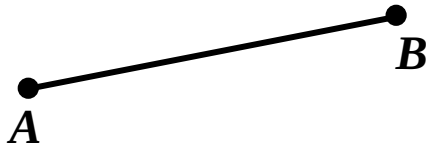
***More Terminology and Notation:***

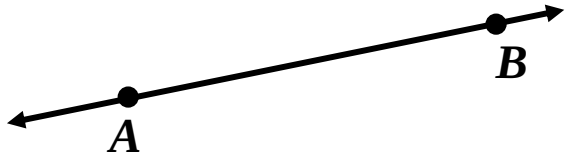
**Plane:** **It's an infinitely large flat surface.**

**Line Segment:** **It's the straight arrangement of points that connect two points called the endpoints.**



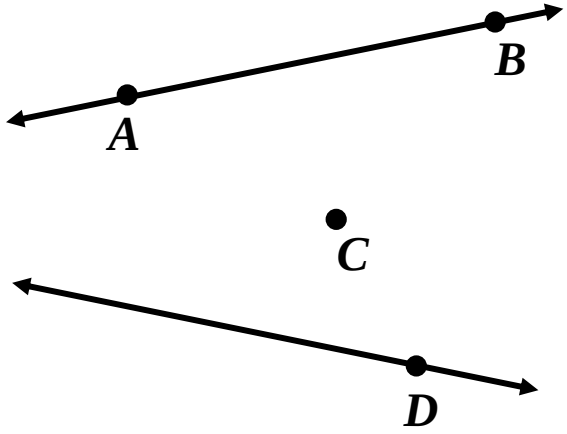

$\overline{AB}$

**Line:** **It's a straight arrangement of points that extends indefinitely in opposite directions.**

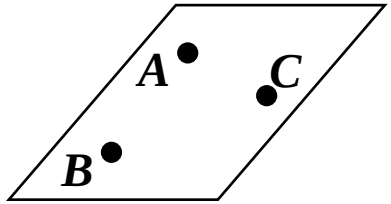



$\overleftrightarrow{AB}$

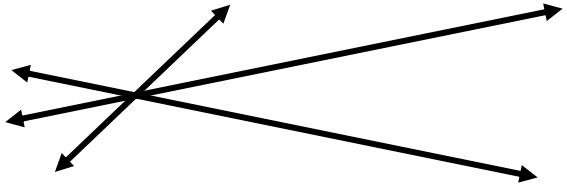
**<u>Collinear Points:</u> Points that lie on the same line/line segment are called collinear points.**



