# **Polygon area:**

## 1. Given the length of a side.

By definition, all sides of a regular polygon are equal in length. If you know the length of one of the sides, the area is given by the formula:

area

=

s\*s\*n/4\*tan(180/n)

where  
*s*  is the length of any side  
*n*  is the number of sides  
*tan*  is the tangent function calculated in **degrees**   
(see [Trigonometry Overview](https://www.mathopenref.com/trigsummary.html))

To see how this equation is derived, see [Derivation of regular polygon area formula](https://www.mathopenref.com/polygonregularareaderive.html).

## 2. Given the radius (circumradius)

If you know the radius (distance from the center to a vertex, see figure above):

Area=r\*r\*n\*sin(360/n)/2

where  
*r*  is the radius (circumradius)  
*n*  is the number of sides  
*sin*  is the sine function calculated in **degrees**  
(see [Trigonometry Overview](https://www.mathopenref.com/trigsummary.html))

To see how this equation is derived, see [Derivation of regular polygon area formula](https://www.mathopenref.com/polygonregularareaderive.html).

## 3. Given the apothem (inradius)

If you know the [apothem](https://www.mathopenref.com/apothem.html), or inradius, (the perpendicular distance from center to a side. See figure above), the area is given by:

area

=a\*a\*n\*tan(180/n)

where  
*a* is the length of the [apothem](https://www.mathopenref.com/apothem.html) (inradius)  
*n*  is the number of sides  
*tan*  is the tangent function calculated in **degrees** (see [Trigonometry Overview](https://www.mathopenref.com/trigsummary.html)).

To see how this equation is derived, see [Derivation of regular polygon area formula](https://www.mathopenref.com/polygonregularareaderive.html).

## 4:

**Write down the formula for finding the area of a regular polygon.** To find the area of a regular polygon, all you have to do is follow this simple formula: *area = 1/2 x perimeter x apothem.*[[1]](https://www.wikihow.com/Calculate-the-Area-of-a-Polygon#_note-1) Here is what it means:

* Perimeter = the sum of the lengths of all the sides
* Apothem = a segment that joins the polygon's center to the midpoint of any side that is perpendicular to that side[[2]](https://www.wikihow.com/Calculate-the-Area-of-a-Polygon#_note-2)