

Grade 7 - Angle Relationships and Equations - Lesson

Common Core 7.G.B.5 · maths-pdf.fr/en/

Two angles are **complementary** if their measures add up to 90 degrees and **supplementary** if they add up to 180 degrees. Angles on a straight line are **supplementary**, and **vertical angles**, which are opposite each other where two lines cross, are equal. You can write and solve a simple equation to find an unknown angle.

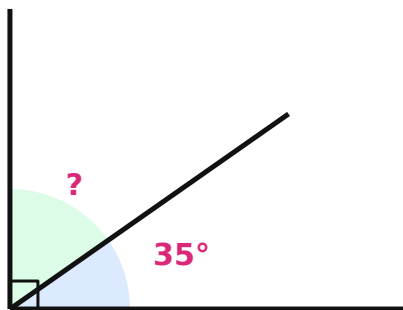
Grade 7 · Common Core State Standards: **7.G.B.5**

Key facts

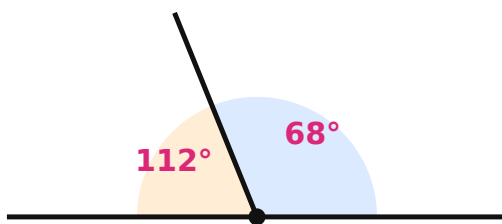
- Complementary angles add to 90° ; supplementary angles add to 180° .
- Angles on a straight line add to 180° ; angles around a point add to 360° .
- Vertical angles are equal.
- Adjacent angles share a vertex and a side.
- Write an equation from the relationship, solve it, and check the sum.

What are complementary and supplementary angles?

Two angles are **complementary** if their measures add up to 90° . Two angles are **supplementary** if their measures add up to 180° .



Complementary angles add up to 90° . Here $35^\circ + 55^\circ = 90^\circ$.

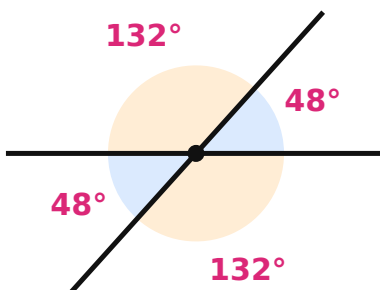


Supplementary angles add up to 180° . A straight line forms a linear pair: $68^\circ + 112^\circ = 180^\circ$.

If one angle is 35° , its complement is $90 - 35 = 55^\circ$. If one angle is 112° , its supplement is $180 - 112 = 68^\circ$. A straight line makes 180° , and two angles that share a side and form a straight line are a **linear pair**.

What are vertical angles?

When two lines cross, they make four angles. Angles that are across from each other are **vertical angles**, and vertical angles are always equal.

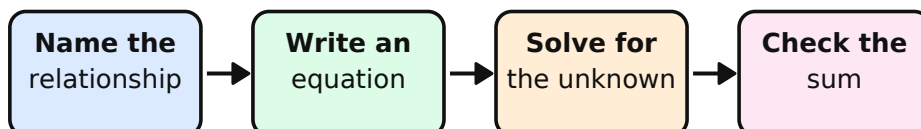


Vertical angles are opposite each other and equal: 48° and 48° , 132° and 132° .

Adjacent angles

Adjacent angles share a vertex and a side but do not overlap. Adjacent angles on a straight line are supplementary, and adjacent angles in a right angle are complementary.

How do you write an equation for an unknown angle?



Choose the equation from the relationship.

1. Decide the relationship: sum of 90, sum of 180, equal, or sum of 360 around a point.
2. Write an equation using the angle expressions.
3. Solve it with inverse operations.
4. Substitute to find each angle and check the sum.

Example. Two supplementary angles measure $(3x+10)^\circ$ and $(x+30)^\circ$. Then $3x+10+x+30=180$, so $4x+40=180$, which gives $x=35$. The angles are 115° and 65° , and $115+65=180$.

Angles around a single point add up to 360° . Three angles on a straight line add up to 180° . Use these facts to find unknown angles in any diagram, and always check that your answers make sense: an angle in a picture that looks acute cannot be 120° .

Questions about angle relationships and equations

What is the difference between complementary and supplementary angles?

Complementary angles add up to 90° and supplementary angles add up to 180° . A way to remember: C comes before S, and 90 comes before 180.

What are vertical angles?

Vertical angles are the angles opposite each other when two lines cross. They have the same measure.

How do you find the supplement of an angle?

Subtract the angle from 180. The supplement of 112° is $180-112=68^\circ$.

Are adjacent angles always supplementary?

No. Adjacent angles are supplementary only when together they form a straight line. Adjacent angles in a right angle are complementary.

How do I solve for x in an angle problem?

Write an equation that matches the relationship, such as $x+65=90$, and solve it with inverse operations. Then check that the angles add up correctly.