

Angle Evidence Lab

Use angle facts to solve and justify geometric relationships.

GRADE 8 • 8.G.A.5

CCSS.Math.Content.8.G.A.5 "Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example..."

NAME _____

DATE _____

ANGLE FACTS THAT CONNECT

The three interior angles of any triangle add to 180 degrees, and an exterior angle equals the sum of its two remote interior angles. When parallel lines are cut by a transversal, matching angle relationships can prove angle measures equal, and two matching angle pairs prove triangles similar by AA.

WORKED EXAMPLE

A triangle has interior angles of 47 degrees and 68 degrees. Find its third angle.

1. The known angles total $47 + 68 = 115$ degrees.
2. A triangle has 180 degrees in all.
3. Subtract: $180 - 115 = 65$ degrees.

Answer: 65 degrees

PRACTICE 6 problems

- 1** A triangle has angles of 52 degrees and 71 degrees. Find the third angle.

ANSWER _____

- 2** The angles of a triangle are $(4x + 12)$ degrees, $(3x + 21)$ degrees, and $(2x + 3)$ degrees. Find x .

ANSWER _____

- 3** An exterior angle of a triangle is formed at one vertex. Its two remote interior angles measure 38 degrees and 79 degrees. Find the exterior angle.

ANSWER _____

- 4** An exterior angle of a triangle measures 124 degrees. One remote interior angle measures 53 degrees. Find the other remote interior angle.

ANSWER _____

- 5** Lines m and n are parallel and are cut by transversal t . At line m , the angle above m and to the right of t measures 112 degrees. Find the measure of the angle above n and to the right of t .

ANSWER _____

- 6** Triangle ABC has angles of 62 degrees and 84 degrees. Triangle DEF also has angles of 62 degrees and 84 degrees. Are the triangles similar? State why.

ANSWER _____

APPLY IT Show your work

- 1** A skateboard park uses a triangular metal side brace for a ramp. Two interior angles of the brace measure 58 degrees and 67 degrees. What is the measure of the third interior angle?

WORK SPACE

ANSWER _____

- 2** In a basketball video game court design, two parallel boundary lines are crossed by a diagonal guide line. An angle at the first boundary line measures 73 degrees. The angle in the same relative position at the second boundary line is a corresponding angle. What is its measure?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

In a triangle, the two remote interior angles for one exterior angle measure $(2x + 9)$ degrees and $(3x + 12)$ degrees. The exterior angle measures $(7x - 3)$ degrees. Find x and all three interior angle measures. Explain how the exterior angle fact supports your equation.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A triangle has angles of 52 degrees and 71 degrees. Find the third angle.	57 degrees
2	The angles of a triangle are $(4x + 12)$ degrees, $(3x + 21)$ degrees, and $(2x + 3)$ degrees. Find x .	$x = 16$
3	An exterior angle of a triangle is formed at one vertex. Its two remote interior angles measure 38 degrees and 79 degrees. Find the exterior angle.	117 degrees
4	An exterior angle of a triangle measures 124 degrees. One remote interior angle measures 53 degrees. Find the other remote interior angle.	71 degrees
5	Lines m and n are parallel and are cut by transversal t . At line m , the angle above m and to the right of t measures 112 degrees. Find the measure of the angle above n and to the right of t .	112 degrees
6	Triangle ABC has angles of 62 degrees and 84 degrees. Triangle DEF also has angles of 62 degrees and 84 degrees. Are the triangles similar? State why.	Yes. Triangle ABC is similar to triangle DEF by AA similarity.

PART 2 • APPLY IT

- 55 degrees** Add the two known interior angles: $58 + 67 = 125$. Subtract from 180 to get 55 degrees.
- 73 degrees** Corresponding angles formed by a transversal cutting parallel lines are equal. The matching angle measures 73 degrees.

CHALLENGE

$x = 12$. The remote interior angles are 33 degrees and 48 degrees, the exterior angle is 81 degrees, and the third interior angle is 99 degrees. The exterior angle equals the sum of the remote interior angles, so $(2x + 9) + (3x + 12) = 7x - 3$.

Accept equivalent equation work and degree labels. For the similarity item, accept AA or angle-angle similarity, as long as students identify two equal angle pairs.