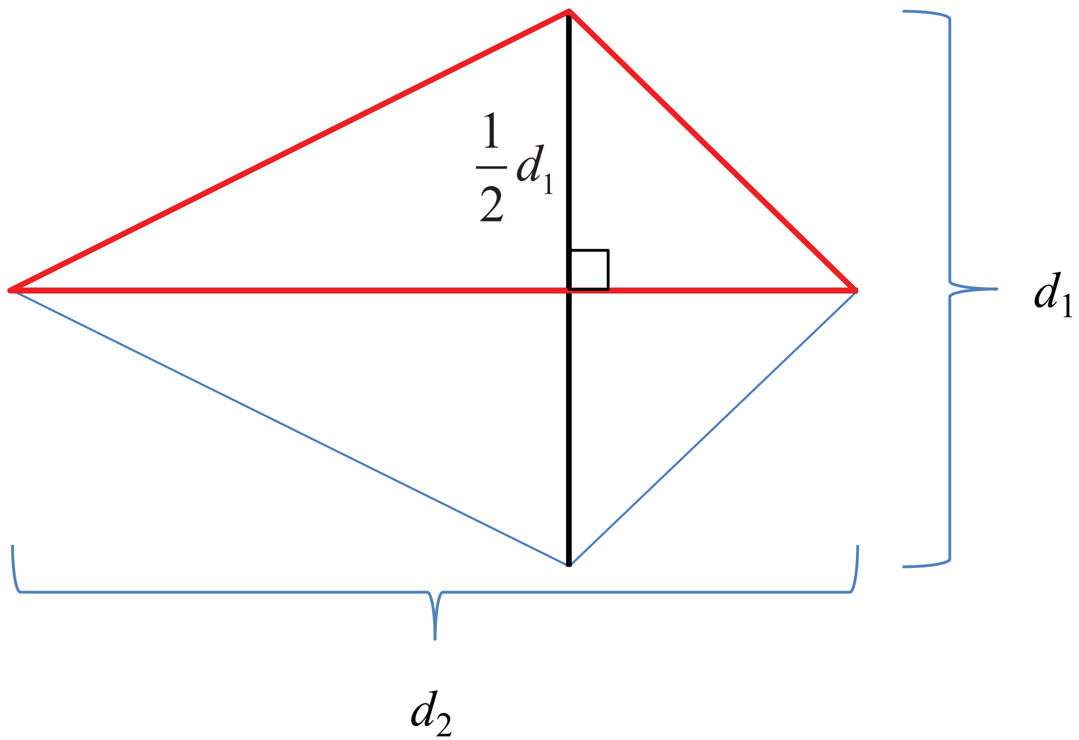
Area Formulas

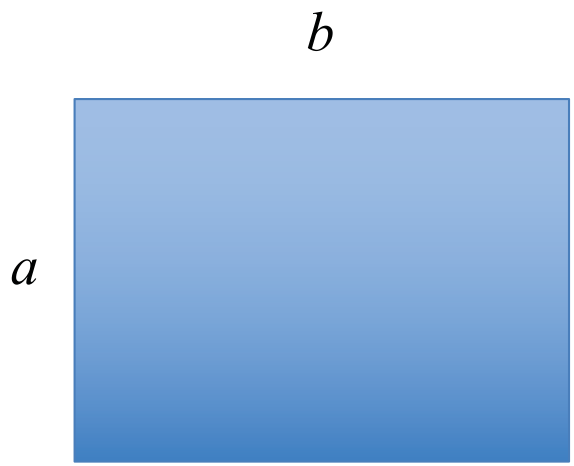
Find the area of this kite



Note that the upper half is a triangle with base is d_2 and height $\frac{1}{2}d_1$

The area of this upper triangle is $A = \frac{1}{2}bh = \frac{1}{2}d_2\left(\frac{1}{2}d_1\right) = \frac{1}{4}d_2 d_1$

The area of the kite is just twice the area of the triangle so $A_{kite} = \frac{1}{2}d_1 d_2$

