MEASURING AND IDENTIFYING ANGLES

To measure angles, we use a protractor which is divided into 180 units to represent 180 degrees. The protractor has two sets of numbers so that the angle may be measured from either the right or left, depending on which way the starting ray is pointing. If the starting ray is pointing to the left, read the top numbers, or if it is pointing to the right, read the bottom numbers.

Two types of angles are acute and obtuse. Acute angles measure less than 90 degrees. Obtuse angles measure more than 90 degrees and less than 180 degrees. Two special angles are the right angle, which measures exactly 90 degrees, and the straight angle which measures exactly 180 degrees.

We will measure and identify angles with a protractor. Benchmark angles will help in measuring angles. The angles serve as a guide in deciding if the measurement is reasonable.

PROPERTIES OF TRIANGLES

Triangles can be named by the size of the three angles formed at the vertices (corners) of the triangle. When classifying triangles by angles, triangles may be identified as acute, obtuse, or right triangles.

The three angles in a triangle share a special connection. The sum of the angles of a triangle adds up to 180 degrees. We will check this property and discover how and why it applies to all triangles.

Another way to identify types of triangles is classify triangles by the length of their sides. In this type of classification, triangles may be identified as scalene, isosceles, or equilateral.

Measuring and Identifying Angles
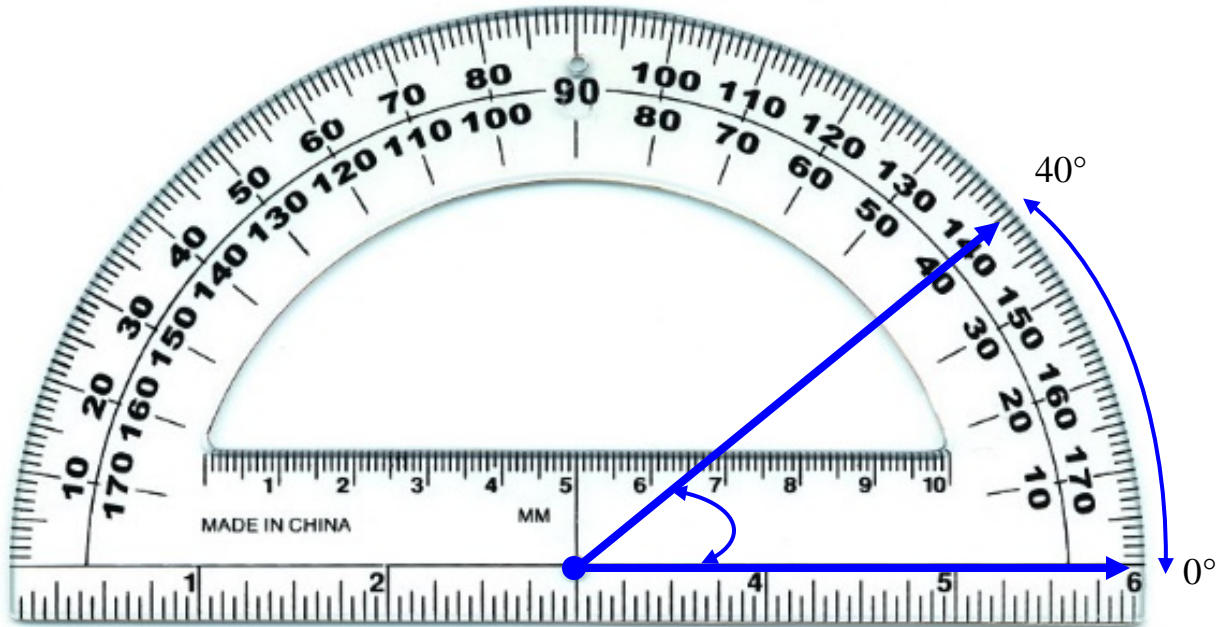
The starting ray, in this case, the bottom ray, is at 0°. Read the other ray. The ray is passing through both 40° and 140°. You must decide which number makes sense. Think about a right angle – it measures 90°. This angle is not as open as a right angle; thus, you would read the smaller number. This angle measures 40°. Notice the numbers near the bottom ray, the lower set of numbers start at 0, then 10, 20, etc. That is the set of numbers that is used to read this angle. The starting ray starts at 0°. This is an **acute angle** because it measures more than 0° and less than 90°.
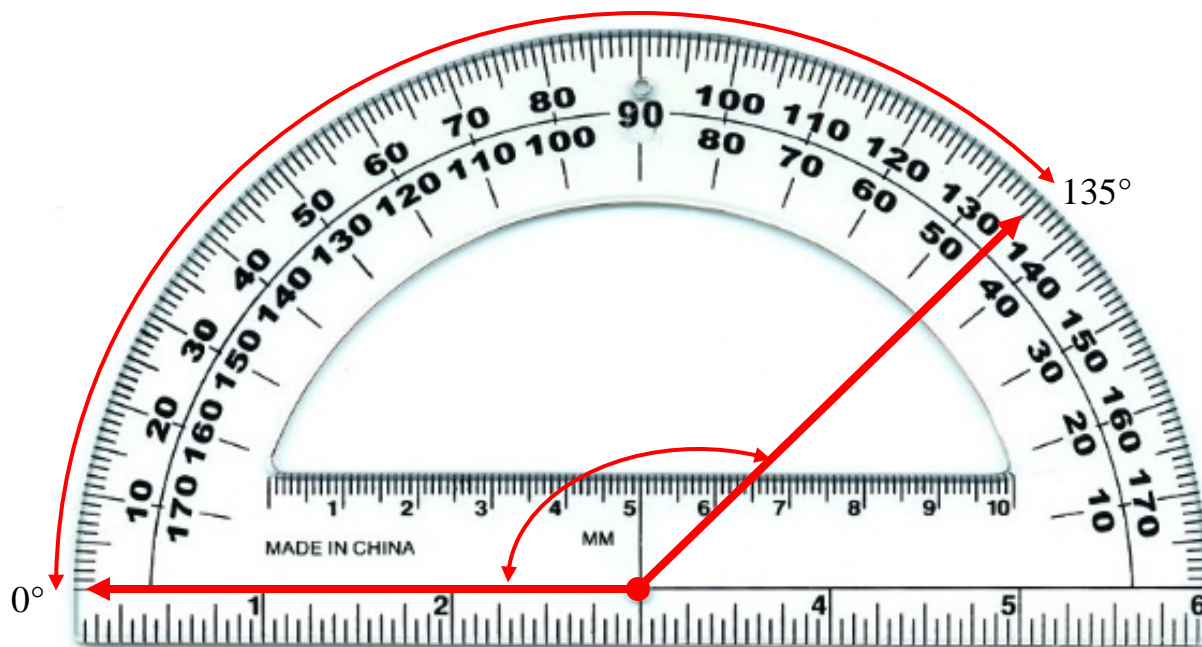
135°

