

Angle Relationships and Unknown Angles

Grade 7 math · Worksheet · Standards: 7.G.B.5

Name: _____ Date: _____ Class: _____

These 20 problems cover complementary, supplementary, vertical and adjacent angles and the equations used to find an unknown angle. Standard 7.G.B.5 is the focus.

Problems 1 to 7 use single steps and diagrams. Problems 8 to 14 introduce algebraic expressions. Problems 15 to 20 are multi-step word problems from construction, roads and signs.

Standards: 7.G.B.5 · **Level:** Grade 7

Problem 1 Find the complement (easy)

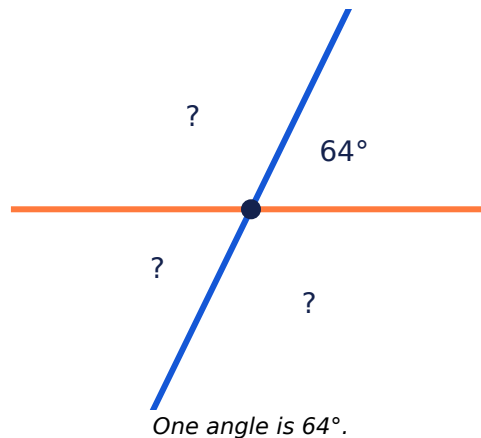
Calculate the complement of a 38° angle.

Problem 2 Find the supplement (easy)

Calculate the supplement of a 127° angle.

Problem 3 Vertical and adjacent (easy)

Two lines cross as shown. One angle measures 64° . Name the measure of the vertical angle and the measure of an adjacent angle.

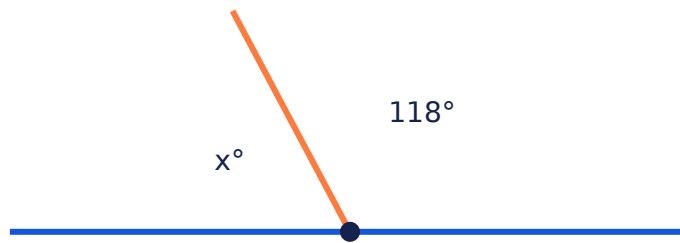


Problem 4 Complementary equation (easy)

Two complementary angles measure x° and 41° . Write an equation and solve for x .

Problem 5 Straight line equation (easy)

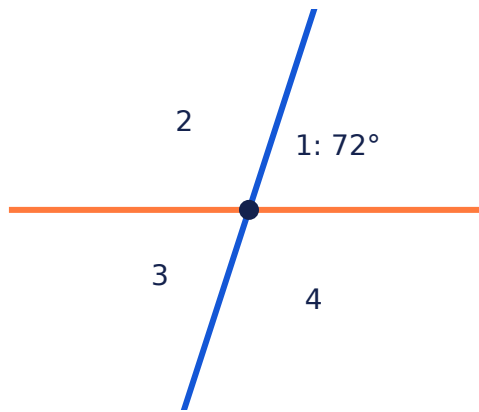
The angles in the diagram lie on a straight line. Solve for x .



Angles on a line.

Problem 6 Four angles at a crossing (easy)

Lines cross and $\angle 1 = 72^\circ$. Find $\angle 2$, $\angle 3$ and $\angle 4$.



Angle 1 is 72° .

Problem 7 Classify the pairs (easy)

Classify each pair of angle measures as complementary, supplementary, or neither. (a) 68° and 22° , (b) 99° and 81° , (c) 45° and 135° , (d) 30° and 50° .

Problem 8 Triple angle (medium)

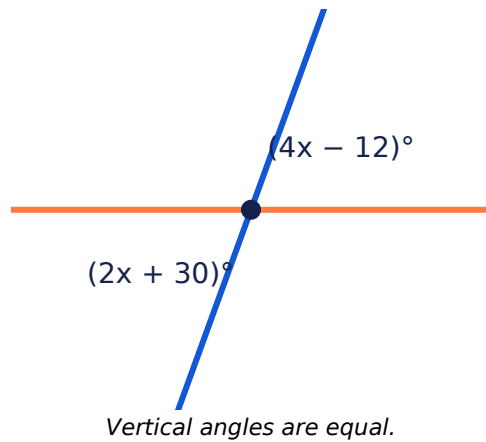
Two supplementary angles are such that the larger is 3 times the smaller. Find both angles.