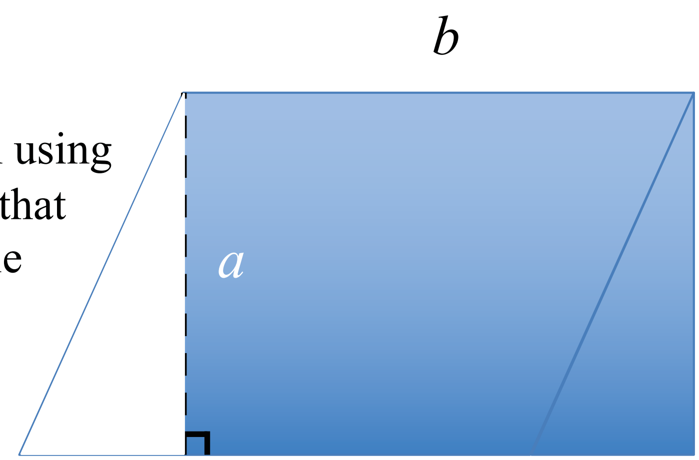


$$A = ab$$

We know the area of a rectangle

What about a parallelogram?

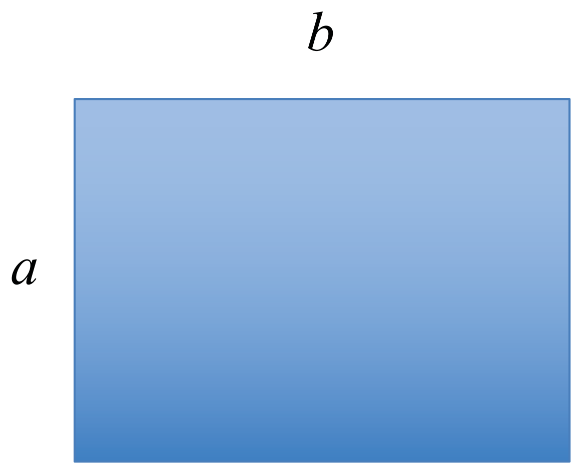
It can be proven using hypotenuse-leg that this right triangle

