LESSON MAKER PRO

Angle Detective Lab

Use triangle and parallel-line facts to solve angle puzzles.

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..."

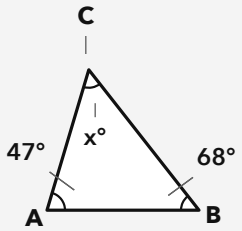
NAME _____ DATE _____

ANGLE FACTS

The interior angles of every triangle add to 180°, and an exterior angle equals the sum of its two remote interior angles. When parallel lines are cut by a transversal, corresponding and alternate interior angles are equal, while same-side interior angles add to 180°; two pairs of equal angles prove triangles are similar by AA.

WORKED EXAMPLE

Use the figure. Find x.

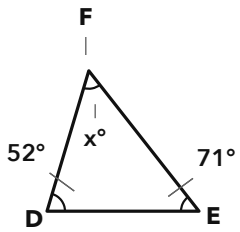


1. The three interior angles of a triangle add to 180°.
2. 47° + 68° + x = 180°.
3. x = 180° - 115° = 65°.

Answer: x = 65°

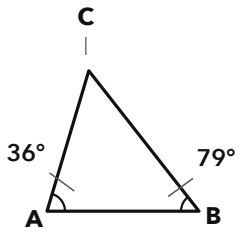
PRACTICE 6 problems

1 Use the figure. Find x.



ANSWER _____

2 In the shown triangle, A=36° and B=79°. Extend AC past C. Find the exterior angle between that extension and CB.



ANSWER _____

3 Two parallel lines are cut by a transversal. An angle and its corresponding angle measure 118° and x°. Find x.

ANSWER _____

4 Two parallel lines are cut by a transversal. Alternate interior angles measure 73° and x°. Find x.

ANSWER _____

5 Two parallel lines are cut by a transversal. Same-side interior angles measure 26° and x°. Find x.

ANSWER _____

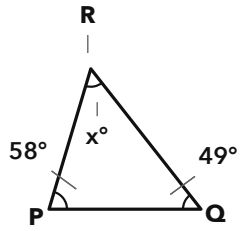
6 Triangle JKL has angles of 41° and 64°. Triangle MNP has angles of 41° and 64°. Are the triangles similar? State the criterion.

ANSWER _____

_____

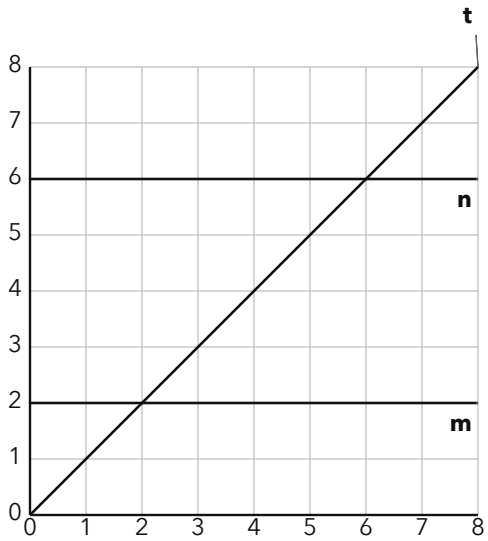
APPLY IT Show your work

1 A game design club makes a triangular pennant for its tournament booth. Use the figure to find x, the third interior angle of the pennant.



ANSWER _____

2 For a street-art design, the figure shows parallel borders m and n cut by line t. The obtuse angle above m and left of t is 135°. Find x, the obtuse angle above n and left of t.



ANSWER _____

CHALLENGE One step up

Triangle RST has angles of 2x + 8°, x + 16°, and 3x + 6°. Find x and the exterior angle adjacent to the 3x + 6° angle. Explain how the exterior angle is related to the two remote interior angles. Then establish the exterior-angle relationship for any triangle: call its two remote interior angles a and b, the adjacent interior angle c, and the exterior angle e. Draw a triangle with one side extended. Write the triangle-sum and straight-angle equations, and use them to explain why e=a+b. Use extra paper for your drawing and argument.

WORK SPACE AND ANSWER

ANSWER KEY

Angle Detective Lab

GRADE 8 · 8.G.A.5

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the figure. Find x.	**x = 57°**
2	In the shown triangle, A=36° and B=79°. Extend AC past C. Find the exterior angle between that extension and CB.	**115°**
3	Two parallel lines are cut by a transversal. An angle and its corresponding angle measure 118° and x°. Find x.	**x = 118°**
4	Two parallel lines are cut by a transversal. Alternate interior angles measure 73° and x°. Find x.	**x = 73°**
5	Two parallel lines are cut by a transversal. Same-side interior angles measure 26° and x°. Find x.	**x = 154°**
6	Triangle JKL has angles of 41° and 64°. Triangle MNP has angles of 41° and 64°. Are the triangles similar? State the criterion.	**Yes. The triangles are similar by AA similarity.**

PART 2 · APPLY IT

1. **x = 73°** Add the two known interior angles: 58° + 49° = 107°. Subtract from 180° to get 73°.
2. **x = 135°** The two marked angles are corresponding angles formed by parallel lines and a transversal. Corresponding angles are equal.

CHALLENGE

x = 25; the exterior angle is 99°. It equals the sum of the remote interior angles, 58° + 41° = 99°. General argument: a+b+c=180° by the triangle angle sum, and c+e=180° because adjacent interior/exterior angles form a straight angle. Thus e=180°-c=a+b. The extended-side drawing must identify these adjacent and remote angles.

Accept equivalent equations and angle-sum reasoning. For the challenge require a valid general argument using both the triangle-sum and straight-angle relationships (or an equivalent valid geometric argument), not only repetition of the numerical sum. Check the labeled extended-side drawing. Preserve x=25 and exterior 99°.