0°

The starting ray, in this case, the bottom ray, is at 0°. Read the other ray. The ray is passing through both 45° and 135°. You must decide which number makes sense. Think about a right angle – it measures 90°. This angle is open wider than a right angle; thus, you would read the larger number. This angle measures 135°. Notice the numbers near the bottom ray, the upper set of numbers start at 0, then 10, 20, etc. That is the set of numbers that is used to read this angle. The starting ray starts at 0°. This is an **obtuse angle** because it measure more than 90° and less than 180°.
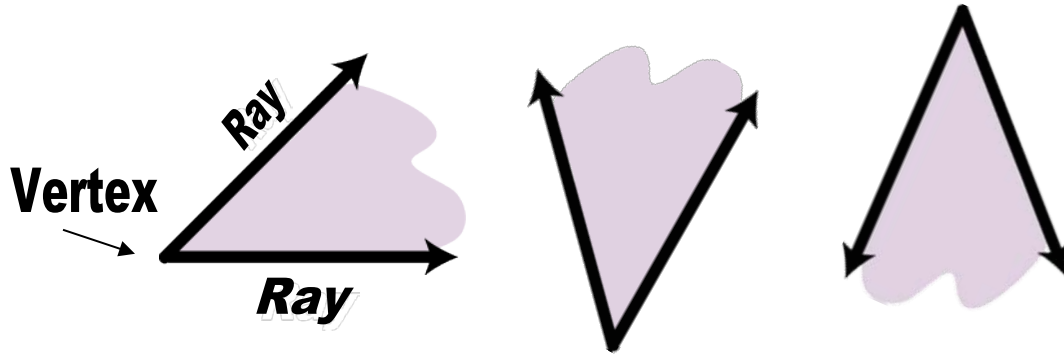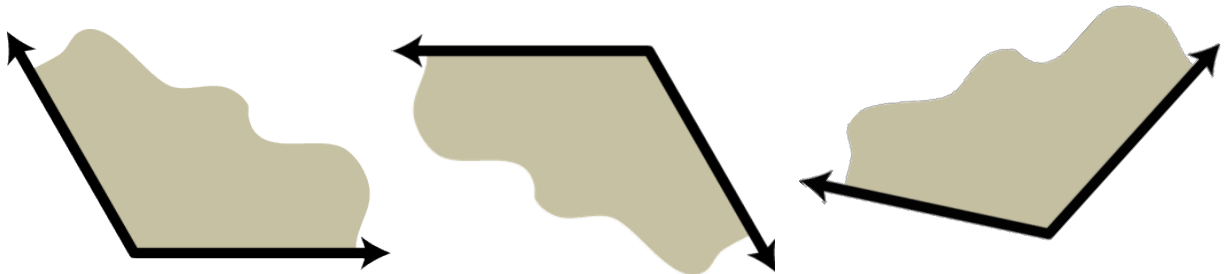
Protractor
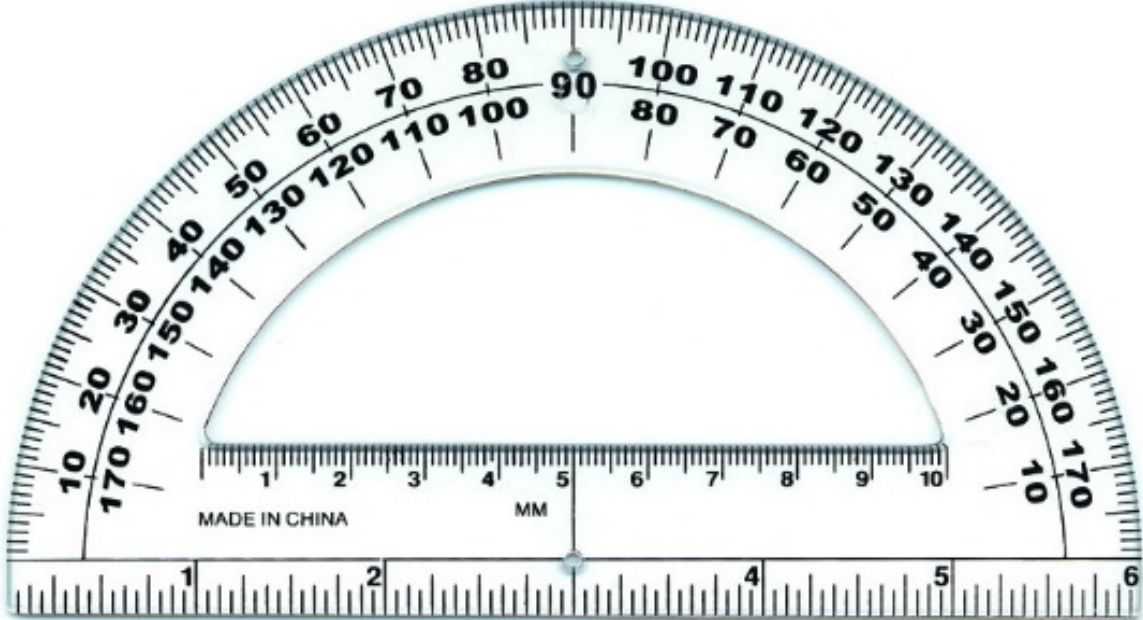
Benchmark Angles