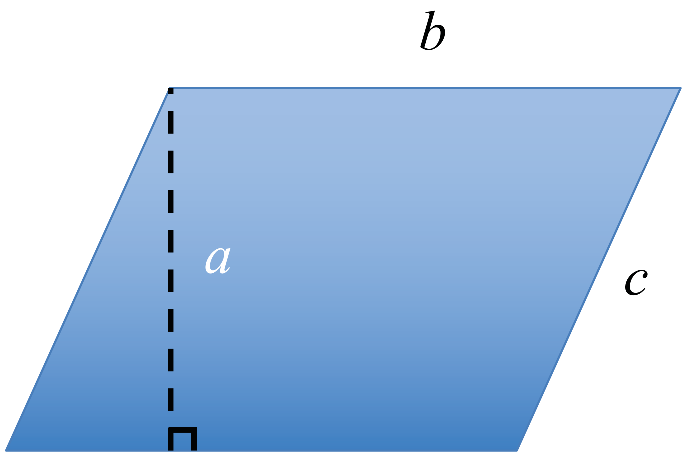


Is congruent to this right triangle

Once we establish the height of the triangle, the area of this parallelogram is

$$A = ab$$





$$A = ab$$

We know the area of a rectangle

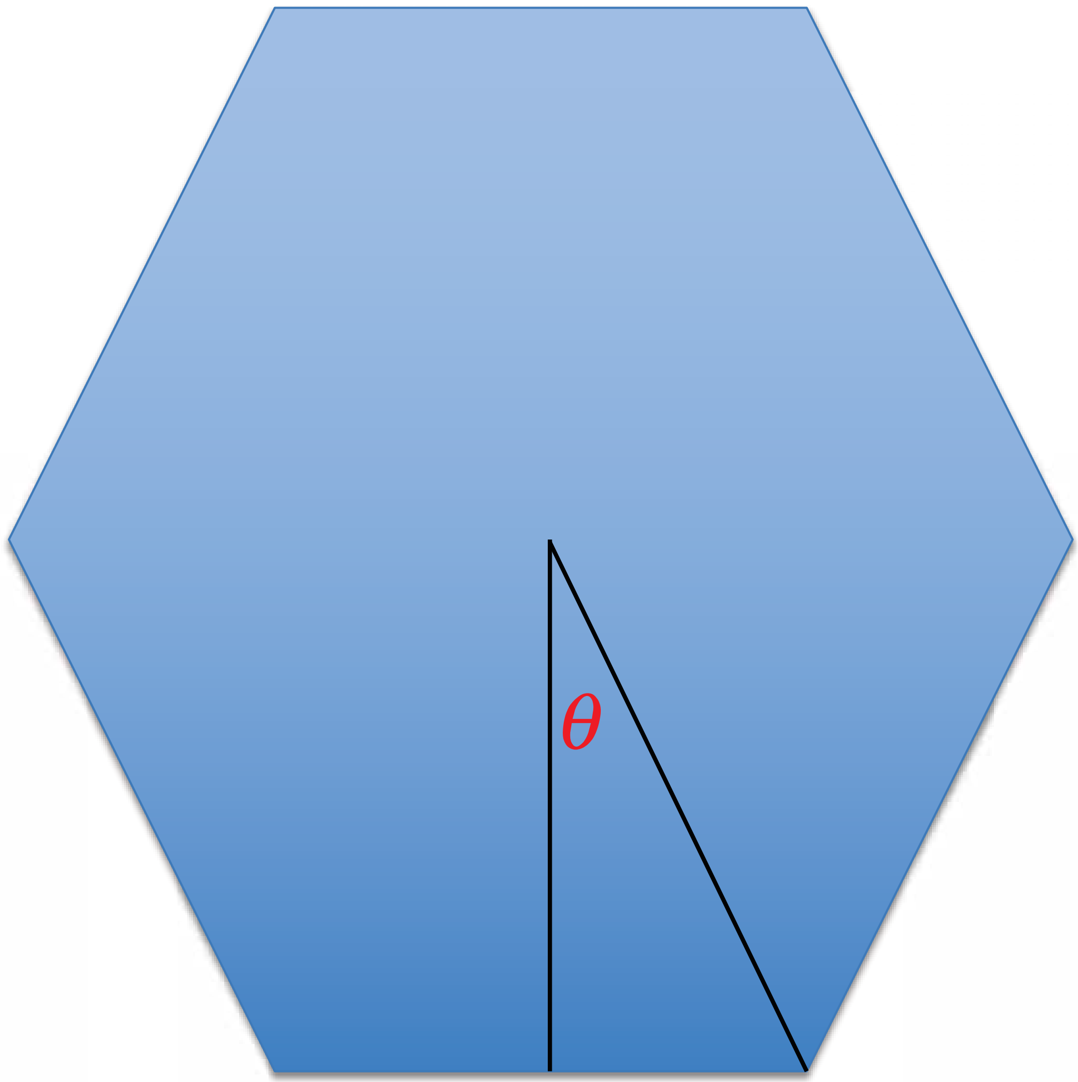
What about a parallelogram?

Once we establish the height of the triangle, the area of this parallelogram is

$$A = ab$$

The trick would be finding the length of *a* since the diagonal *c* would be different

Areas of regular polygons are really about areas of triangles as we will see here



