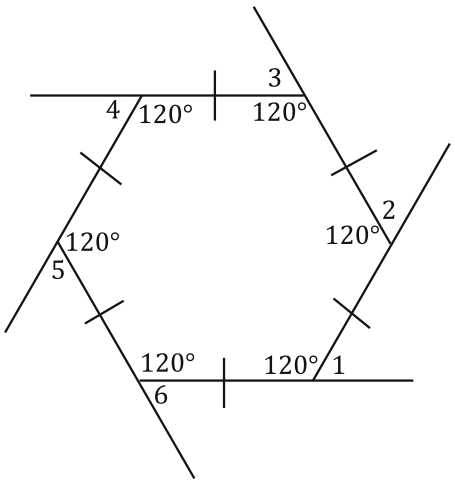
Exterior Angles of Polygons

Poly went outside of course. She is, after all, a parrot.

Related to the interior angles of polygons, we also have the exterior angles of polygons. What are these? Well, remember the remote exterior angle theorem from triangles? It's kinda like that. What do you think the sum of the exterior angles of any polygon is? Let's take a look....

Remember that one interior angle of a regular hexagon is 120°?



To find an exterior angle of the hexagon, all we have to do is realize that m∠1 and 120° are supplementary, right? So, that makes m∠1+120=180. A little algebra and m∠1=60° m∠1=m∠2=m∠3=m∠4=m∠5=m∠6, because you would do the same calculation to get each angle. Because the polygon is regular 6*60=360. It just so happens that if you were to repeat this with any polygon, regular or not, you would get 360°. So....

The sum of the exterior angles of any polgon is 360°.

Also... one angle of a regular n-gon=$\frac{360°}{n}$

Let's look at some examples...

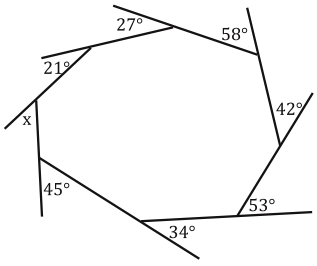
Ex. 1. What is the measure of an exterior angle of a regular Octagon?

$n=8$ $\frac{360°}{n}$ $\frac{360°}{8}=45°$

Ex. 2. How many sides does a regular polygon have if one of its exterior angles =18°?

$\frac{360°}{n}=18°$ $n*\frac{360°}{n}=18°*n$ $360°=18°n$ $\frac{360°}{18°}=\frac{18°n}{18°}$ $20=n$ so... 20 sides

Ex. 3. Find the missing angle.



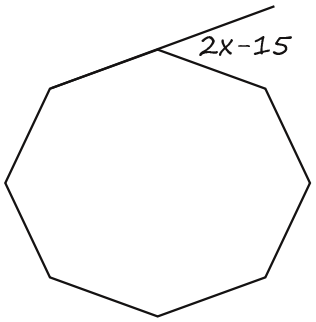
$21°+27°+58°+42°+53°+34°+45°+x=360°$

$280°+x=360°$

$-280° \quad -280°$

$x=80°$

Ex. 4. Solve for x.



$n=8$

$\frac{360°}{n}$

$\frac{360°}{8}$

$45°$

$2x-15°=45°$

$+15° \quad +15°$

$\frac{2x}{2}=\frac{60°}{2}$

$x=30°$