Here are some angles to help you measure angles. Use these angles to estimate the size of the angle you are drawing.
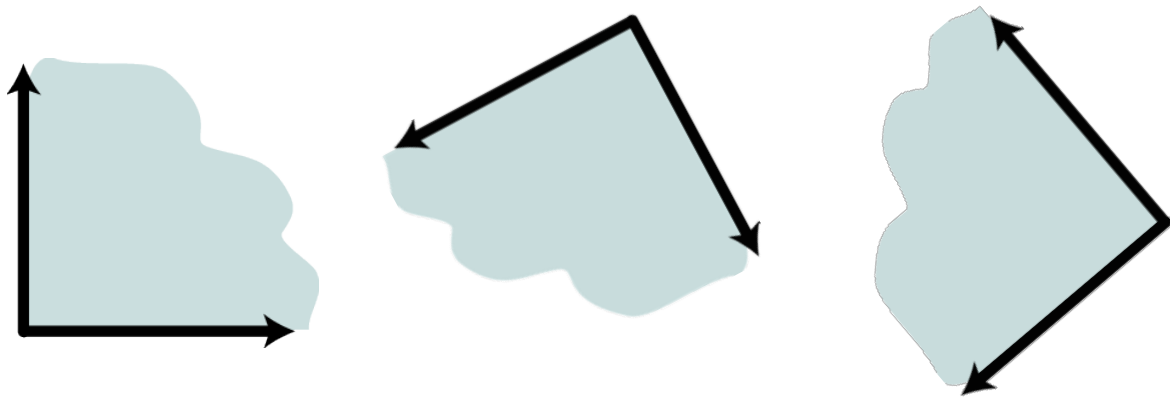
All of these angles are 45°. *The manner in which they are turned does not affect the size of the angle.* The rays form a 45° at the vertex.

Vertex

Ray

Ray

All of these angles are 120°. The rays form a 120° at the vertex.

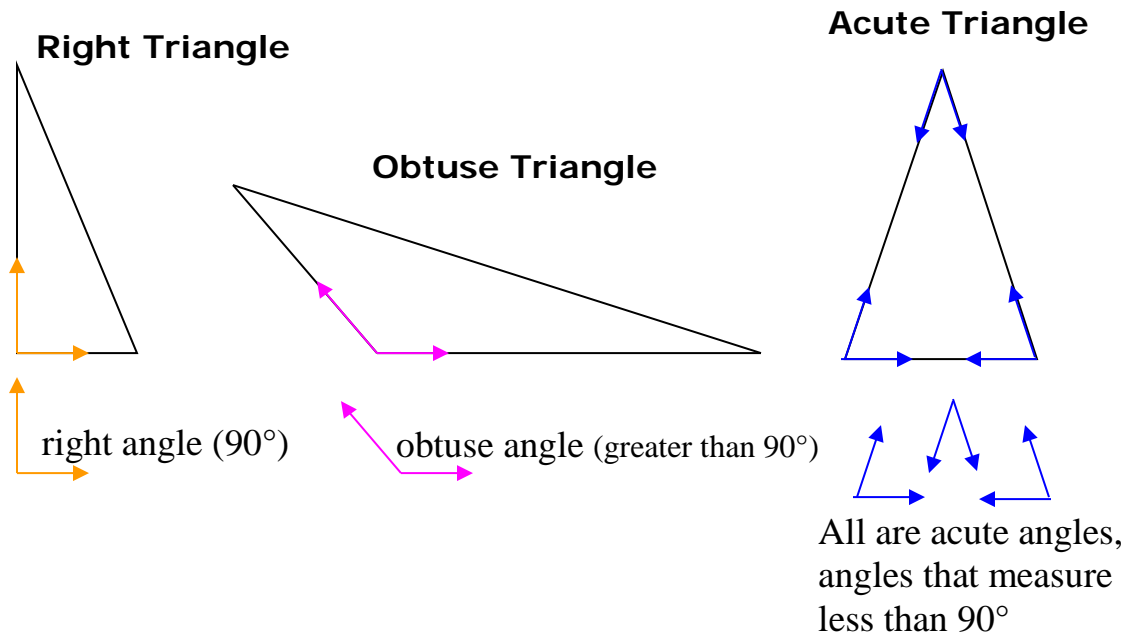All of these angles are 90°. The rays form a 90° angle at the vertex.

