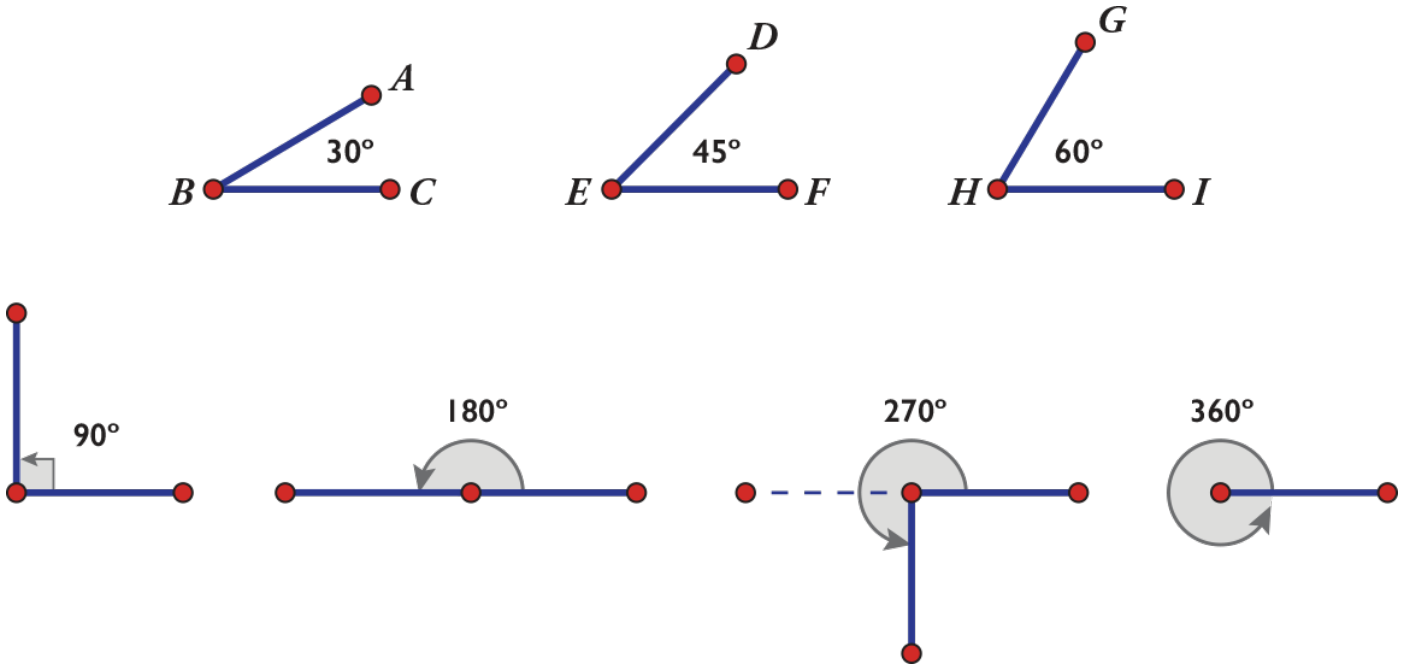
# Angles: Types

An angle is a figure consisting of two rays (or a ray and a line segment) that extend from a single point.

The size of an angle is measured in degrees (°). Here are some examples:

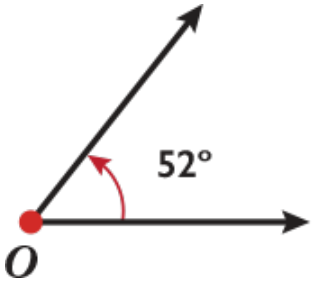
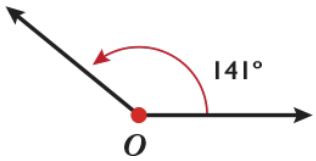
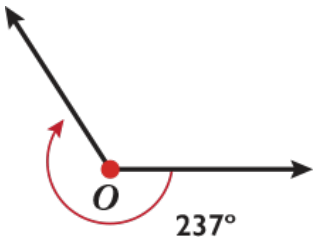
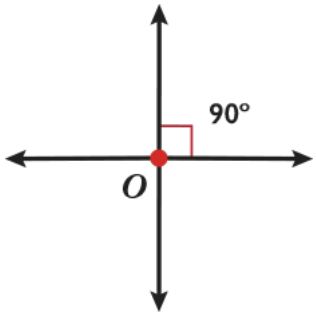
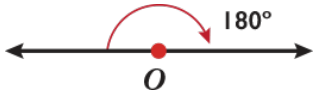
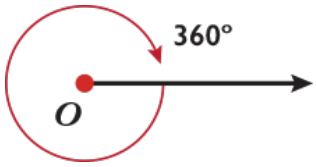



