

A regular hexagon has sides of 5 feet. What is the area of the hexagon?

Solution:

In this case we can divide the hexagon into six congruent equilateral triangles. We can make six triangles by connecting the center of the hexagon to each of the vertices (where two sides of the hexagon meet). The central angle of each of these triangles will be $\frac{360}{6} = 60^\circ$.

Since the other two angles in each of the triangles are equal, and there are 180° degrees in a triangle, then each angle in each of these triangles is 60° . So each triangle is an equilateral triangle.

The area of any triangle is $S = \frac{1}{2} a * b * \sin(a, b)$. Where a and b the sides of the triangle and $\sin(a, b)$ sine of angles between a and b sides. In our case for equilateral triangle with sides 5

we have
$$S_0 = \frac{1}{2} * 5 * 5 * \sin(60) = \frac{25\sqrt{3}}{4}$$

For all regular hexagon(6 equilateral triangles) we have
$$S = 6 * S_0 = 6 * \frac{25\sqrt{3}}{4} = \frac{75\sqrt{3}}{2}$$

Answer:
$$\frac{75\sqrt{3}}{2}$$