Classifying Triangles by Angles

A Triangle can be classified by the types of angles that are formed by its three sides.

If a triangle has one right angle, then it is called a **right triangle**.

If a triangle has one obtuse angle, then it is called an **obtuse triangle**.

If all the angles in a triangle are acute, then the triangle is called an **acute triangle**.

Right Triangle

Obtuse Triangle

Acute Triangle

right angle (90°)

obtuse angle (greater than 90°)

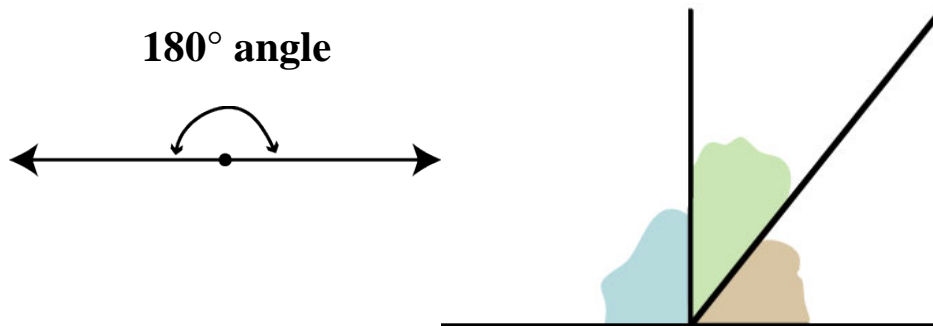All are acute angles, angles that measure less than 90°

Sum of Angles in a Triangle

Look at the angles in the triangle below. Cut the angles away from the triangle.
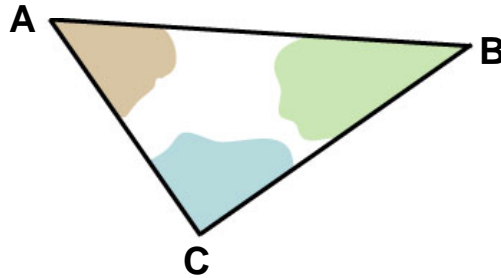
Place the angles side by side at one vertex point, so that there are no gaps between the angles.

180° angle

The three angles of the triangle together make up a 180° angle.

If the $m\angle C$ is 95° and $m\angle B$ is 40°, what would be the $m\angle A$?

$$m\angle A + m\angle B + m\angle C = 180°$$
$$x \quad + \quad 40° + \quad 95° = 180°$$

$$x \quad + \quad 135° \quad = 180$$
$$ -135 \quad\quad -135$$

$$x = 45°$$

# Classifying Triangles by Sides

Triangles can be classified by the lengths of their three sides.

If a triangle has all sides measuring different lengths, it is a **scalene triangle**.

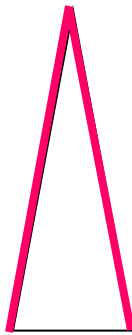If a triangle has two sides that measure the same length, it is an **isosceles triangle**.

If a triangle has all three sides measuring the same length, it is an **equilateral triangle**.
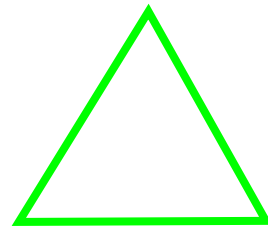
Scalene Triangle	Isosceles Triangle	Equilateral Triangle
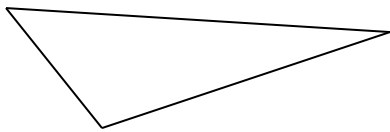
All sides are different lengths.

Two sides are the same lengths.

All three sides are the same lengths.

Practice

You will need a piece of paper to draw your answers on.

- Draw an equilateral triangle.

- Draw a quadrilateral that has 4 sides, opposite sides equal, and no sides are perpendicular.

- Draw a scalene triangle with all 3 different sides.

- Draw a quadrilateral whose diagonals bisects each other at right angles with all sides equal in length and opposite sides are parallel.

Click [here](#) to create geometric shapes.