

Angle Equation Quest

Use angle facts to solve for x .

GRADE 7 • 7.GSR.5.3

7.GSR.5.3 "Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve equations for an unknown angle in a figure."

NAME _____

DATE _____

ANGLE FACTS

Vertical angles have equal measures. Adjacent angles share a side, and they add to 90° when complementary or 180° when supplementary.

WORKED EXAMPLE

Vertical angles measure $6x + 8$ and $2x + 32$. Find x and the angle measure.

1. Set vertical angles equal: $6x + 8 = 2x + 32$.
2. Subtract $2x$: $4x + 8 = 32$.
3. Subtract 8: $4x = 24$.
4. $x = 6$, so $6(6) + 8 = 44^\circ$.

Answer: $x = 6$; each angle = 44°

PRACTICE 5 problems

- 1** Two vertical angles measure $5x - 7$ and $3x + 21$. Find x and the angle measure.

ANSWER _____

- 2** A linear pair measures $13x + 7$ and $5x - 7$. Find x and both angle measures.

ANSWER _____

- 3** Two adjacent complementary angles measure $5x + 15$ and $x + 3$. Find x and both angle measures.

ANSWER _____

- 4** A 112° angle and an adjacent angle measuring $5x + 3$ form a linear pair. Find x and the unknown angle.

ANSWER _____

- 5** Adjacent angles measuring $3x + 17$ and $7x - 7$ form a straight angle. Find x and both angle measures.

ANSWER _____

APPLY IT Show your work

- 1** At a skate park, a straight painted line is split by a ray into two adjacent angles. The angles measure $9x + 9$ and $3x + 27$. Find x and both angle measures.

WORK SPACE

ANSWER _____

- 2** Two light beams cross on a concert stage. One angle measures $11x - 19$, and its vertical angle measures $7x + 29$. Find x and the angle measure.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A straight angle is divided into three adjacent angles measuring $5x + 1$, $x + 7$, and $3x + 10$. Find x and all three angle measures. Explain which total you used.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Two vertical angles measure $5x - 7$ and $3x + 21$. Find x and the angle measure.	$x = 14$; each angle = 63°
2	A linear pair measures $13x + 7$ and $5x - 7$. Find x and both angle measures.	$x = 10$; angles = 137° and 43°
3	Two adjacent complementary angles measure $5x + 15$ and $x + 3$. Find x and both angle measures.	$x = 12$; angles = 75° and 15°
4	A 112° angle and an adjacent angle measuring $5x + 3$ form a linear pair. Find x and the unknown angle.	$x = 13$; unknown angle = 68°
5	Adjacent angles measuring $3x + 17$ and $7x - 7$ form a straight angle. Find x and both angle measures.	$x = 17$; angles = 68° and 112°

PART 2 • APPLY IT

- $x = 12$; angles = 117° and 63°** Add the adjacent angles because they form a straight angle: $9x + 9 + 3x + 27 = 180$. Solve for x , then substitute.
- $x = 12$; each vertical angle = 113°** Set the vertical angle measures equal: $11x - 19 = 7x + 29$. Solve for x , then substitute.

CHALLENGE

$x = 18$; angles = 91° , 25° , and 64° . The three adjacent angles total 180° because they form a straight angle.

Accept equivalent equations and angle measures listed in any order. Students may state that a linear pair or straight angle totals 180° .