math hands

Trigonometry: Ch1 guide

Definition of One Degree

Degrees are units of measurement for angles. *One degree* is defined to be the measurement of the angle created by slicing up a circle into 360 equal slices.

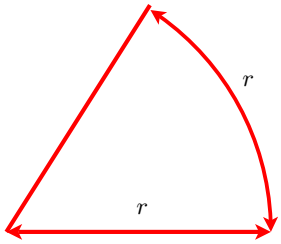
One Degree angle

$\frac{1}{360}$ of a circle

Definition of One Radian

Radians are units of measurement for angles. *One Radian* is defined to be the measurement of the angle created by the distance of one radius along part of the circumference of a circle.

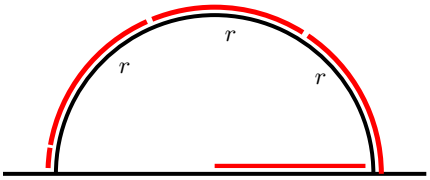
One Radian



Definition of π

π is defined to be *the exact number of times the radius of a circle fits in half the circumference of the circle.*

OWN π



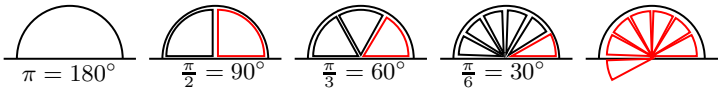
π = *exact* number of r's that fit in a half-circle

$\pi \approx 3.14$

Famous: Degrees & Radians

Here is a visual representation of some famous angles converted to both in degrees and in radians.

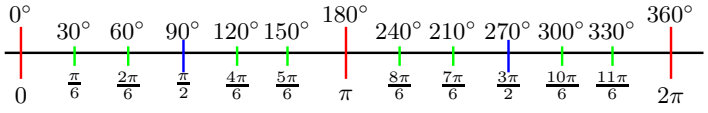
$\frac{7\pi}{6} = 7 \cdot 30^\circ = 210^\circ$



$\pi = 180^\circ$ $\quad \frac{\pi}{2} = 90^\circ$ $\quad \frac{\pi}{3} = 60^\circ$ $\quad \frac{\pi}{6} = 30^\circ$

Famous: Degrees & Radians

Here is another way to visualize the conversion of famous degrees and their respective famous counterparts measured in radians.



Converting NON-Famous

The key idea to convert units from/to degrees to/from radians is the observation, by definition of degrees and radians [DDR]:

$$\pi\, rad = 180\, deg \text{ thus.. } 1 = \frac{\pi\, rad}{180\, deg} \text{ and } 1 = \frac{180\, deg}{\pi\, rad}$$

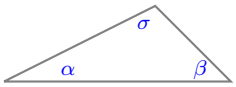
Converting can be achieved by multiplying by the appropriate versions of '1'. To convert from degrees to radians one would multiply by '1' written as $1 = \frac{\pi\, rad}{180\, deg}$. On the other hand, to convert from radians to degrees one would multiply by '1' written as $1 = \frac{180\, deg}{\pi\, rad}$

example: Convert $75\, deg$

$$\begin{aligned} 75\, deg &= 75\, deg \cdot 1 && \text{(MiD)} \\ &= 75\, deg \cdot \frac{\pi\, rad}{180\, deg} && \text{(DDR)} \\ &= 75 \cdot \frac{\pi\, rad}{180} && \text{(Bi, note 'deg' no more)} \\ &\approx 1.309\, rad && \text{(Bi)} \end{aligned}$$

Interior Angels Theorem

For any triangle in Euclidian Space, the sum of the interior angles is 180° i.e. for α, β and σ below



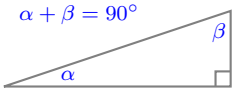
then

$$\alpha + \beta + \sigma = 180^\circ$$

COmplimentary Angels

If the measurement of two angles adds to 90°, these angles are called *complimentary*.
Note: on a right triangle, the two non-right angles are complimentary. i.e. α and β below

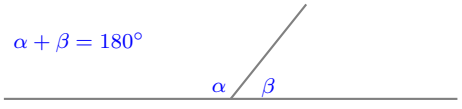
$\alpha + \beta = 90^\circ$



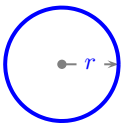
Supplementary Angels

If the measurement of two angles adds to 180°, these angles are called *supplementary*.
Note: on a right triangle, the two non-right angles are complimentary. i.e. α and β below

$\alpha + \beta = 180^\circ$



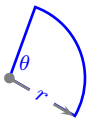
Circles & Portions Of



Area= πr^2

Circ= $2\pi r$

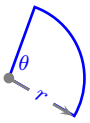
if θ is in degrees



Area= $\pi r^2 \left(\frac{\theta}{360}\right)$

Circ= $2\pi r \left(\frac{\theta}{360}\right)$

if θ is in radians



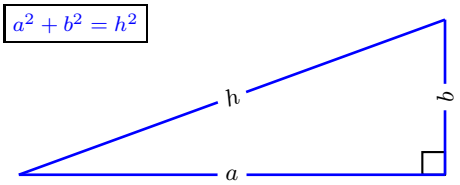
Area= $\pi r^2 \left(\frac{\theta}{2\pi}\right)$

Circ= $2\pi r \left(\frac{\theta}{2\pi}\right)$

Pythagoras Theorem

The pythagoras Theorem is useful, among other things, to solve for the third side of a right triangle when two sides are known.

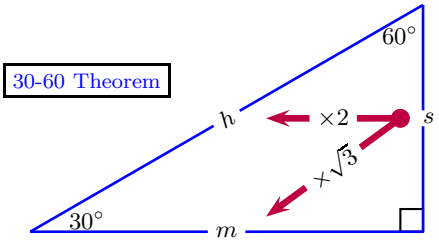
$a^2 + b^2 = h^2$



30-60 Theorem

By knowing *a side & a ratio* on a right triangle, we can determine *all sides* of the triangle. On 30-60 triangles, *we know* the ratios of the sides.

30-60 Theorem



45-45 Theorem

By knowing *a side & a ratio* on a right triangle, we can determine *all sides* of the triangle. On 45-45 triangles, *we know* the ratios of the sides.

45-45 Theorem