The area of a circle

We imagine breaking a circle down into many many triangles.

These will be triangles with a slightly rounded base, but ultimately the actual triangles would cover the circle in a similar way to what a polygon with this many sides would.

Now if we arrange the triangles like so,

they'll interlock with each other like this

and then we have something that approximates a rectangle.

This will have a length that's half the distance around the circle,

so it will be 2pi times the radius divided by 2,

or just pi times the radius,

and then the height of this rectangle is also similar to the radius.

The idea, is that if we make the sides of our polygon smaller and smaller,

and we have more and more triangles,

eventually this approximating polygon will completely cover the circle

and the area we have here will be exact.