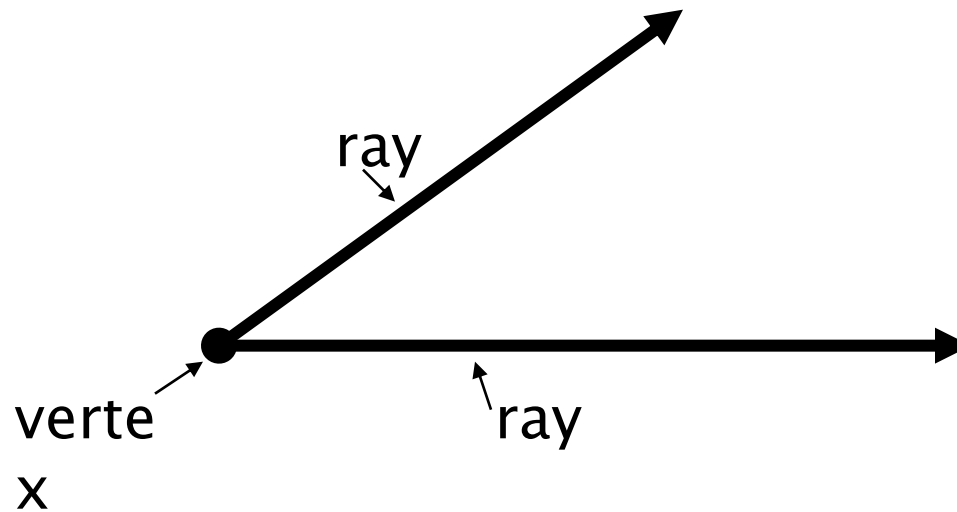


Angle

Department of Mathematics Education
Faculty of Mathematics and Science YSU
2014

Angle

An *angle* is a shape formed by two rays or two segments with a common endpoint; contains two rays (segments) and a vertex



Naming an Angle

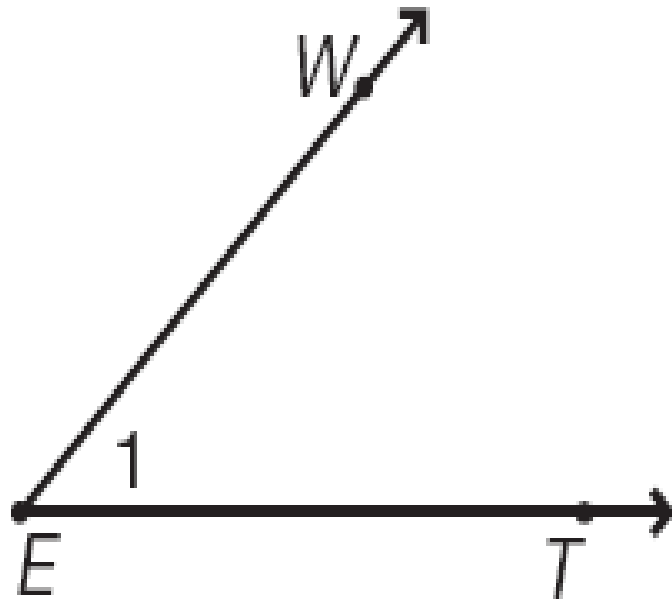
An angle can be named in different ways. An angle may be named in any of the following ways:

- ❑ With the vertex letter, if there is only one angle having this vertex
- ❑ With a small letter placed between the sides of the angle and near the vertex
- ❑ With a number placed between the sides of the angle and near the vertex if it is not the angle measurement
- ❑ With three capital letters, such that the vertex letter is between two others, one from each sides of the angle

Naming an Angle

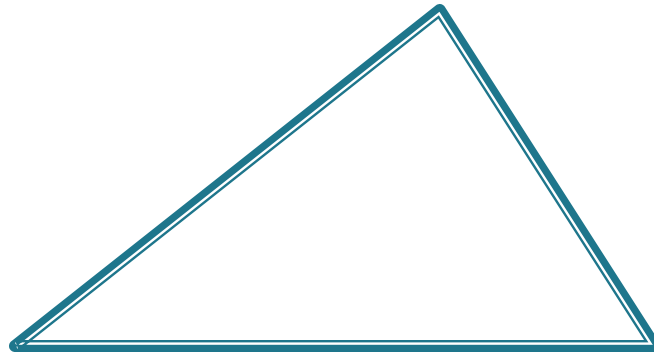
The angle in above can be named with any one of these names:

$\angle WET$, $\angle TEW$, $\angle E$, or $\angle 1$



Interior Angles

- An interior angle (or internal angle) is an angle formed by two sides of a simple polygon that share an endpoint.