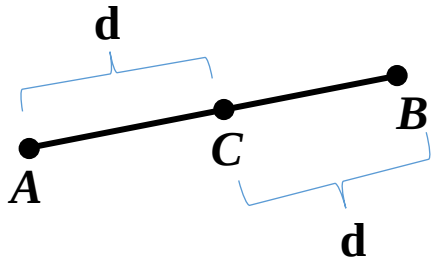

**<u>Coplanar Points:</u> Points that lie on the same plane are called coplanar points.**



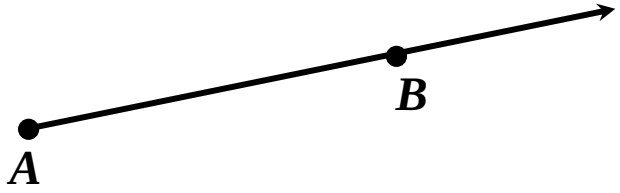

**<u>Concurrent Lines:</u> Three or more lines that contain the same point are called concurrent.**



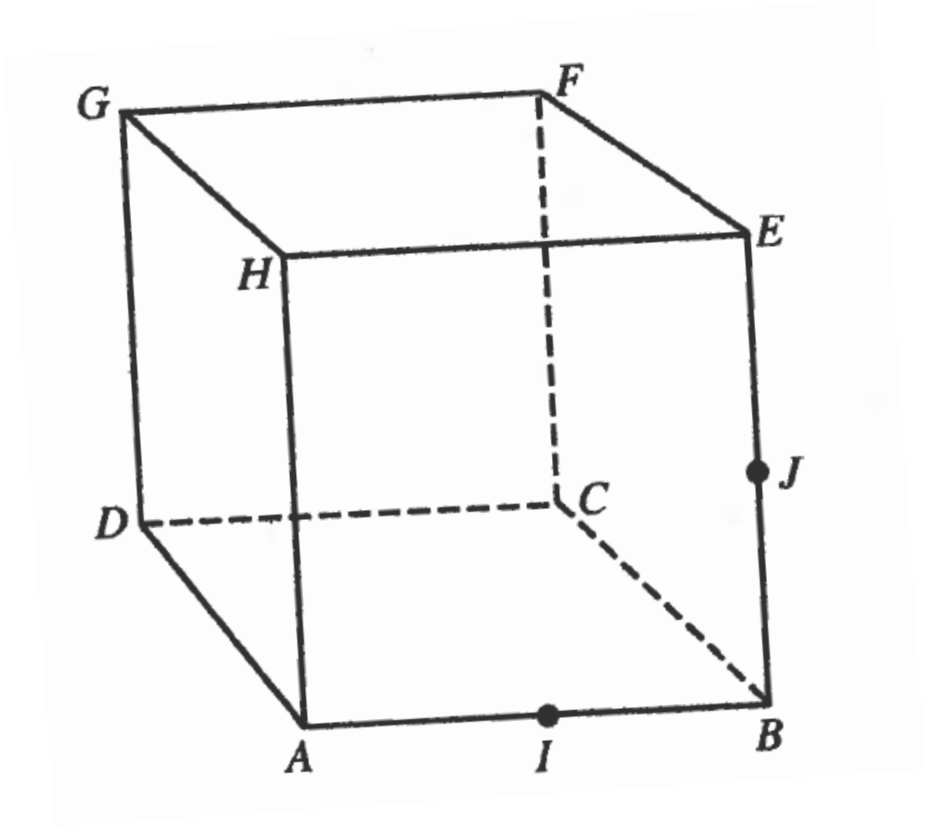
**<u>Midpoint:</u> It's the point on a line segment that is equidistant from the endpoints.**




**<u>Ray:</u> It's a straight arrangement of points that extends indefinitely in one direction from a point called its endpoint.**




$\overrightarrow{AB}$




**Which set of points are collinear?**

***D,G,H***

***H,C,B***

***E,J,B***

***A,D,C,B***

**Which set of points are coplanar?**

***A,I,D,G***

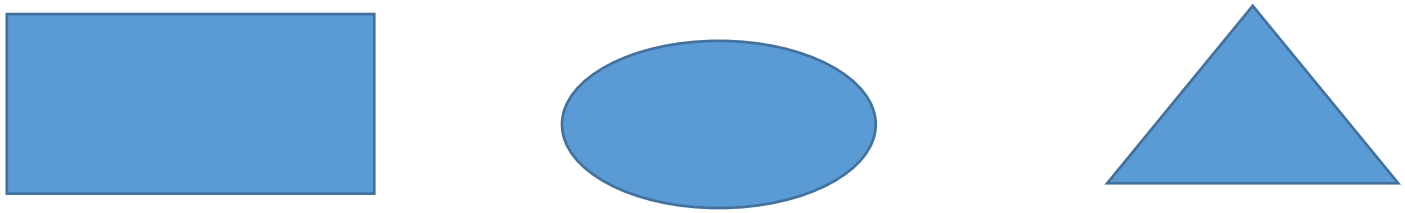
***A,H,E,F***

***A,B,C,D***

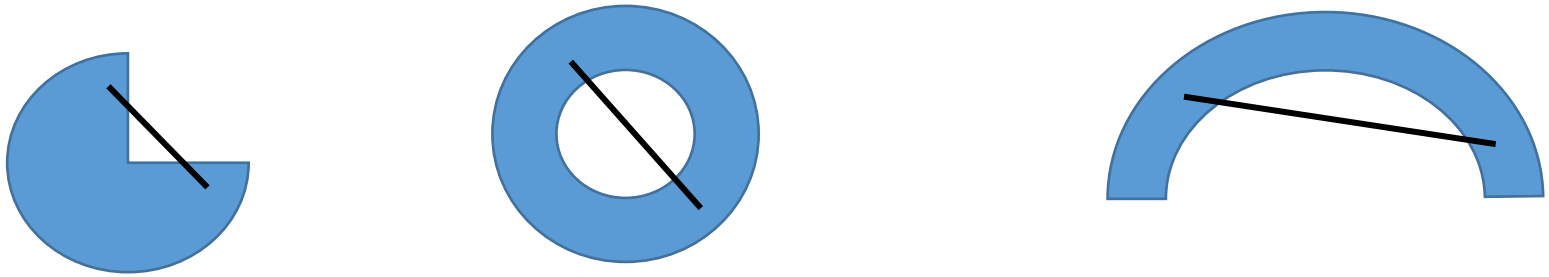
***B,G,H,J***

**<u>Convex and Concave Regions:</u>** **A region is convex if for every pair of points in the region, the line segment connecting them is also in the region. A region is concave if there is at least one pair of points in the region where the connecting line segment leaves the region.**

