

Angle Equation Quest

Use triangle sums and angle relationships to solve for x .

GRADE 7 • TEKS 7.11.C

7.11.C "write and solve equations using geometry concepts, including the sum of the angles in a triangle, and angle relationships."

NAME _____

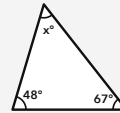
DATE _____

ANGLE RULES TO USE

The three interior angles of any triangle add to 180° . Vertical angles have equal measures, and adjacent angles that make a straight line add to 180° . Write an equation using the relationship, then solve for x .

WORKED EXAMPLE

Find x in the triangle shown.



$$1. 48 + 67 + x = 180$$

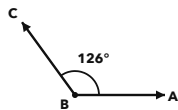
$$2. 115 + x = 180$$

$$3. x = 65$$

Answer: $x = 65^\circ$

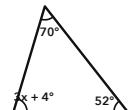
PRACTICE 6 problems

- 1** The marked angle in the figure and angle x form a straight line. Find x .



ANSWER _____

- 2** Find x in the triangle shown.



ANSWER _____

- 3** The interior angles of a triangle measure $x + 17^\circ$, $2x + 9^\circ$, and 64° . Find x .

ANSWER _____

- 4** Two vertical angles measure $5x - 7^\circ$ and $3x + 21^\circ$. Find x .

ANSWER _____

- 5** Two adjacent angles form a straight line. Their measures are $4x + 12^\circ$ and $2x + 18^\circ$. Find x .

ANSWER _____

- 6** An exterior angle of a triangle measures 124° . Its two nonadjacent interior angles measure $3x + 14^\circ$ and $2x + 10^\circ$. Find x .

ANSWER _____

APPLY IT Show your work

- 1** For a robotics club display, Maya designs a triangular support with interior angles measuring $4x + 8^\circ$, $3x + 10^\circ$, and 36° . Find x and the measure of each angle.

WORK SPACE

ANSWER _____

- 2** At a school concert, a stage-light beam splits a straight overhead line into two adjacent angles. The angles measure $7x - 5^\circ$ and $5x + 17^\circ$. Find x and both angle measures.

WORK SPACE

ANSWER _____

CHALLENGE One step up

In a triangle, two interior angles measure $2x + 10^\circ$ and $x + 20^\circ$. The exterior angle at the third vertex measures $5x - 6^\circ$. Find x . Explain why the equation you use is true.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The marked angle in the figure and angle x form a straight line. Find x .	$x = 54^\circ$
2	Find x in the triangle shown.	$x = 18$
3	The interior angles of a triangle measure $x + 17^\circ$, $2x + 9^\circ$, and 64° . Find x .	$x = 30$
4	Two vertical angles measure $5x - 7^\circ$ and $3x + 21^\circ$. Find x .	$x = 14$
5	Two adjacent angles form a straight line. Their measures are $4x + 12^\circ$ and $2x + 18^\circ$. Find x .	$x = 25$
6	An exterior angle of a triangle measures 124° . Its two nonadjacent interior angles measure $3x + 14^\circ$ and $2x + 10^\circ$. Find x .	$x = 20$

PART 2 • APPLY IT

- $x = 18$; the angles are 80° , 64° , and 36° .** Add the three angle expressions and set the sum equal to 180. Solve $7x + 54 = 180$, then substitute $x = 18$ into each expression.
- $x = 14$; the angles are 93° and 87° .** The adjacent angles form a straight line, so their sum is 180. Solve $12x + 12 = 180$, then substitute $x = 14$.

CHALLENGE

$x = 18$. The exterior angle equals the sum of the two nonadjacent interior angles, so $5x - 6 = (2x + 10) + (x + 20)$.

Accept equivalent equations and correct angle measures with degree symbols optional. For the challenge, accept an explanation that the exterior angle equals the sum of the two nonadjacent interior angles.