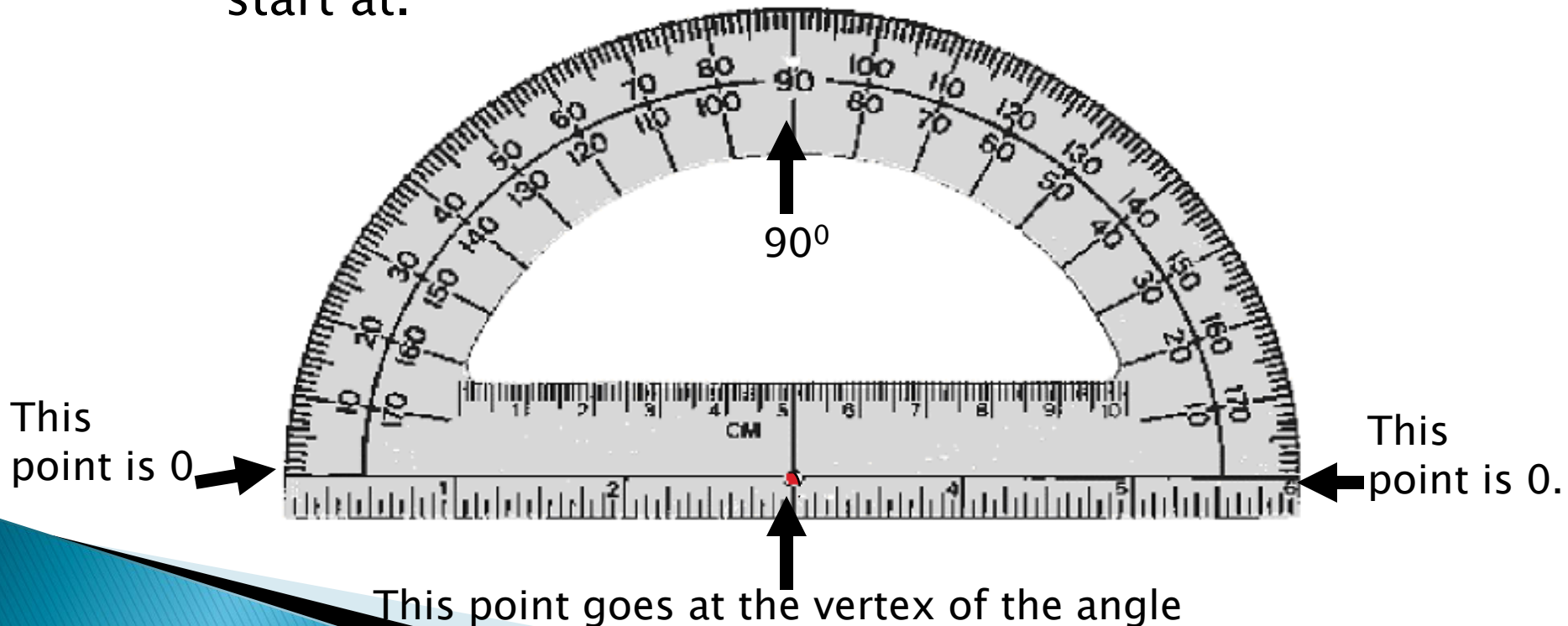
Measuring an Angle

- ❑ The size of an angle depends on the extent to which one side of the angle must be rotate, or turned about the vertex, until it meets the other side.
- ❑ We choose degrees to be the unit of measure for angles. The measure of an angle is the number of degrees it contains.
- ❑ We will write $m\angle A = 60^\circ$ to donate that “angle A measures 60° . The size of an angle does not depend on the length of the side of the angle.