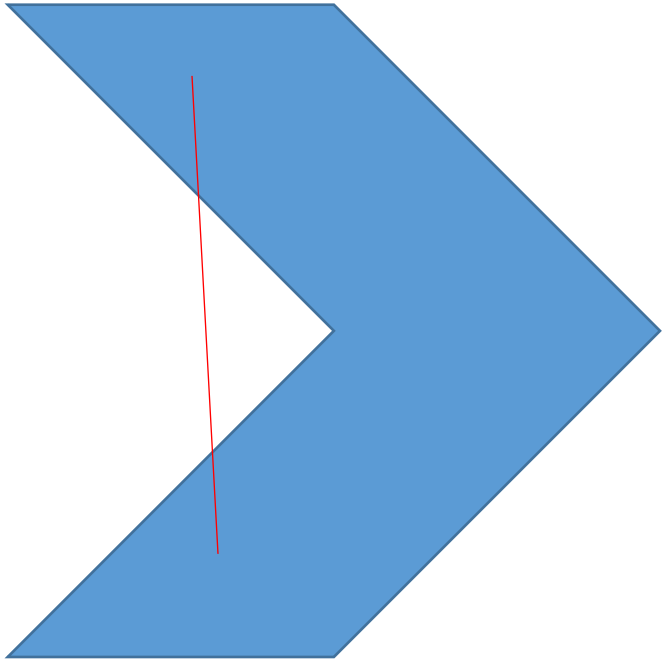
**Convex:**



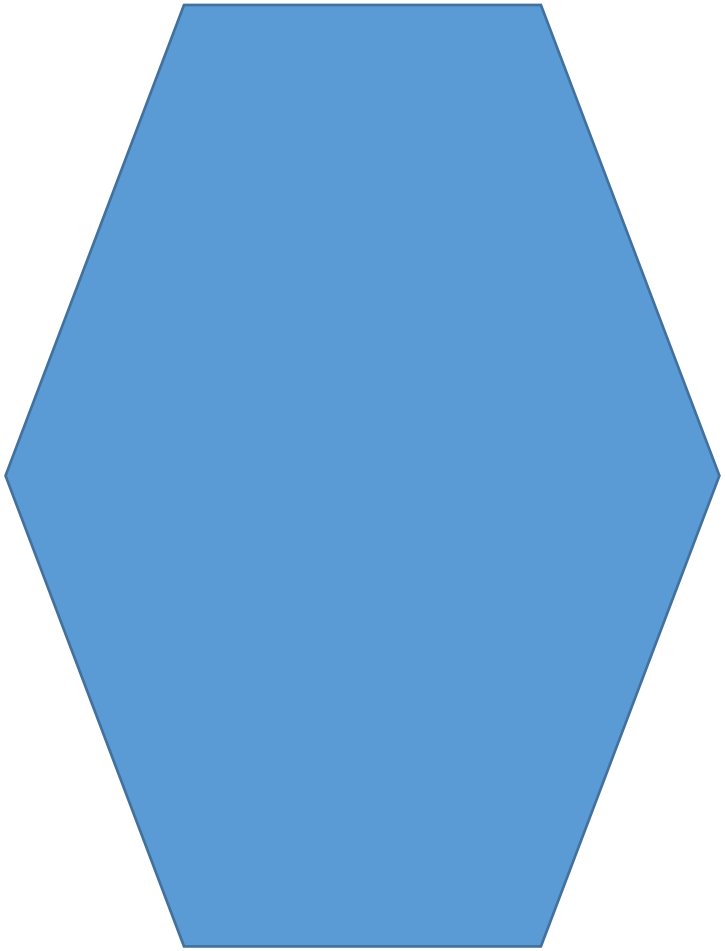
**Concave:**



**Convex or Concave?**

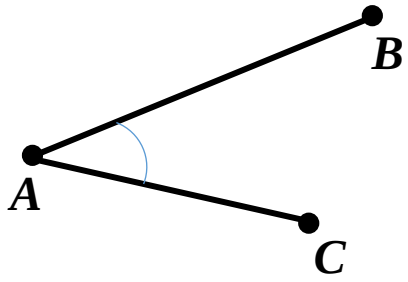


concave

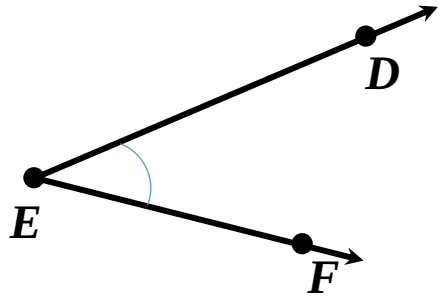


convex

**Angle:** **It's the union of two line segments with a common endpoint or the union of two rays with a common endpoint. The common endpoint is called its vertex, and the line segments or rays are called its sides.**

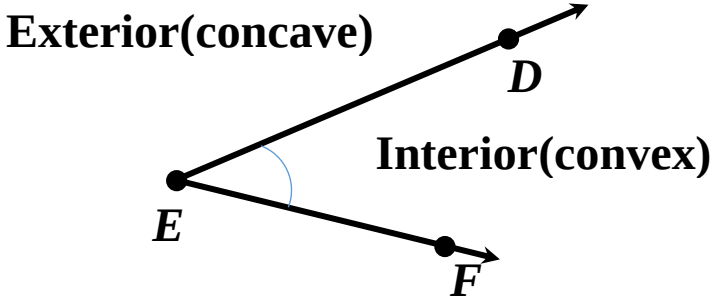