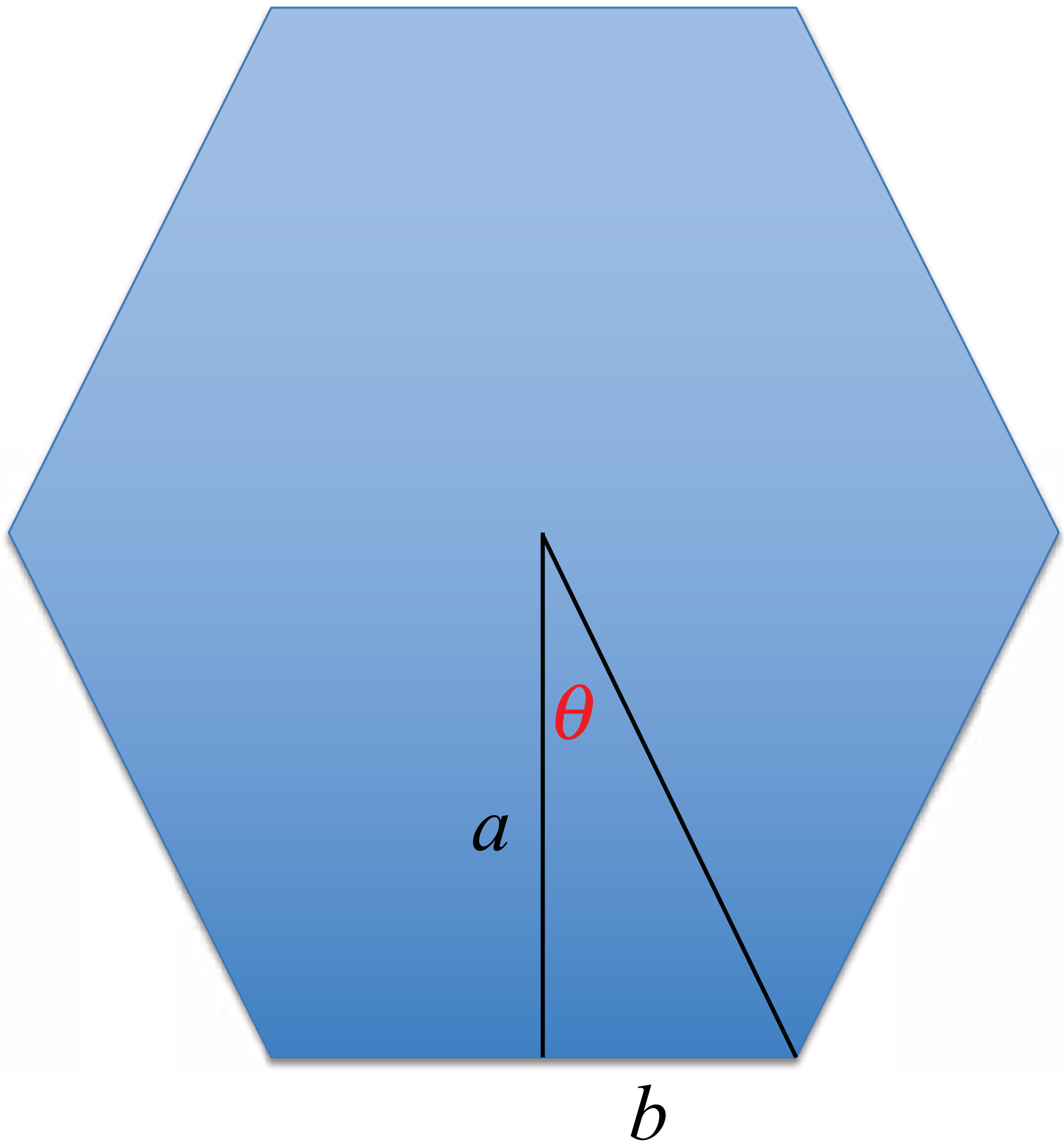
$$\theta = 30^\circ$$

Why?

In the case of a hexagon, it would take 12 of these right triangles to fill the entire hexagon and since the central angles add up to 360°…

So what can we do with this info?

Areas of regular polygons are really about areas of triangles as we will see here



