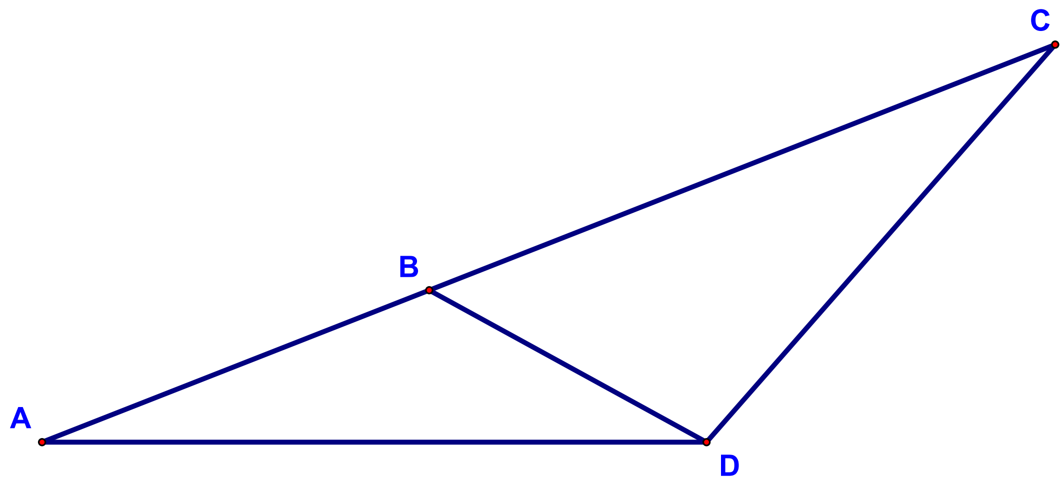
Lesson 1-2 – Measurements of Segments and Angles

Hello again…here's a warmup problem:

Name all the angles in the diagram.



Recently, you all got your "tools of geometry!" That would be that thing I gave you that has a straight edge (for measuring segments), a protractor (for measuring angles), and a compass (for constructing circles and arcs of circles). We will practice using the various parts of this tool to perform constructions soon! You should remember the following, paying particular attention to the symbology!

The length, or measure of a line segment is the distance between its endpoints.

We measure segments using a ruler (in either inches or centimeters).

There are two ways to symbolically indicate the length of a segment:

AB = 2"

m$\overline{AB}$ = 2"

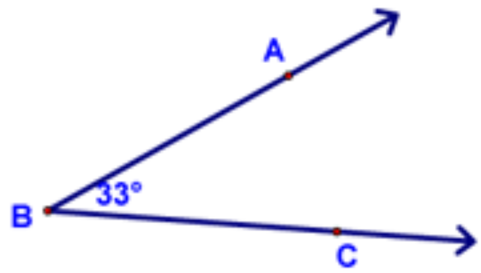
We measure angles using a protractor (in degrees). For our purposes, angles will always measure between 0° and 180°, inclusive of 180°.

0° < measure of angle ≤ 180°

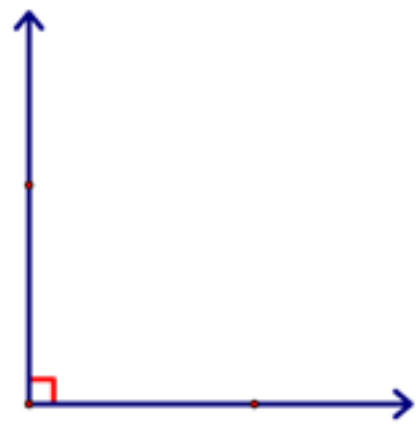
To symbolically represent "the measure of an angle ABC is 36 degrees," we write

m∠ABC = 36°

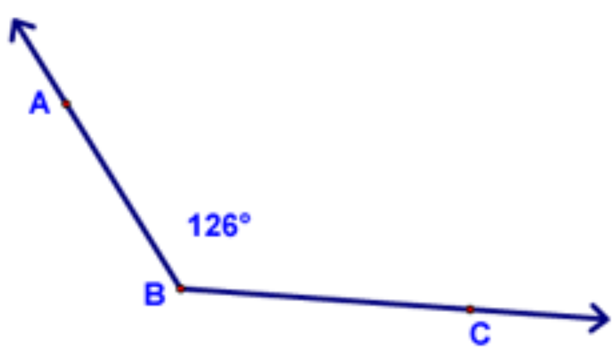
Now let's discuss how we classify angles by their measure:



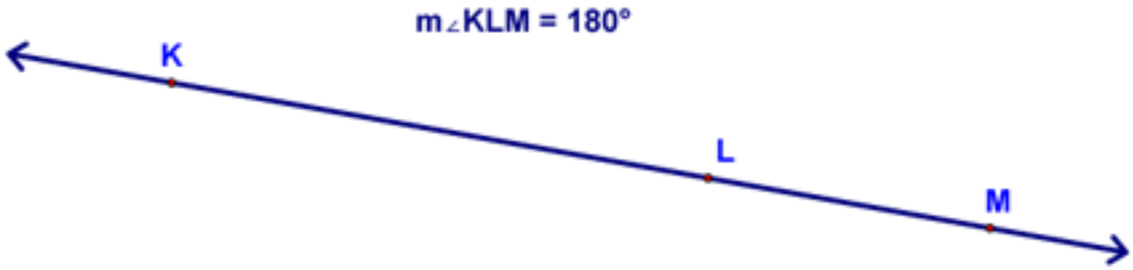
An *acute angle* is an angle whose measure is greater than 0° and less than 90°.