$\angle BAC$

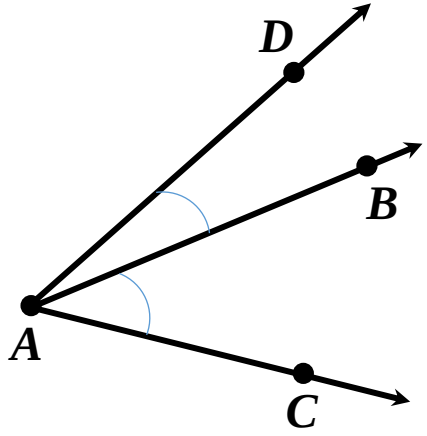



$\angle DEF$

**Interior/Exterior of an Angle:** **An angle that is formed by two rays divides a plane into three parts: the angle, the interior of the angle, and the exterior of the angle.**

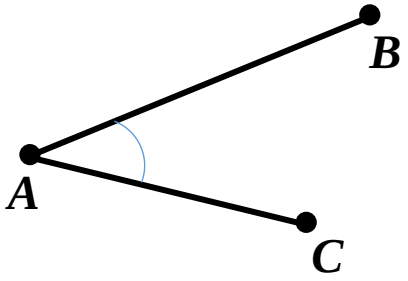


**<u>Adjacent Angles:</u> They are two angles that share a vertex, have a common side, but whose interiors don't intersect.**



