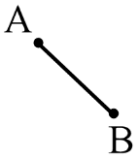
Name: _____ Geometry

A **plane** is a flat surface that goes on forever in all directions. It has no thickness. A **point** is a location on a plane.

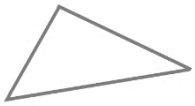
We draw a point by making a dot on a piece of paper (or on the board). But, in mathematics, a point is not really something that you can see. Why?—because it doesn't take up any space at all. A **point** has a position, but no size. We draw points so that we can talk about them, but you should remember that a point is not an object, it is an idea.

When we draw points, we name them with capital letters.

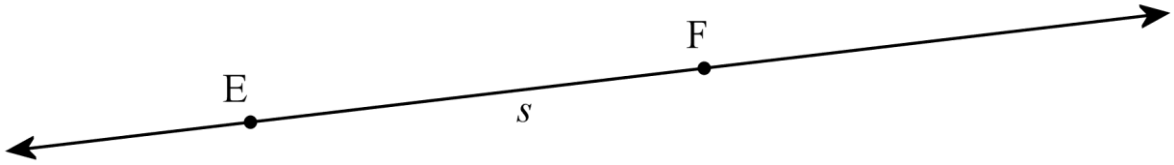
If we connect two points using a straight edge (or ruler), we get a **line segment**. A line segment has length, but no width. The line segment at the right contains the point A, point B, and all the points in between.



The sides of a triangle are line segments.

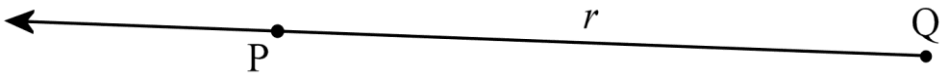


A line segment is part of a line. A **line** has no beginning point or end point. Imagine it going on forever in both directions. We show this by putting little arrowheads at both ends. In geometry, only <u>straight</u> lines are called *<u>lines</u>*. A curvy line is called a **curve**.



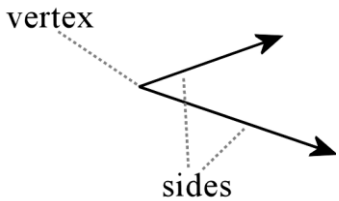
Line segment EF is part of (lies on) line *s.*

A **ray** starts at a point and continues infinitely far in only one direction. We show its direction by drawing an arrowhead at one end of the ray.

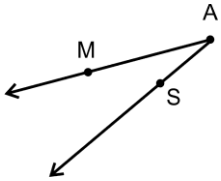


Here ray *r* starts at point Q and extends forever in the direction of point P.

An **angle** is made up of two rays that begin at the same point. This point is called the **vertex** of the angle and the rays are its **sides**.



The vertex of the angle on the right is point A. The rays $\overrightarrow{AM}$ and ray $\overrightarrow{AS}$ are its sides.



Name: _____ Geometry

Measuring Angles:

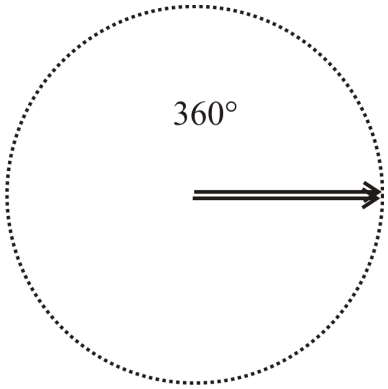
The measure of an angle is determined by how 'open' it is. The standard unit of measure for angles is the degree.

Imagine that the two sides of an angle are right next to each other, side by side. ⟹

Now, let's slowly 'open up' the angle by moving just one of the sides—rotating one ray about the vertex.

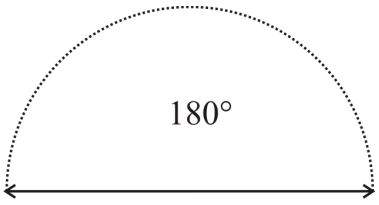
Our angle keeps getting larger as we open it up.

If we keep on going until the two sides meet again, we will have swept out a complete circle.



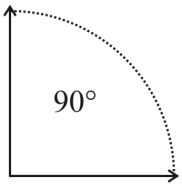
When the angle has opened to a full circle, we say that it has a measure of 360 degrees (360°). We say an angle that is not open at all (above) has a measure of zero degrees (0°).

We can measure angles between 0° and 360° by asking how much of the circle each angle sweeps out.



This angle sweeps out half a circle. So, its measure is ½ of 360° = ½ x 360° = 180°.

Notice that the two rays (the sides of the angle) form a straight line. For this reason an 180° angle is called a **straight angle**.

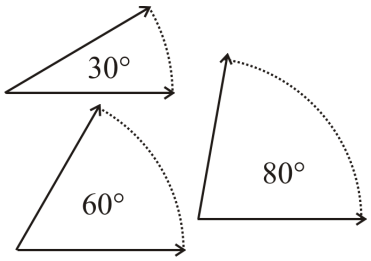


This angle sweeps out a quarter circle. So its measure is ¼ of 360° = ¼ x 360° = 90°. A 90° degree angle is also called a **right angle**. The two rays (sides) of a right angle are said to be **perpendicular**.

Any two lines or line segments are said to be perpendicular if they form an angle of 90° (a right angle).

Name: _____ Geometry

An angle that is less than 90° is called an **acute** angle. The three angles at the right are all acute angles.



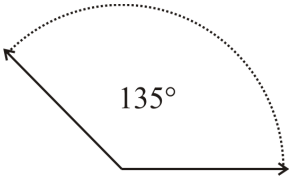
A 30° angle sweeps out 30/360 = 1/12 of a circle. It is equal to 30/90 = 1/3 of a right angle.

An 80° angle sweeps out 80/360 = 8/36 = 2/9 of a circle. It is equal to 80/90 = 8/9 of a right angle.

What fraction of a full <u>circle</u> does a 60° angle sweep out? _____

What fraction of a <u>right</u> angle is 60°? _____

An angle that is greater than a right angle (> 90°) but less than a straight angle (< 180°) is called an **obtuse** angle.



This 135° angle is an obtuse angle. It is between 90° and 180°. We can write this as 90° < 135° < 180°.
A 135° angle is 135/180 = 3/4 of a *straight angle*.

What fraction of a <u>straight</u> angle is an angle of 120°? _____

What fraction of the whole <u>circle</u> does an angle of 120^0 sweep out? _____

<u>NOTE</u>: When you draw an angle (or see one drawn) it does *not* matter how long its sides are. Remember, the sides of an angle are rays, and rays go on forever. But, when we draw the rays on paper, we have to end them somewhere—where doesn't matter. We can even draw the rays having dfferent lengths, and that doesn't matter either.

All that matters in determining the size of the angle is how *open* the angle is—how much of the whole circle the angle sweeps out.