Measuring an Angles

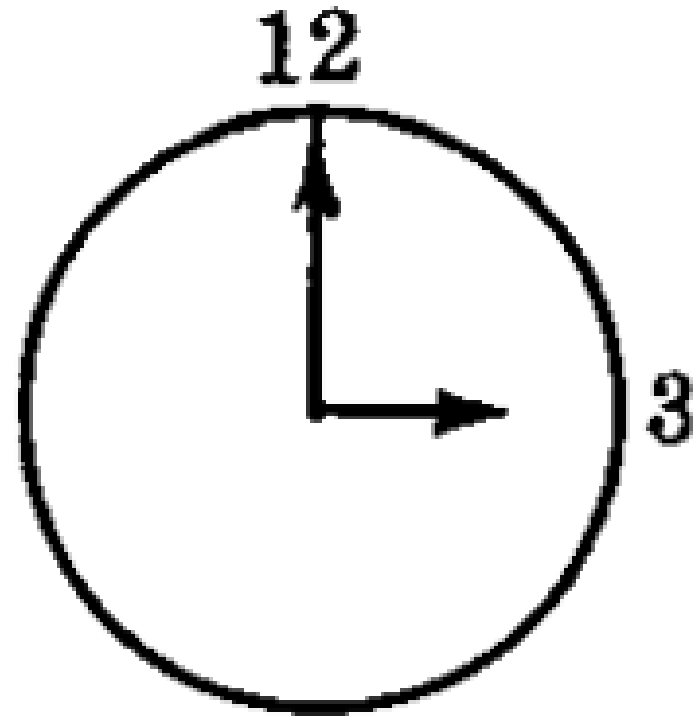
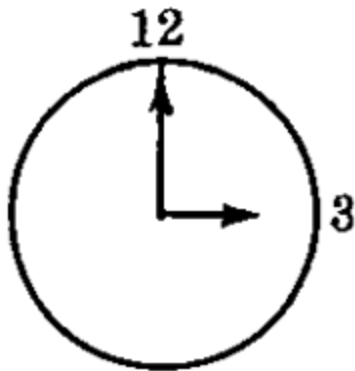
- We can measure an angles with a **protractor**.

Notice there are two scales. Be careful which 0 you start at.



Measuring an Angle

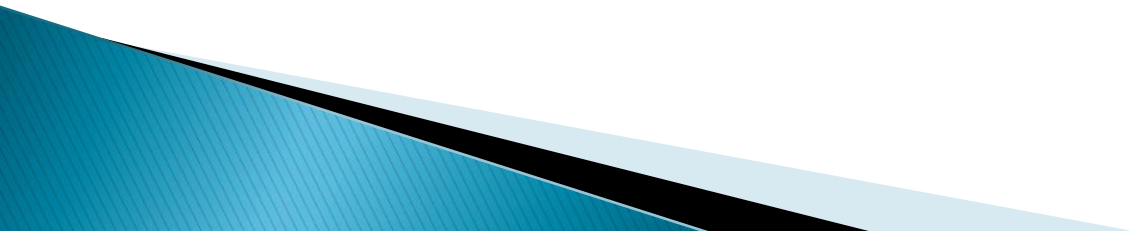
- No matter how large or small a clock is, the angle formed by its hands at 3 o'clock measures 90° , as shown below.



Measuring an Angle

- Angles that measure less than 1° are usually represented as fraction or decimals. For example, one-thousandth of the way around a circle is either $360^\circ/1000$ or 0.36° .
- In some fields, such as navigation and astronomy, small angle are measured in minutes and seconds. One degree is comprised of 60 minutes, written $1^\circ = 60'$.
- A minute is 60 seconds, written $1' = 60''$. In this notation, one-thousandth of a circle is $21'36''$ because $21/60 + 36/3600 = 360/1000$