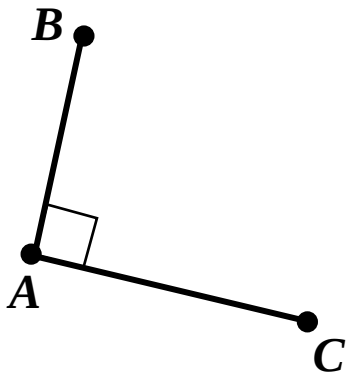

$\angle DAB$ **and** $\angle BAC$ **are adjacent angles.**

**<u>Acute Angle:</u> An angle whose degree measure is less than** $90°$**.**



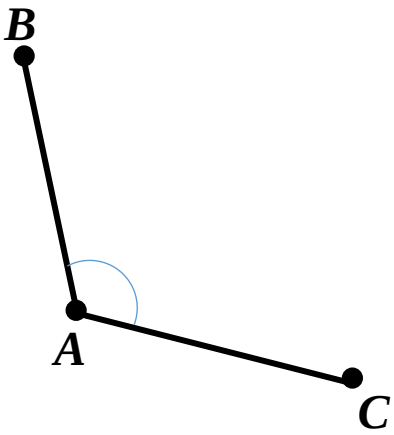

$m\left(\angle BAC\right) < 90°$

**<u>Right Angle:</u> An angle whose degree measure is equal to $90°$.**



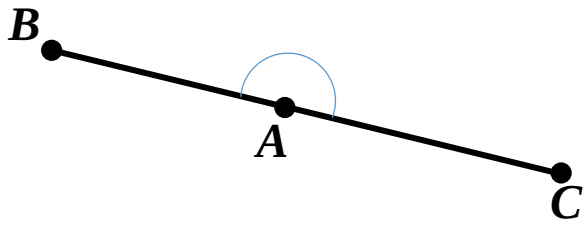

$$m\left(\angle BAC\right)=90°$$

**<u>Obtuse Angle:</u> An angle whose degree measure is greater than $90°$ but less than $180°$.**



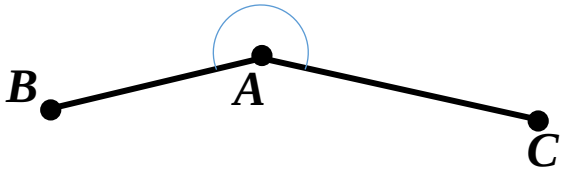

$$90°<m\left(\angle BAC\right)<180°$$

**<u>Straight Angle:</u> An angle whose degree measure is equal to $180°$. Interior and exterior are convex.**



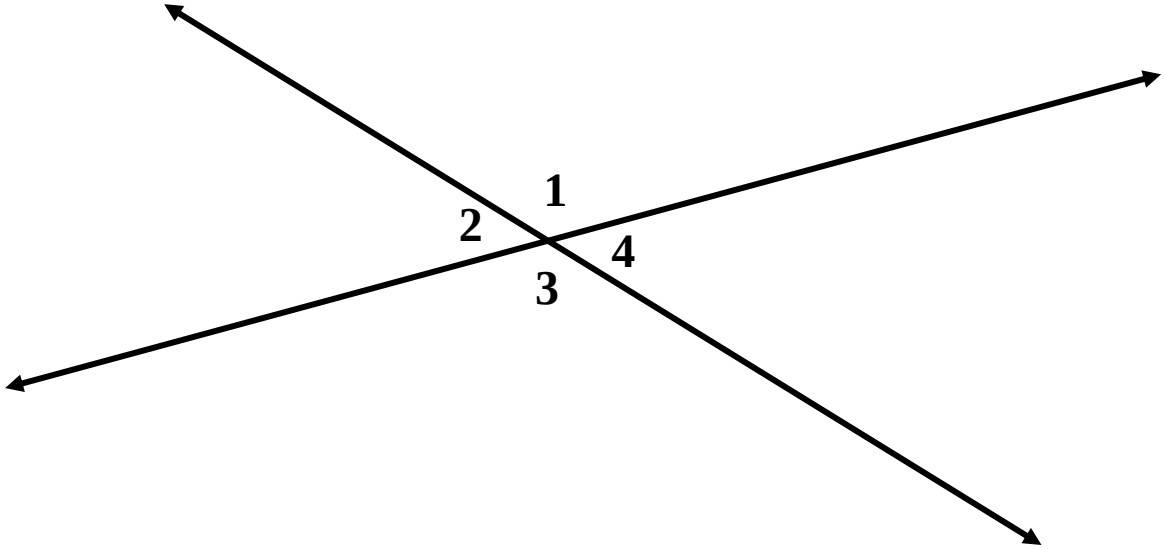

$$m\left(\angle BAC\right)=180°$$

**<u>Reflex Angle:</u> An angle whose degree measure is greater than $180°$ but less than $360°$. Interior is concave, and the exterior is convex.**




$$180° < m\left(\angle BAC\right) < 360°$$

**<u>Vertical Angles:</u> When two lines intersect, angles are formed. The pairs of non-adjacent angles are called vertical angles.**




**$\angle 1$ and $\angle 3$ are vertical angles.**

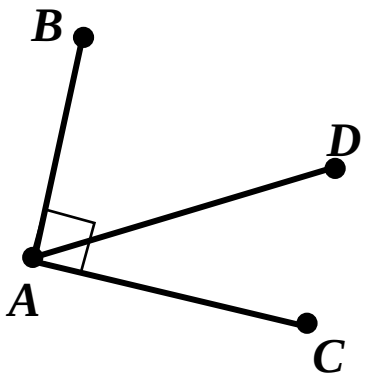
**$\angle 2$ and $\angle 4$ are vertical angles.**