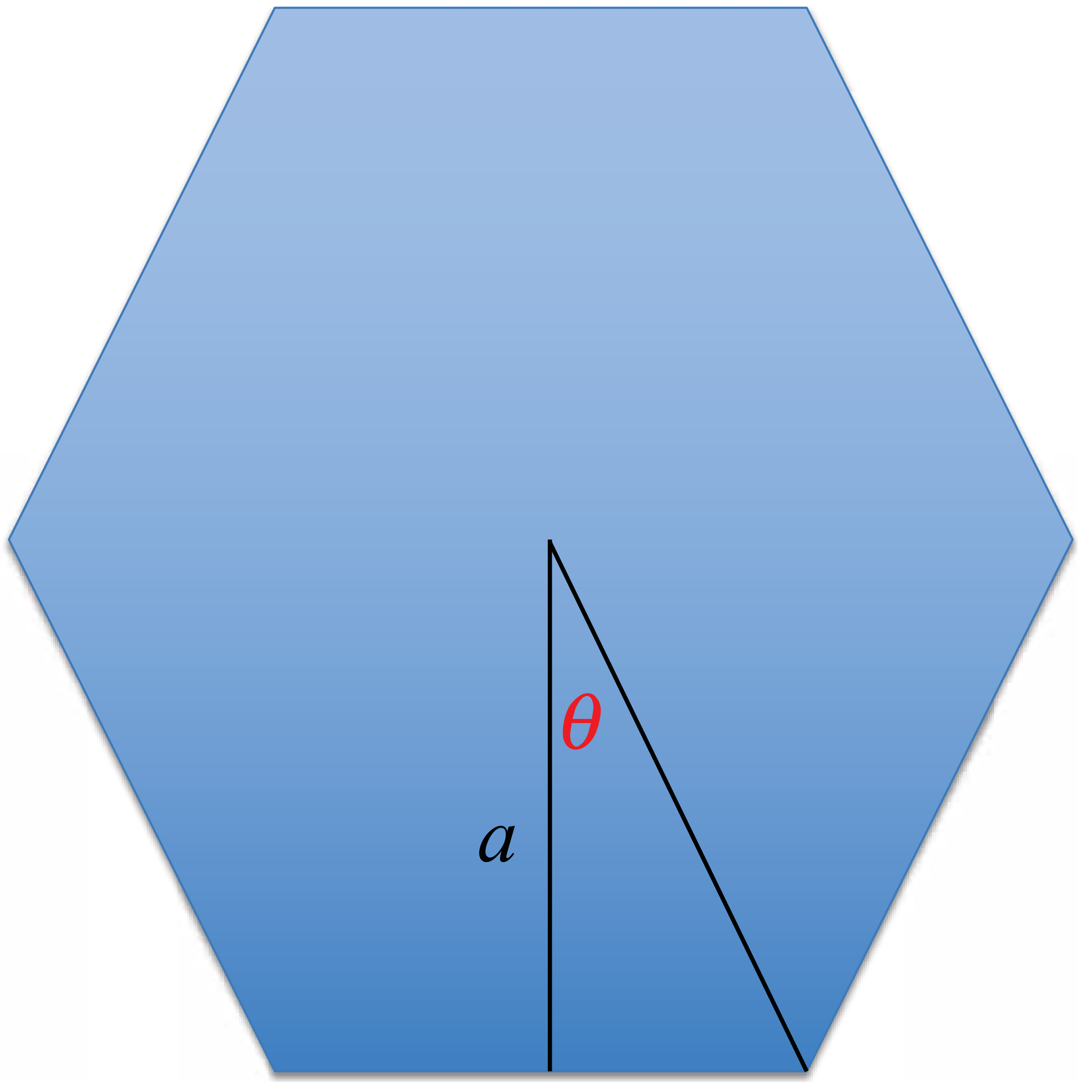
$$\theta = 30°$$

a is called the *apothem*

$$\frac{b}{a} = \tan\theta$$

$$a = \frac{b}{\tan\theta}$$

Areas of regular polygons are really about areas of triangles as we will see here



$$\theta = 30^\circ$$

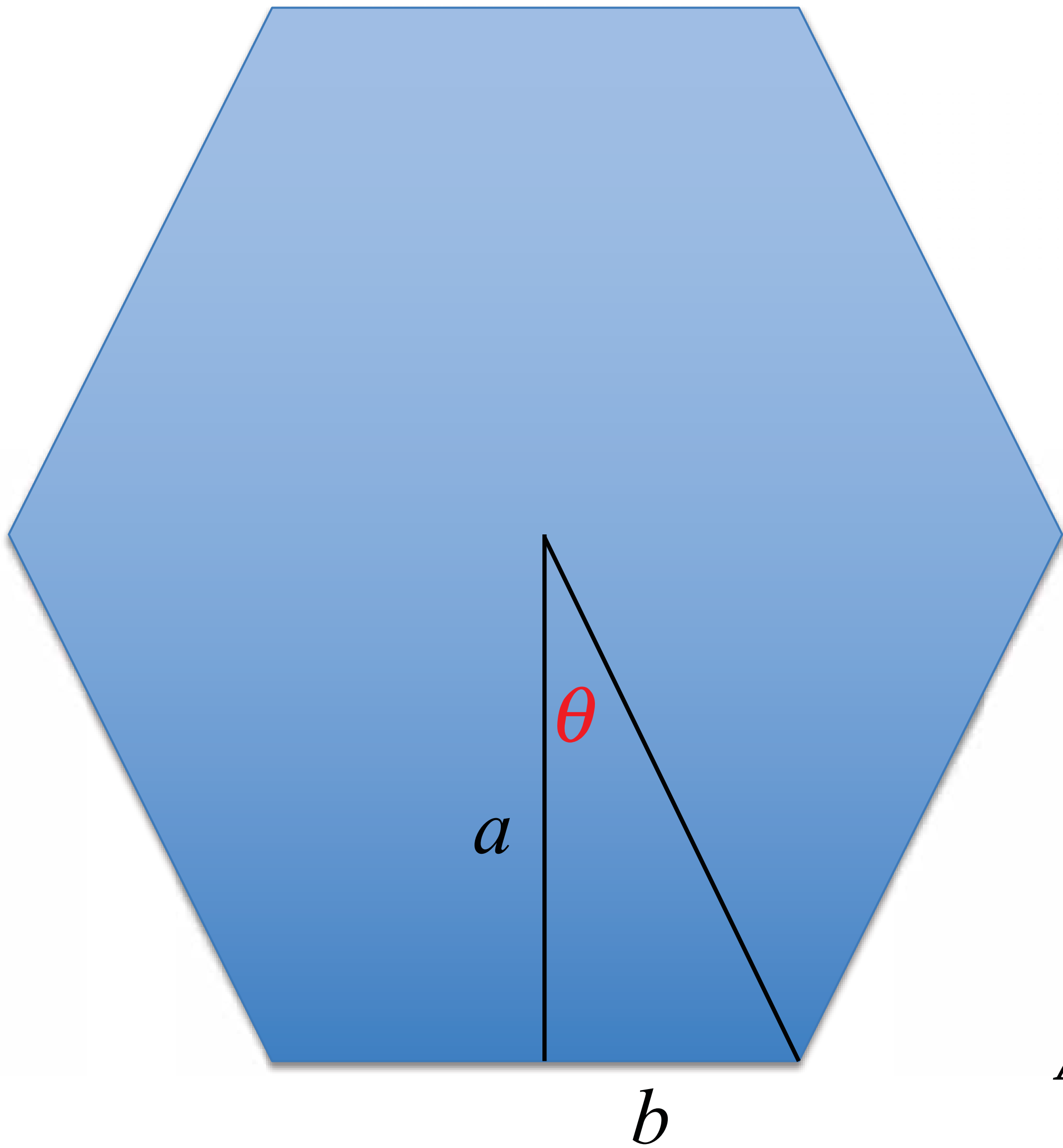
If the perimeter of this hexagon is 24, find the area