Problem 9 Complementary expressions (medium)

Two complementary angles measure $(2x + 4)^\circ$ and $(x + 17)^\circ$. Find x and both angles.

Problem 10 Vertical angle expressions (medium)

In the figure, the vertical angles measure $(4x - 12)^\circ$ and $(2x + 30)^\circ$. Find x and the angle measure.



Problem 11 Linear pair expressions (medium)

A linear pair has angle measures $(6x - 5)^\circ$ and $(4x + 15)^\circ$. Find x and both angles.

Problem 12 Less than its complement (medium)

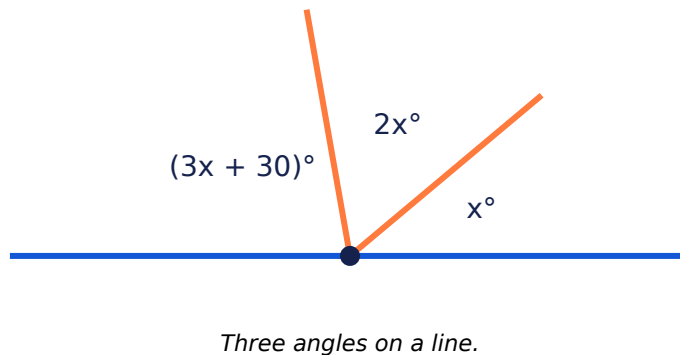
An angle measures 24° less than its complement. Find the angle.

Problem 13 More than its supplement (medium)

An angle measures 30° more than its supplement. Find the angle.

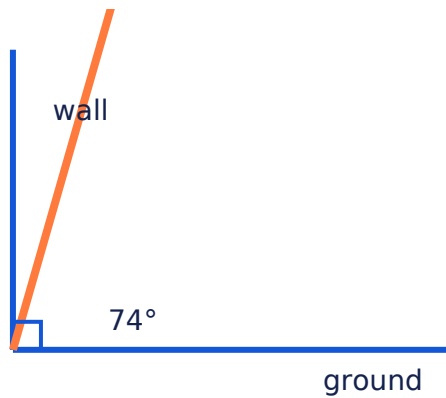
Problem 14 Three angles on a line (medium)

Three angles lie on a straight line as shown. Solve for x and find each angle.



Problem 15 Leaning ladder (hard)

A ladder leans against a vertical wall and makes a 74° angle with the level ground, as shown. Find the angle between the ladder and the wall, and the angle on the other side of the ladder with the ground.



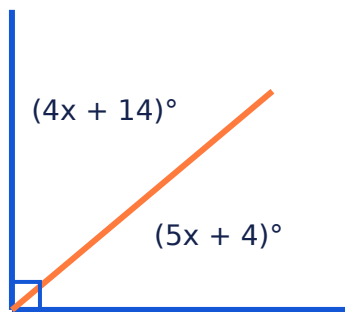
A ladder, a wall and the ground.

Problem 16 Crossing roads (hard)

Two straight roads cross. One angle is $(3x + 15)^\circ$ and the angle vertical to it is $(5x - 25)^\circ$. Find x , then all four angles at the crossing.

Problem 17 Split right angle (hard)

A laser beam OB splits a right-angle corner $\angle AOC$ into $\angle AOB = (5x + 4)^\circ$ and $\angle BOC = (4x + 14)^\circ$. Find x and both angles.



A right angle split by ray OB .

Problem 18 Supplement versus complement (hard)

Mia says that her mystery angle has a supplement four times as large as its complement. Set up an equation in one variable and find the mystery angle.

Problem 19 Bridge cables (hard)

Two steel cables on a bridge cross at a point. One angle between them is $(7x - 4)^\circ$ and the adjacent angle is $(2x + 13)^\circ$. Find x and all four angles.

Problem 20 Sign board angle (hard)

A sign board is attached to a vertical post. The board makes an angle of $(4x + 3)^\circ$ with the horizontal ground line, and the angle between the board and the post is $(x + 12)^\circ$. Find x and both angles.