***<u>Vertical angles are congruent.</u>*** **Show why $\angle 1$ and $\angle 3$ are congruent.**

$$m(\angle 1)+m(\angle 4)=180°, m(\angle 3)+m(\angle 4)=180°$$

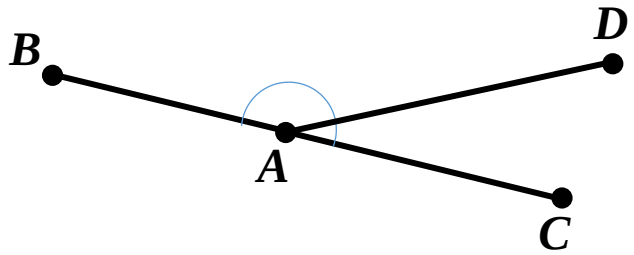
$$\Rightarrow m(\angle 1)=m(\angle 3)$$

**<u>Complementary Angles:</u> If the measures of two angles add up to $90°$, then the two angles are complementary.**



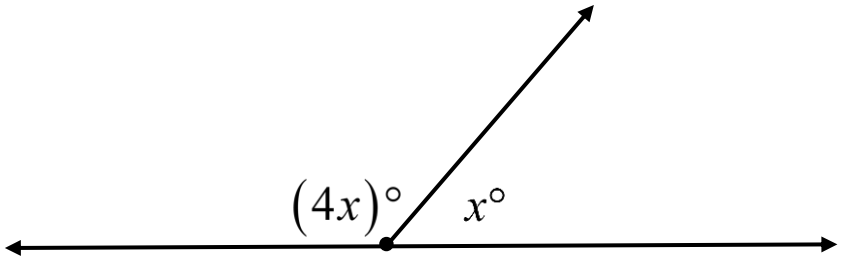

**$\angle BAD$ and $\angle DAC$ are complementary angles.**

**<u>Supplementary Angles:</u> If the measures of two angles add up to $180°$, then the two angles are supplementary.**




**$\angle BAD$ and $\angle DAC$ are supplementary angles.**

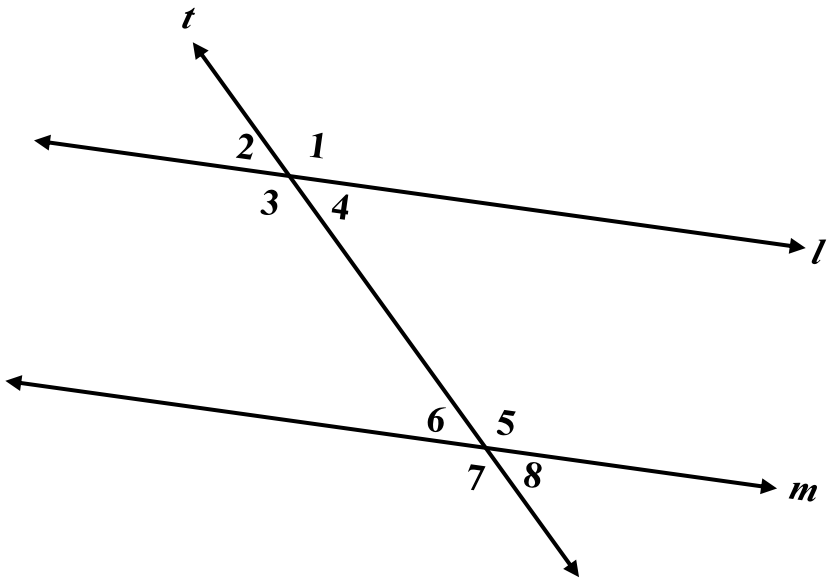
**Find the value of $x$.**




$$(4x)° + x° = 180° \Rightarrow (5x)° = 180°$$

$$\Rightarrow 5x = 180 \Rightarrow x = \boxed{36}$$

***Two Parallel Lines Intersected by a Transversal:***




*l* and *m* are the parallel lines, and *t* is the transversal.