Angles are named by using the angle sign, ∠, and letters to indicate three points on the angle: one point on each side and one point at the vertex. The first two angles shown in the previous example would be $\angle ABC$ (or $\angle CBA$) and $\angle DEF$ (or $\angle FED$). The vertex point is always the middle letter, just as the vertex itself lies between the two sides.

Sometimes, if there is no possibility of confusion, angles are named using only the vertex point. Using this naming method, the first angle in the previous example would be named $\angle B$, the second $\angle E$, and the third $\angle H$.

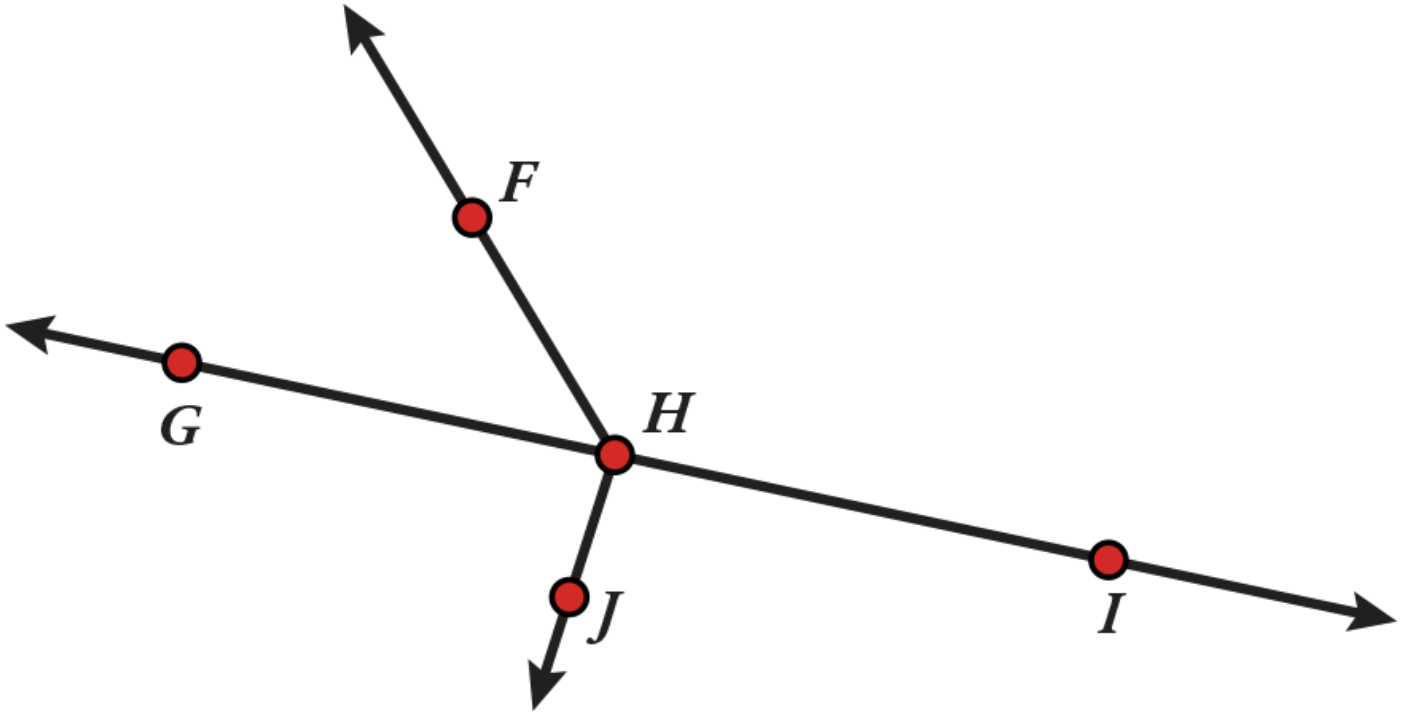
### Angle Types

Angles are classified according to their size. Different types of angles have different measures.