$$a = \frac{2}{\tan 30^\circ} = \frac{2}{1/\sqrt{3}} = 2\sqrt{3}$$

$$A = 12\left(\frac{1}{2}ba\right)$$

$$A = 12\left(2\sqrt{3}\right) = 24\sqrt{3}$$

Areas of regular polygons are really about areas of triangles as we will see here



$$\theta = 30^\circ$$

$$A = 12\left(\frac{1}{2}ab\right)$$

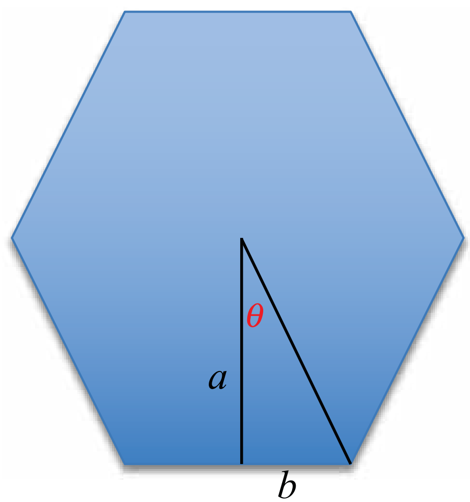
$$\frac{P}{12}$$

$$A = 12\left(\frac{1}{2}a\frac{P}{12}\right)$$

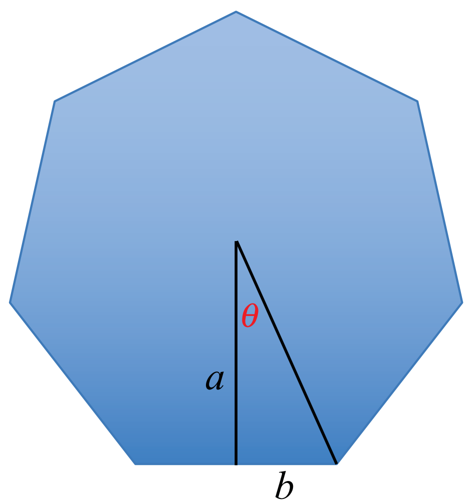
$$A = \frac{1}{2}aP \ = \frac{1}{2}\frac{b}{\tan\theta}P$$

Areas of regular polygons are really about areas of triangles as we will see here