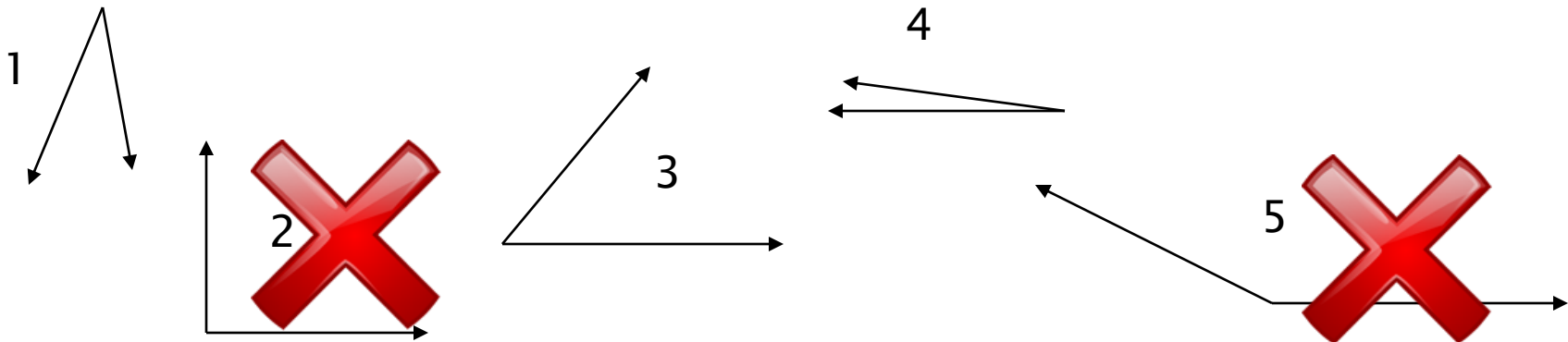
Types of Angle



Acute Angle

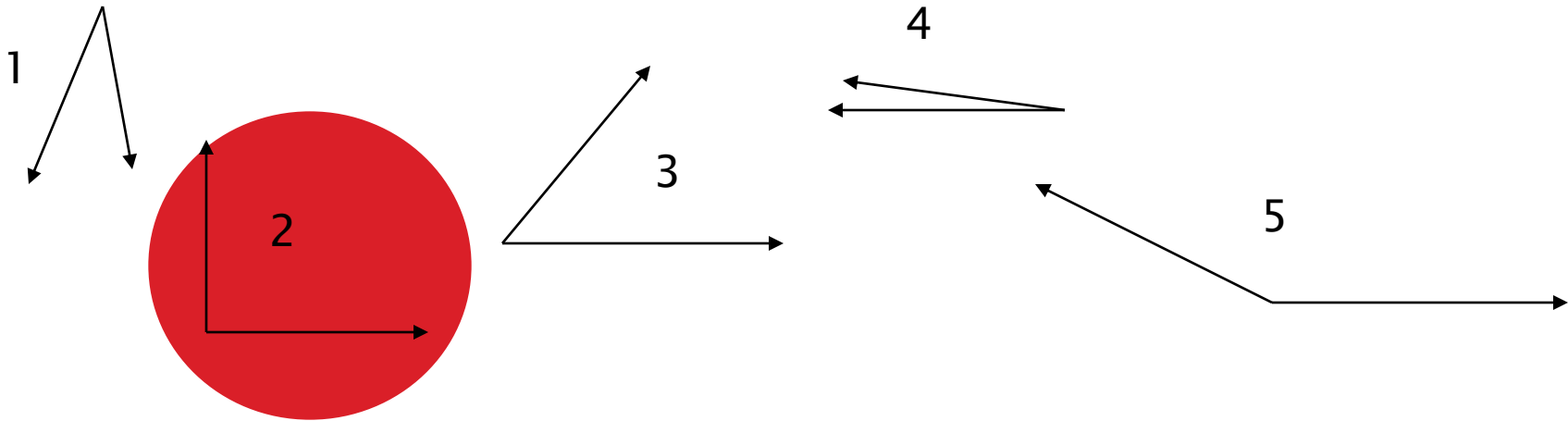
Acute angle: An angle whose measure is greater than zero degrees and less than 90 degrees

Which angles are **not** acute?