**Corresponding Angles: Pairs of angles that match up.**

**∠1 and ∠5 are corresponding angles.**

**∠2 and ∠6 are corresponding angles.**

**∠3 and ∠7 are corresponding angles.**

**∠4 and ∠8 are corresponding angles.**

**Corresponding angles are congruent.**

**<u>Alternate Interior Angles:</u> Pairs of non-adjacent angles between the parallel lines but on opposite sides of the transversal.**

**$\angle 3$ and $\angle 5$ are alternate interior angles.**

**$\angle 4$ and $\angle 6$ are alternate interior angles.**

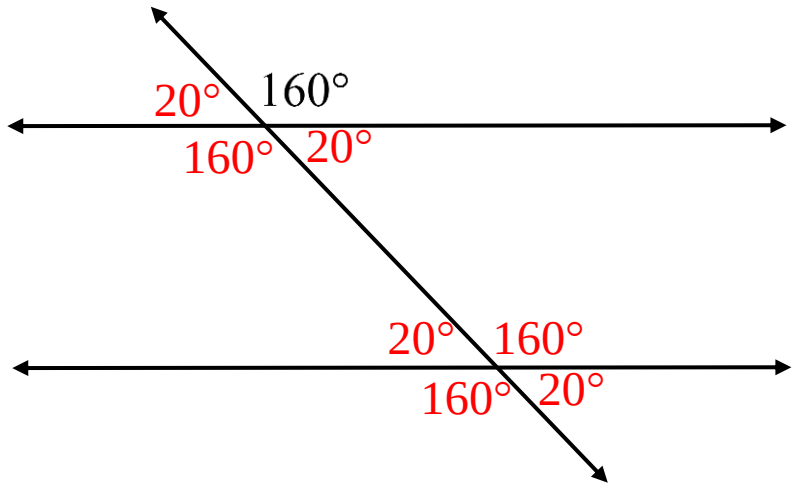
***<u>Alternate interior angles are congruent.</u>*** **Show why $\angle 3$ and $\angle 5$ are congruent.**

$\angle 3$ and $\angle 1$ are vertical angles, so they are congruent.

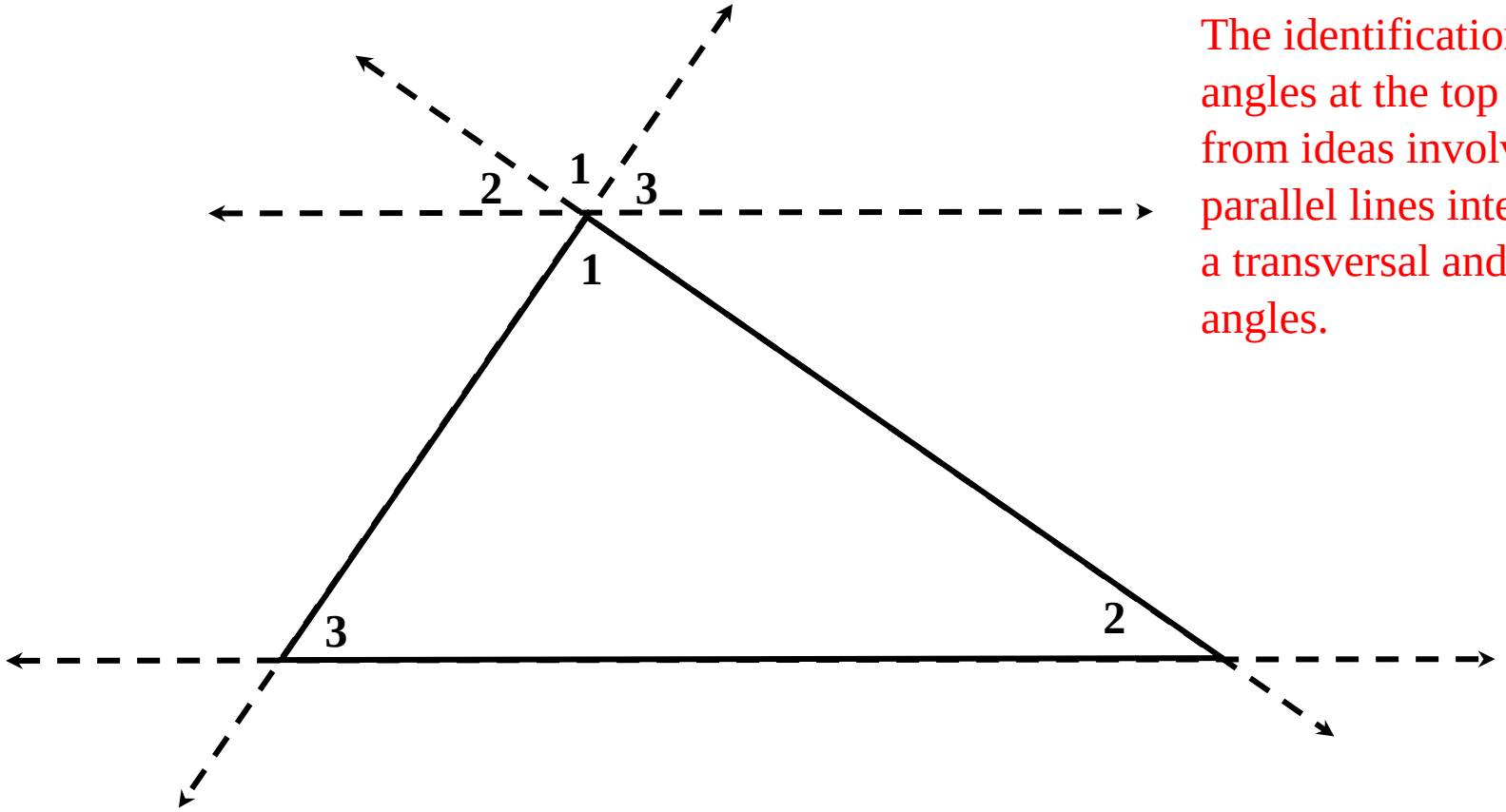
$\angle 1$ and $\angle 5$ are corresponding angles, so they are congruent.

