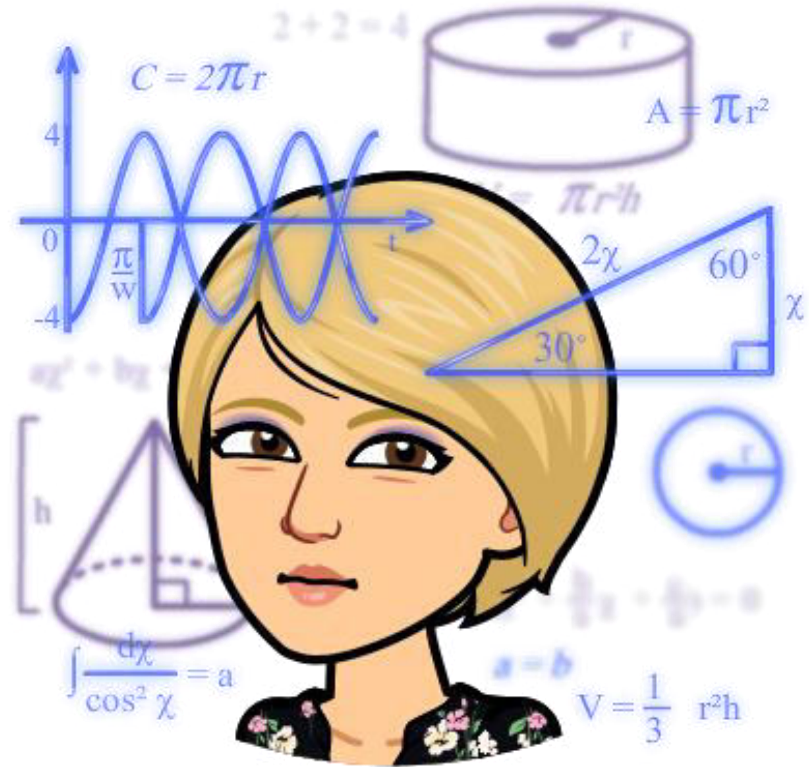**When you know two angles inside a triangle, how can you find the third angle?**

Subtract two of the angles from 180!

Are there pairs of angles that cannot be used to make a triangle?

Yes! If the two angles are both bigger than or equal to 90°, then you cannot make a triangle.

Today's Goals

❏ If I know two of the angle measures in a triangle, I can find the third angle measure.

Missing Angle Measures

Cool Down 15.4