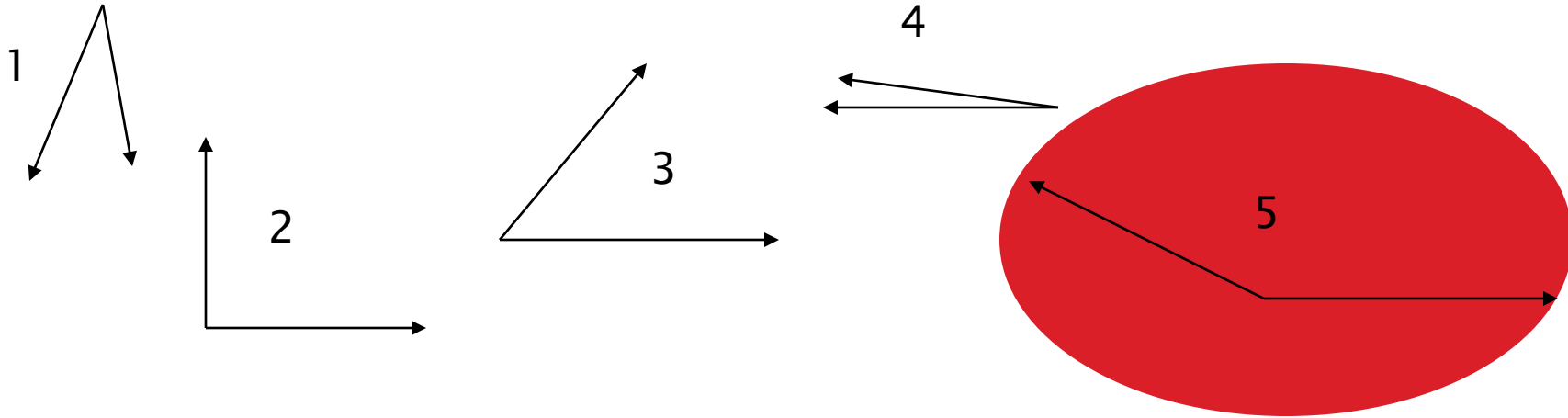
Right Angle

- ❑ **Right angle:** Angle that measures 90 degrees
- ❑ Which angle is a right angle?



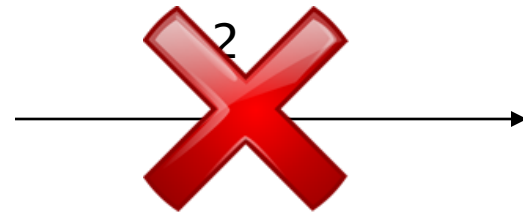
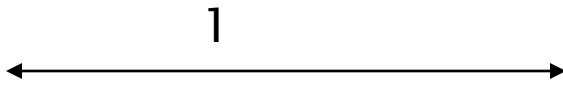
Obtuse Angle

- ❑ **Obtuse angle:** One angle measures greater than 90 degrees and less than 180 degrees
- ❑ Which angle is an obtuse angle?



Straight Angle

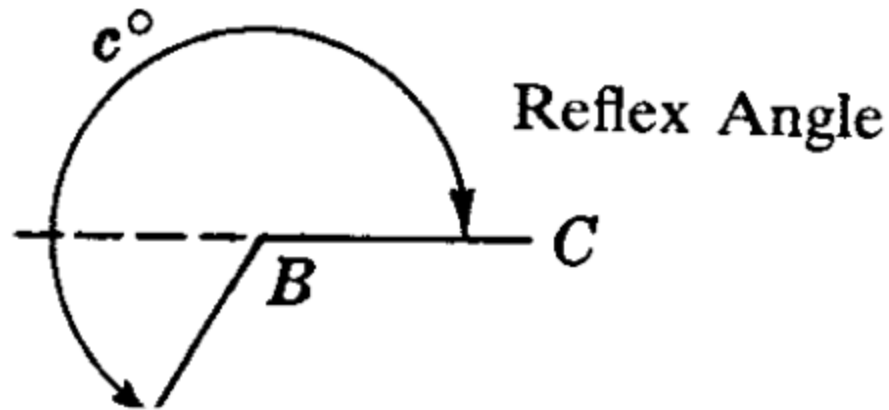
- ❑ **Straight angle:** A line that goes infinitely in both directions and measures 180 degrees
- ❑ Which is **not** a straight angle?



This is a ray. It only goes in one direction.

