LESSON MAKER PRO

Angle Detective Lab

Use triangle and parallel-line angle facts to solve each case.

GRADE 8 · NY-8.G.5

NY-8.G.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."

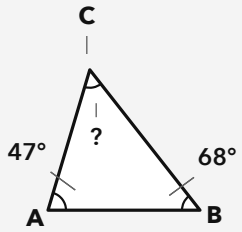
NAME _____ **DATE** _____

ANGLE CLUES

The three interior angles of a triangle add to 180°. 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 triangles similar by AA.

WORKED EXAMPLE

Use the triangle in the figure to find m∠C.

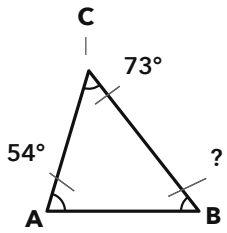


1. m∠A + m∠B + m∠C = 180°.
2. 47° + 68° + m∠C = 180°.
3. m∠C = 180° - 115° = 65°.

Answer: m∠C = 65°

PRACTICE 6 problems

1 Find m∠B in the triangle.



ANSWER _____

2 In triangle ABC, A, C and D are collinear with C between A and D. Exterior angle BCD is 112°. If m∠A = 49°, find m∠B.

ANSWER _____

3 Two remote interior angles of a triangle measure 39° and 71°. Find the exterior angle at the third vertex.

ANSWER _____

4 Lines l and m are parallel and are cut by transversal t. One angle measures 124°. What is the measure of its alternate interior angle?

ANSWER _____

5 Two same-side interior angles formed by parallel lines and a transversal measure (x + 17)° and (3x + 3)°. Find x.

ANSWER _____

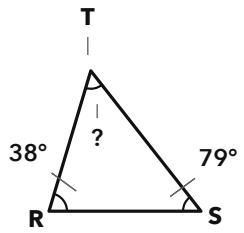
6 Triangle ABC has m∠A = 52° and m∠B = 74°. Triangle DEF has m∠D = 52° and m∠E = 74°. Are the triangles similar? If so, give the matching vertices.

ANSWER _____

_____

APPLY IT Show your work

1 A robotics club uses the triangular brace shown to support a display board. Find the missing angle of the brace.



ANSWER

2 At a concert, two parallel light rails are crossed by one support cable. One interior angle on the same side of the cable is 117°. Find the other same-side interior angle.

WORK SPACE

ANSWER

3 Establish the triangle angle-sum fact with an informal argument, not just a numerical example. Your teacher supplies paper, a straightedge and a protractor. Draw any triangle ABC with C above base AB. Through C draw line EF parallel to AB, with E to the left and F to the right. Mark angle ECA and angle BCF. Explain why they match angles CAB and ABC, using alternate interior angles. The three adjacent angles ECA, ACB and BCF form a straight angle: use this to explain why the interior angles of your triangle total 180°. Attach your labeled drawing and a three- or four-sentence argument.

WORK SPACE

ANSWER

CHALLENGE One step up

Triangle ABC has an exterior angle of 137° at C and m∠A = 59°. Triangle DEF has m∠D = 59° and m∠E = 78°. Are the triangles similar? Explain using angle facts and give the matching vertices.

WORK SPACE AND ANSWER

ANSWER KEY

Angle Detective Lab

GRADE 8 · NY-8.G.5

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find m∠B in the triangle.	**m∠B = 53°**
2	In triangle ABC, A, C and D are collinear with C between A and D. Exterior angle BCD is 112°. If m∠A = 49°, find m∠B.	**m∠B = 63°**
3	Two remote interior angles of a triangle measure 39° and 71°. Find the exterior angle at the third vertex.	**110°**
4	Lines l and m are parallel and are cut by transversal t. One angle measures 124°. What is the measure of its alternate interior angle?	**124°**
5	Two same-side interior angles formed by parallel lines and a transversal measure (x + 17)° and (3x + 3)°. Find x.	**x = 40**
6	Triangle ABC has m∠A = 52° and m∠B = 74°. Triangle DEF has m∠D = 52° and m∠E = 74°. Are the triangles similar? If so, give the matching vertices.	**Yes. Triangle ABC is similar to triangle DEF, with A ↔ D, B ↔ E, and C ↔ F.**

PART 2 · APPLY IT

1. **63°** Add the two known interior angles: 38° + 79° = 117°. Subtract from 180° to get 63°.
2. **63°** Same-side interior angles formed by parallel lines are supplementary. Compute 180° - 117° = 63°.
3. **Because EF is parallel to AB, angle ECA equals angle CAB and angle BCF equals angle ABC. Angles ECA, ACB and BCF together form a straight angle of 180°. Replacing the two outer angles with the equal base angles establishes A+B+C=180°.** Check the parallel line through C, correct angle correspondences and the straight-angle reasoning. The conclusion must follow from the relationships, not only from measuring one triangle or repeating the rule box. Since the argument does not depend on any particular numerical angles, it applies to any nondegenerate triangle. Provide drawing instruments; a supported informal explanation is sufficient.

CHALLENGE

Yes. The exterior angle of 137° equals m∠A + m∠B, so m∠B = 78°. The triangles have two matching angles, 59° and 78°, so triangle ABC is similar to triangle DEF by AA, with A ↔ D, B ↔ E, and C ↔ F.

Accept angle measures written with or without the degree symbol. For similarity items, accept an equivalent correctly ordered similarity statement that preserves the vertex correspondence. Apply 3 requires the labeled parallel-line drawing and an actual argument establishing the sum, with alternate-interior equalities and the straight angle explicitly linked.