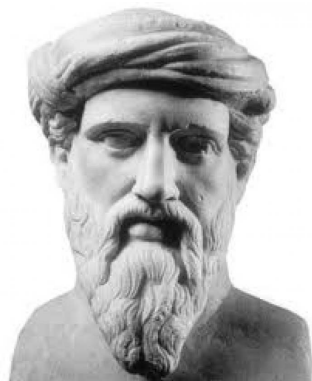


# MATH CIRCLE TTU

## Geometry

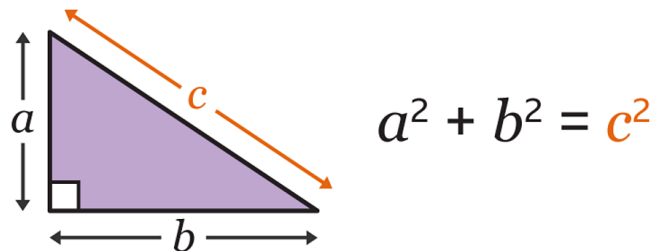
### Trigonometry and Area



## Trigonometric Functions

The trigonometric functions sine (sin) and cosine (cos) are defined as:

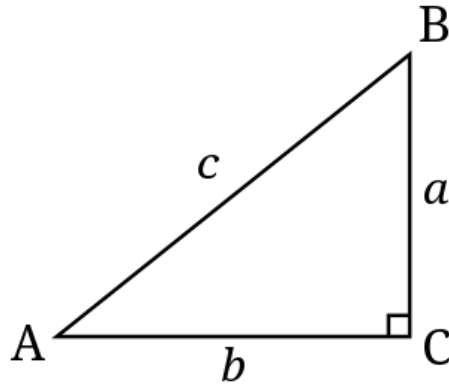
$$\sin(\alpha) = \frac{a}{c}, \quad \cos(\alpha) = \frac{b}{c}.$$



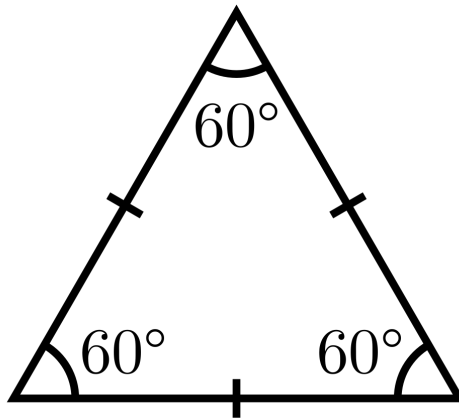
**Question.** In the figure, what angle is  $\alpha$ ?

## Computing Some Values

Sine and Cosine of  $\alpha = 45^\circ$



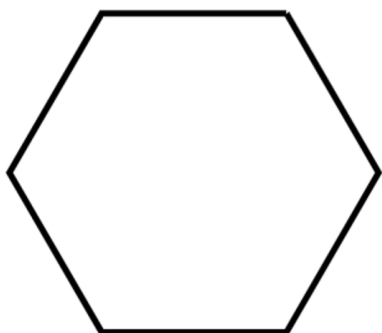
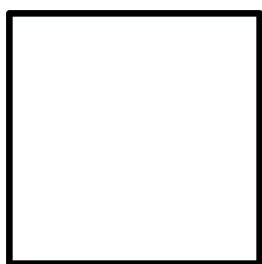
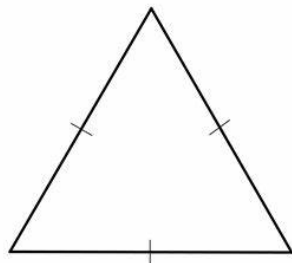
Sine and Cosine of  $\alpha = 60^\circ$



Sine and Cosine of  $\alpha = 30^\circ$

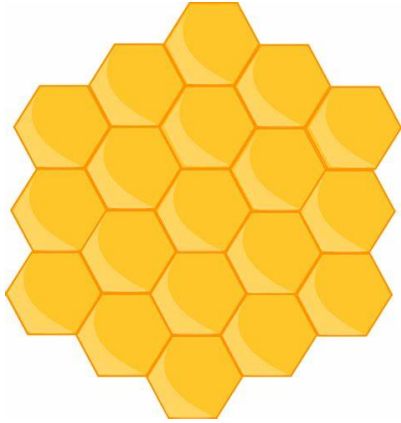
## Area and Perimeter of Polygons

**Problem.** Compute the area and perimeter of the following regular polygons.



**Question.** With what regular polygons can we cover the floor?

What is the shape of a beehive?



**Principle of Least Action.** Everything in Nature happens using the minimum amount of energy/time/effort/money...