Reflex Angle

- ❑ *Reflex angle.* A reflex angle is an angle whose measure is more than 180 degrees and less than 360 degrees



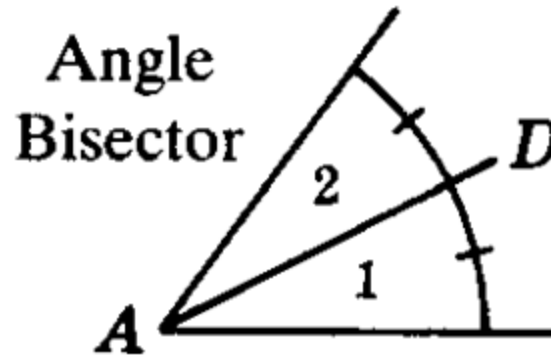
Congruent Angle

- *Congruent angles.* Congruent angles are angles that have the same number of degrees.

In other words, if $m\angle A = m\angle B$ then $\angle A \cong \angle B$

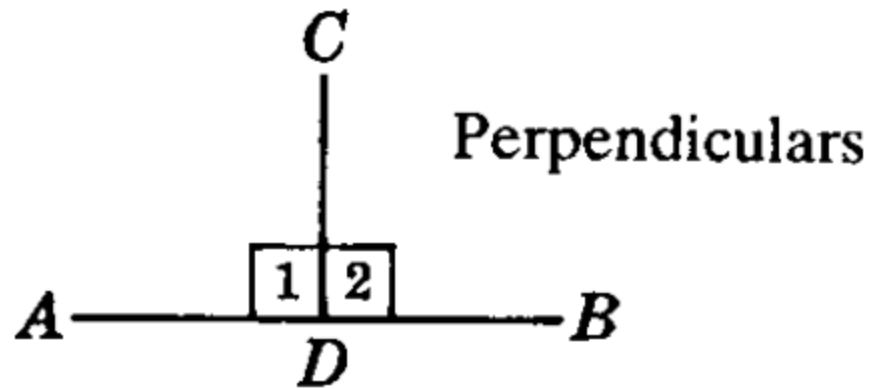
Angle Bisector

- *Angle bisector.* An angle bisector is a line that bisects an angle divides it into two congruent parts.