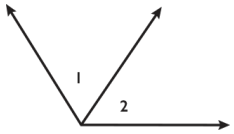
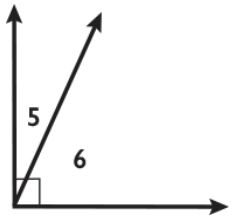
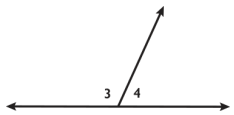
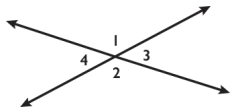
| | |
|---|---|
| Angles that measure greater than 0° and less than 90° are called ***acute angles***. |  |
| Angles that measure greater than 90° and less than 180° are called ***obtuse angles***. |  |
| Angles that measure greater than 180° and less than 360° are called ***reflex angles***. |  |
| A ***right angle*** is formed when perpendicular lines meet. Its measure is 90°. |  |
| A ***straight angle*** measures 180°. |  |
| An angle that measures 360° corresponds to a complete ***revolution*** of a ray about the vertex. |  |

## Angle Configurations

When several rays diverge from the same point, you have ***angles at a point***, meaning all the angles have the same point as their vertex. The next example shows four rays diverging from point *H*.



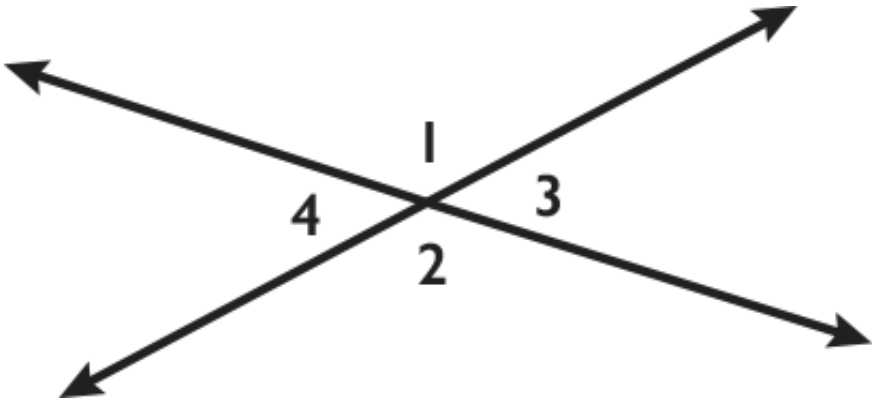

There are four special configurations of two angles that have the same vertex.

| | |
|---|---|
| ***Adjacent angles*** are angles that share a side. In the diagram, ∠1 and ∠2 are adjacent angles. There are two special cases of adjacent angles: complementary angles and supplementary angles. |   |
| ***Complementary angles*** are adjacent angles with measures that add to 90°. In the diagram, ∠5 and ∠6 are complementary angles. |   |
| ***Supplementary angles*** are adjacent angles with measures that add to 180°. In the diagram, ∠3 and ∠4 are supplementary angles. |   |
| ***Vertical angles*** are angles that lie "opposite" of the same vertex. In the diagram, ∠1 and ∠2 represent a pair of vertical angles. Similarly, ∠3 and ∠4 represent a pair of vertical angles.<br><br>The measures of vertical angles are equal to each other; thus, ∠1 = ∠2 and ∠3 = ∠4. |   |

## Solving Problems With Angles

You can use facts about supplementary, complementary, vertical, and adjacent angles to write and solve simple equations for an unknown angle in a figure.

For example, consider this figure:




Suppose you know that m∠1 = 135°. You can determine the measures of the other three angles using this information.

- ∠1 and ∠3 are adjacent angles. They are also supplementary angles because they lie on a straight line, and thus their sum must be 180°. To find the measure of ∠3, you can write this equation:

∠3 = 180° – 135°

Thus, ∠3 = 45°.

- ∠3 and ∠4 are vertical angles. They lie opposite the same vertex. Because you know that vertical angles are equal, you know that ∠4 = 45°.
- ∠2 and ∠4 are supplementary angles. You have already determined that ∠4 = 45°. To find the measure of ∠2, you can write this equation:

∠2 = 180° – 45°

Thus, ∠2 = 135°.