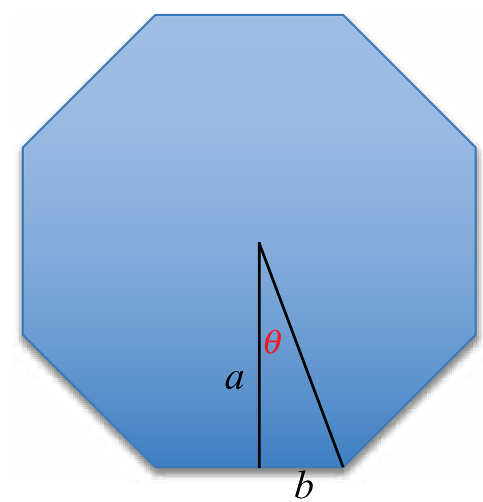
Important to remember when finding the area of any regular polygon



$$\theta = 30°$$



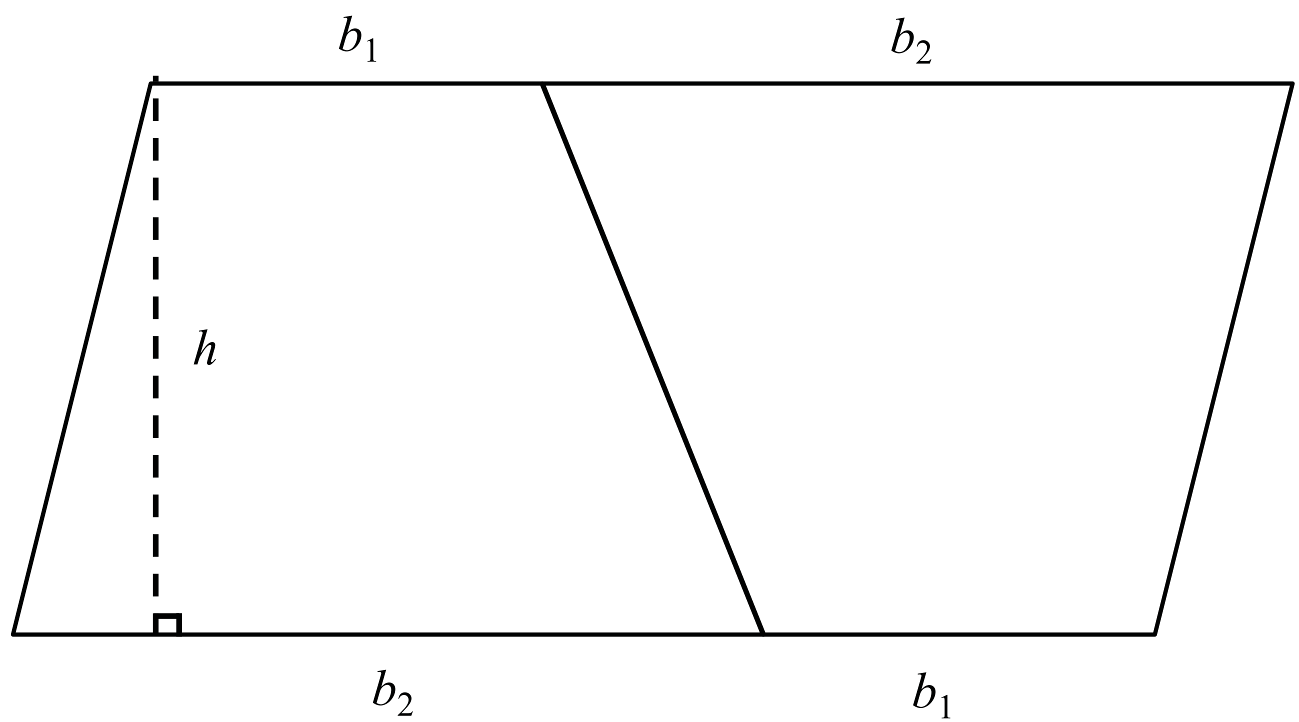
$$\theta = \frac{360°}{14} \approx 25.714°$$



$$\theta = \frac{360°}{16} = 22.5°$$

How would we find the area of this trapezoid?