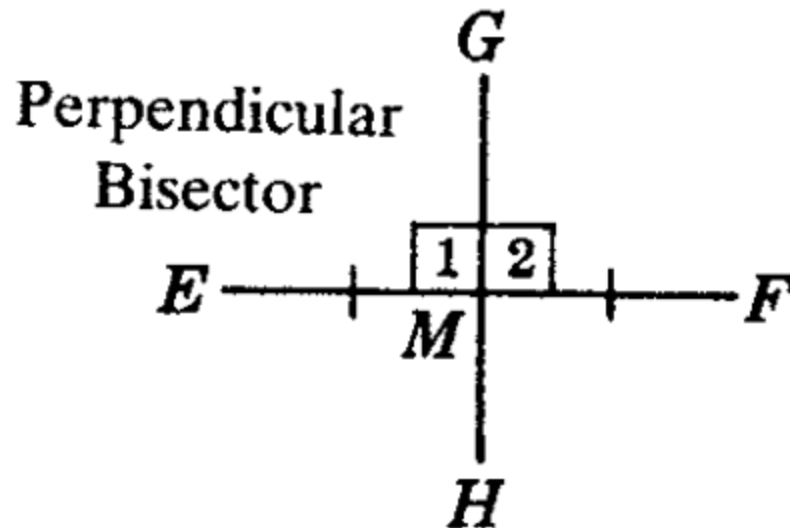
Perpendicular

Perpendicular lines or rays or segments that meet at right angles



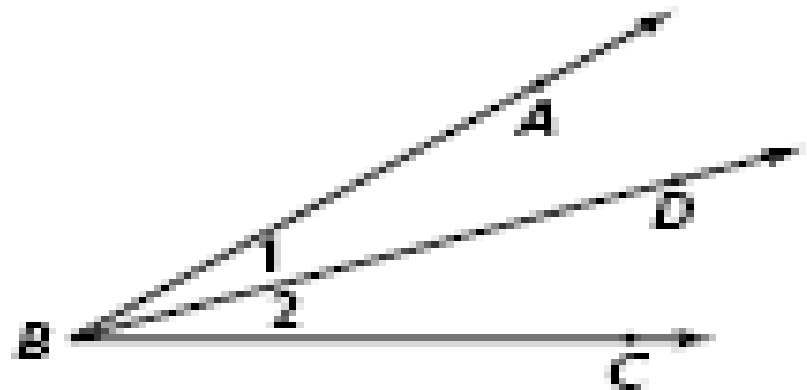
Perpendicular Bisector

A perpendicular bisector of a given segment is perpendicular to the segment and bisects it



Special Angle Pairs

- ❑ Special pairs of angles have special names based upon their positions relative to one another.
- ❑ *Adjacent angles*: two angles that share a vertex and a share a common side that separates them. In the figure below, $\angle 1$ and $\angle 2$ are adjacent angle.

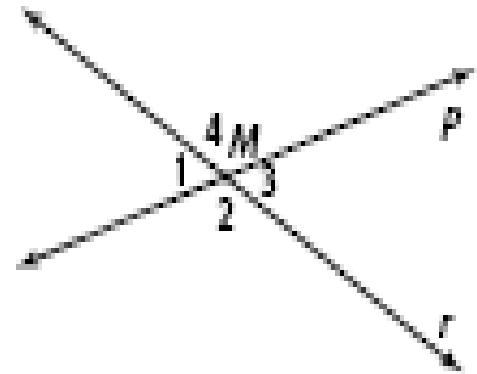


Vertical Angle

- *Vertical angles*: the angles on opposite sides of the common vertex when two lines intersect so as to form four angles. In the figure below, $\angle 1$ and $\angle 3$ are vertical angle, so $\angle 2$ and $\angle 4$.

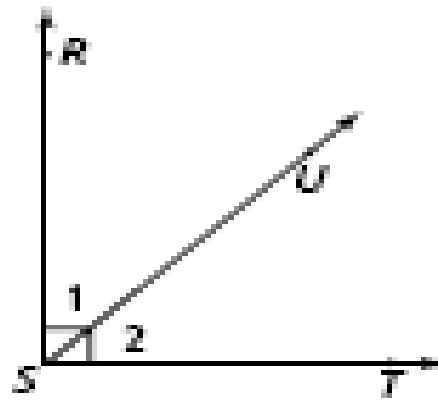
Theorem

- ▶ Vertical angles are equal in measure



Complementary Angle

Complementary angles: any two angles that add up to 90° .

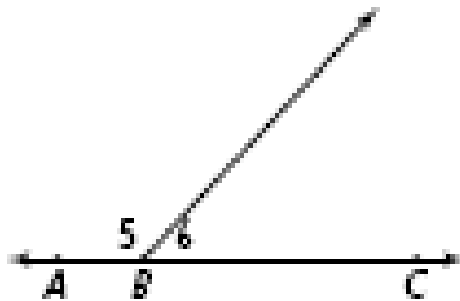


Theorem

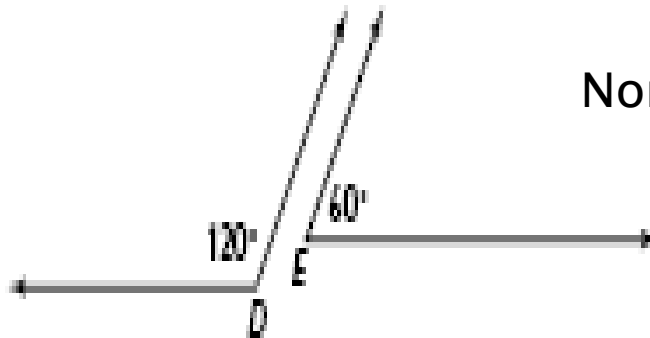
If two angles are complements of the same or equal congruent angle, they are congruent to each other

Supplementary Angle

Supplementary angles: any two angles that add up to a total of 180°



Adjacent supplementary angles



Non-Adjacent supplementary angles

Theorem

If two angles are supplements of the same or equal congruent angle, they are congruent to each other.