A *right angle* is an angle whose measure is 90°.



An *obtuse angle* is an angle whose measure is greater than 90° and less than 180°.



A *straight angle* is an angle whose measure is 180°.

Now we're going to talk about how to measure angles to a degree of accuracy better than degrees:

Each degree of an angle is divided into 60 minutes ('), and each minute of an angle is divided into 60 seconds (").

$60' = 1°$

$60'' = 1'$

So,

$87\frac{1}{2}° = 87°30'$

$60.4° = 60°24'$

$180° = 179°59'60''$

We can convert from fractional degrees to degrees, minutes, and seconds form and vice versa. Make sure you can do these types of problems for the quiz and test!!

Change $47\frac{5}{8}°$ to degrees, minutes, and seconds.

We know $\frac{5}{8}$ is some part of a degree (which is 60'), so $\frac{5}{8} = \frac{x}{60}$

$\Rightarrow x = 37\frac{1}{2}$ minutes.

But $\frac{1}{2}' = 30''$, so $47\frac{5}{8}° = 47°37'30''$

Convert 25°46'40'' to degrees in fraction form.

We know 40'' is $\frac{40}{60}$ or $\frac{2}{3}$ of a minute.

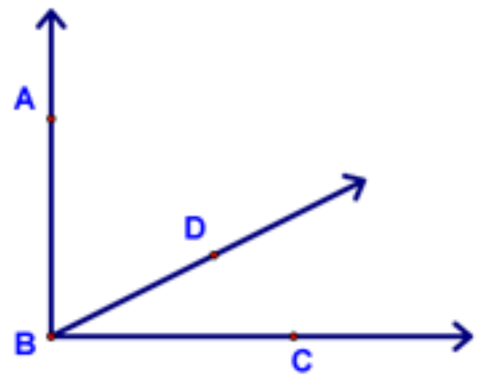
$\Rightarrow 25°46'40'' = 25°46\frac{2}{3}'$

but, $46\frac{2}{3}' = \frac{140}{3}'$ which is $\dfrac{\frac{140}{3}}{60}$ of a degree.

Now, $\dfrac{\frac{140}{3}}{60} = \frac{140}{180} = \frac{7}{9}$.

$\Rightarrow 25°52'40'' = 25\frac{7}{9}°$

We also need to be able to add and subtract angle measures in degrees, minutes, and seconds form. Here's an example:

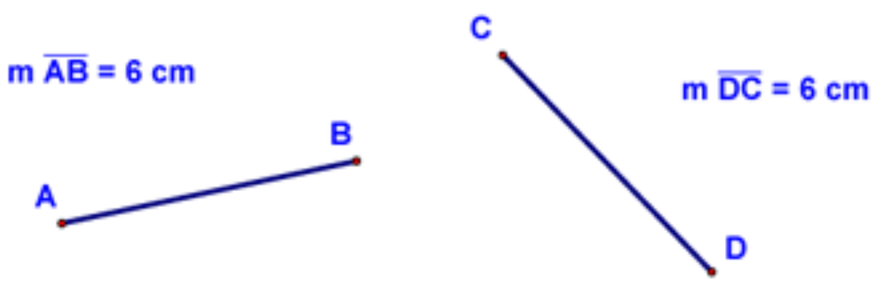


$m\angle ABC = 90°$. $m\angle ABD = 69°24'57''$.

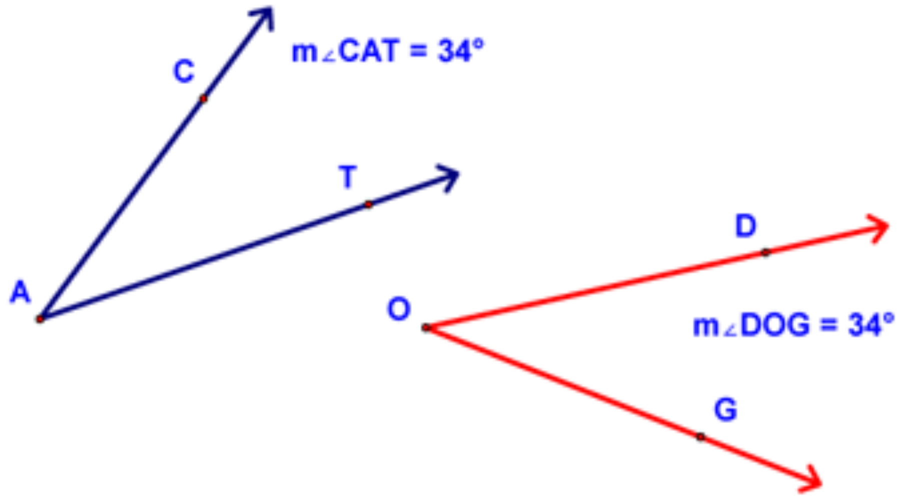
Find $m\angle DBC$.

$$\begin{array}{r} 89°59'60'' \\ -\ 69°24'57'' \\ \hline 20°35'3'' \end{array}$$

Let's end by learning the definitions for congruent segments and congruent angles and learning what symbols to use in association with them:



Two line segments are *congruent line segments* if and only if they have the same measure.



Two angles are ***congruent angles*** **if and only if their measures are the same.**

The symbol for "is congruent to" is ≅. So in the above diagram, ∠CAT ≅ ∠DOG.