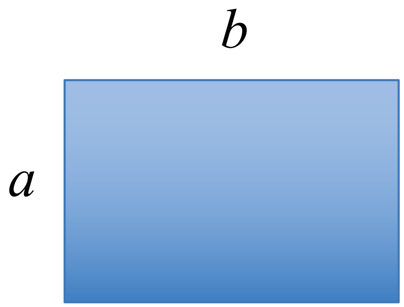
If we attach an inverted identical trapezoid we get a parallelogram



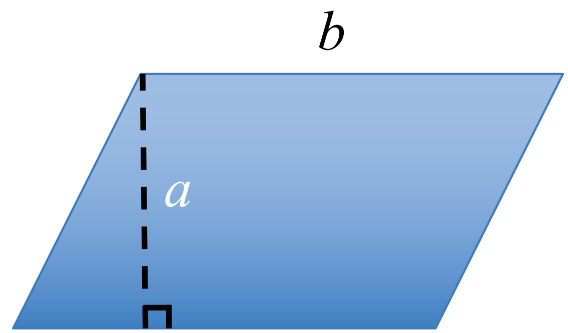
$A = h(b_1 + b_2)$ Since the trapezoid is half of this parallelogram

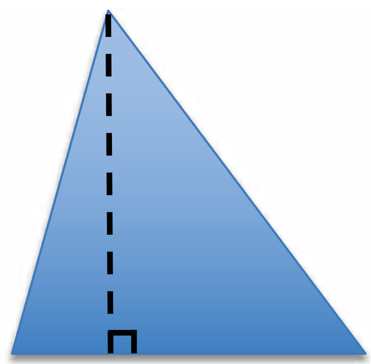
$$A_{trap} = \frac{1}{2} h(b_1 + b_2)$$

So to recap:

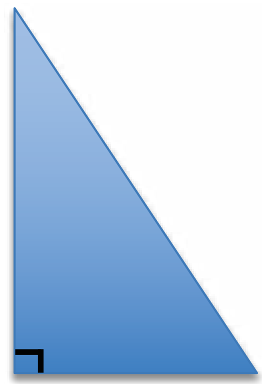


$$A = ab$$

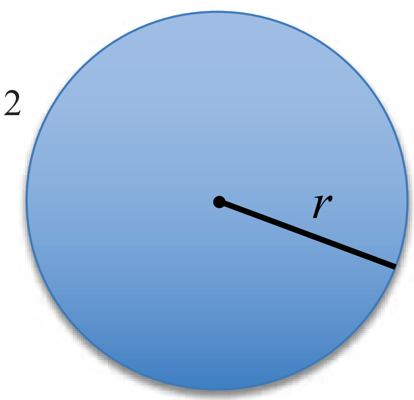




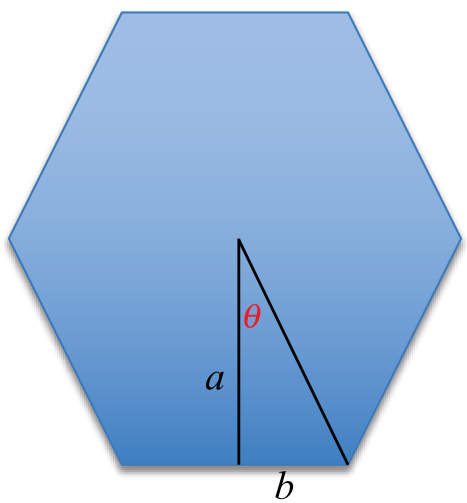
$$A_{triangle} = \frac{1}{2}bh$$

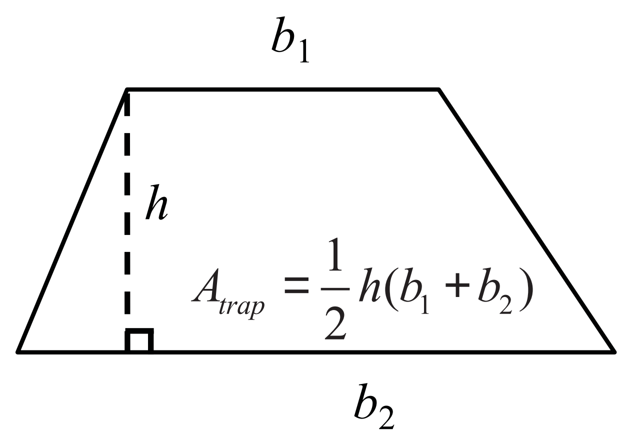


$$A_{circle} = \pi r^2$$



$$A_{regpoly} = \frac{1}{2}aP = \frac{1}{2}\frac{b}{\tan\theta}P$$





$$A_{trap} = \frac{1}{2}h(b_1 + b_2)$$