$\Rightarrow \angle 3$ and $\angle 5$ are congruent.

**Complete the labelling of the angle measures in the following pair of parallel lines cut by a transversal.**



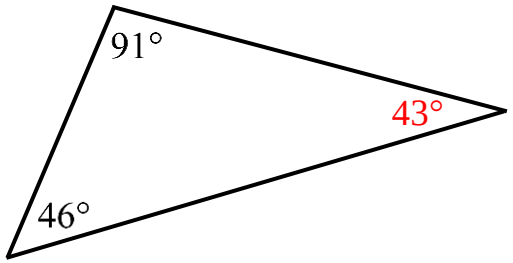
***The sum of the angle measures in a triangle:***




The identification of the angles at the top comes from ideas involving two parallel lines intersected by a transversal and vertical angles.

**So** $m(\angle 1)+m(\angle 2)+m(\angle 3)=180°$

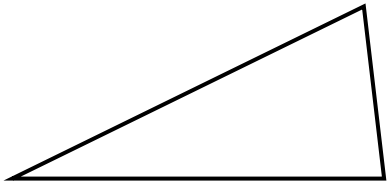
**Find the missing angle measure in the following triangle.**



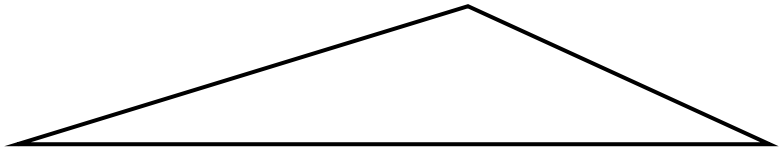

$180° - (91° + 46°) = 180° - 137° = \boxed{43°}$

***More on Triangles:***

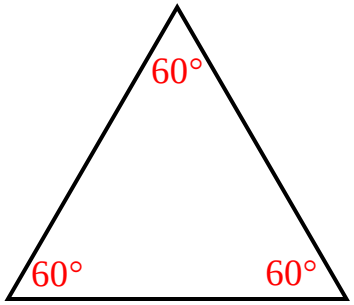
**Acute Triangle:** **It's a triangle in which all three angles are acute.**



**Obtuse Triangle:** **It's a triangle with one angle larger than** $90°$**.**



**<u>Equiangular Triangle:</u> It's a triangle with all three angles of equal measure.**




**What is the measure of each of the angles in an equiangular triangle?**

The sum of the three equal angles must be 180 degrees, so each angle must be 60 degrees.

**In the Venn diagram below, draw a representative figure in each of the three regions, if possible.**