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Unit 1, Lesson 15: Adding the Angles in a Triangle

Let's explore angles in triangles.

15.1: Can You Draw It?

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.

2. Share your drawings with a partner. Discuss your thinking. If you disagree, work to reach an agreement.

	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)			

15.2: Find All Three

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.

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

15.3: Tear It Up

Your teacher will give you a page with three sets of angles and a blank space. Cut out each set of three angles. Can you make a triangle from each set that has these same three angles?

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?

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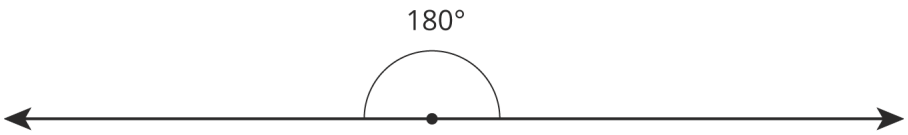
Lesson 15 Summary

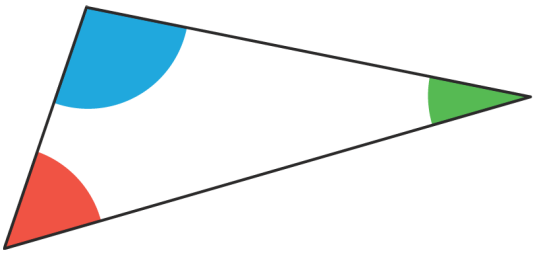
A 180° angle is called a **straight angle** because when it is made with two rays, they point in opposite directions and form a straight line.

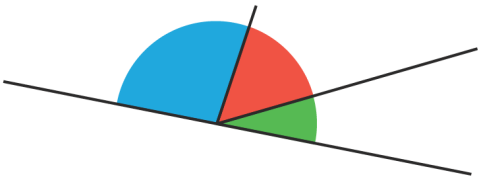


If we experiment with angles in a triangle, we find that the sum of the measures of the three angles in each triangle is 180°—the same as a straight angle!

Through experimentation we find:

- If we add the three angles of a triangle physically by cutting them off and lining up the vertices and sides, then the three angles form a straight angle.
- If we have a line and two rays that form three angles added to make a straight angle, then there is a triangle with these three angles.





Lesson 15 Glossary Terms

- straight angle

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Unit 1, Lesson 15: Adding the Angles in a Triangle

1. In triangle ABC, the measure of angle A is 40°.

   a. Give possible measures for angles B and C if triangle ABC is isosceles.
   b. Give possible measures for angles B and C if triangle ABC is right.

2. For each set of angles, decide if there is a triangle whose angles have these measures in degrees:

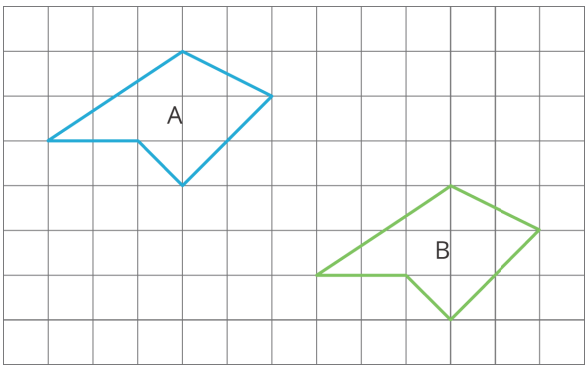
   a. 60, 60, 60
   b. 90, 90, 45
   c. 30, 40, 50
   d. 90, 45, 45
   e. 120, 30, 30

   If you get stuck, consider making a line segment. Then use a protractor to measure angles with the first two angle measures.

3. Angle A in triangle ABC is obtuse. Can angle B or angle C be obtuse? Explain your reasoning.

4. For each pair of polygons, describe the transformation that could be applied to Polygon A to get Polygon B.

   a.



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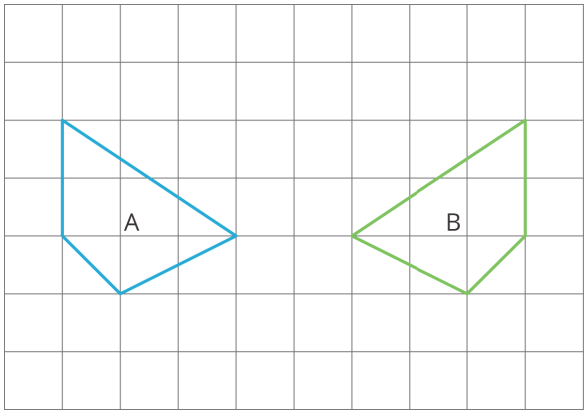
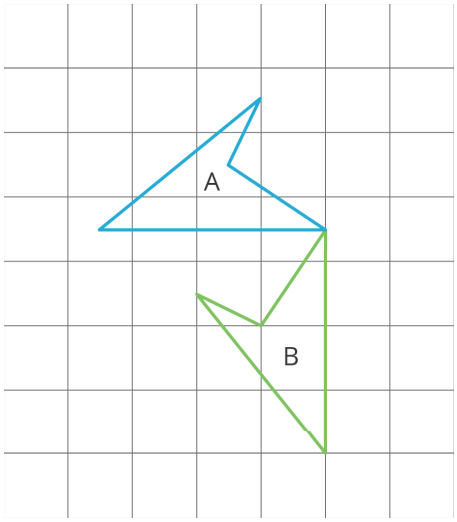
b.

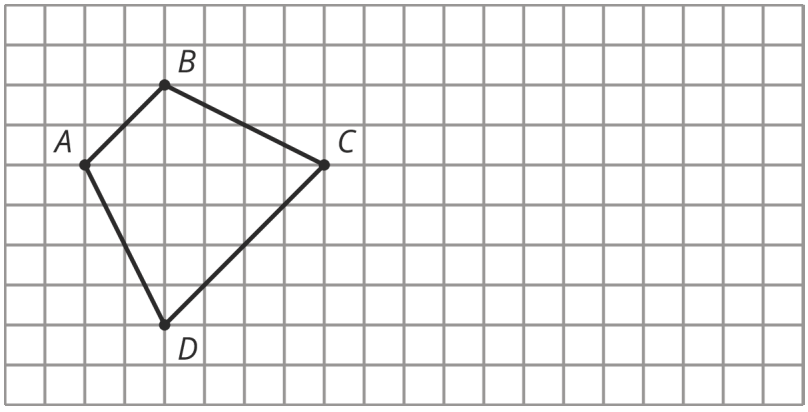


c.



(from Unit 1, Lesson 3)

5. On the grid, draw a scaled copy of quadrilateral $ABCD$ using a scale factor of $\frac{1}{2}$.



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(from Unit 1, Lesson 14)