Special Triangles

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Special Triangles

The trigonometric ratios are based on a general right angled triangle with general angles. Now, if we consider specific angles, now we are dealing with specific right angles triangles, or **special triangles**. There are two **special triangles** based on three special angles. The three specific angles are $\pi/4$ and $\pi/6, \pi/3$. Let's have a look at these two special triangles.
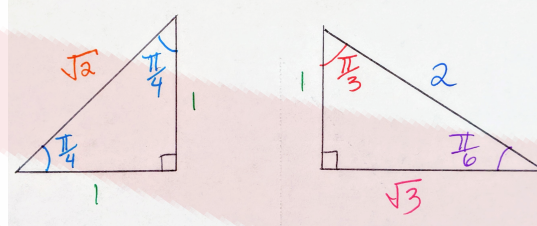
The first special triangle is a right angled triangle with internal angles $45° = \pi/4$ and sides $1, 1$ and hypotenuse $\sqrt{2}$. We have the following trigonometric values for the angles $45° = \pi/4$,

$$\sin 45° = \frac{1}{\sqrt{2}}$$
$$\cos 45° = \frac{1}{\sqrt{2}}$$
$$\tan 45° = 1$$

The second special triangle has angles $60° = \pi/3$ and $30° = \pi6$ with sides of length $\sqrt{3}$ and 1 and hypotenuse length 2. From this triangle we have the following trigonometric values:

$$\sin 60° = \frac{\sqrt{3}}{2}, \quad \sin 30° = \frac{1}{2}$$
$$\cos 60° = \frac{1}{2}, \quad \cos 30° = \frac{\sqrt{3}}{2}$$
$$\tan 60° = \sqrt{3}, \quad \tan 30° = \frac{1}{\sqrt{3}}$$

Exercises

What is the sine, cosine and tangent of the following radian angles?

a) $\frac{\pi}{2}$

f) $\frac{\pi}{3}$

b) $-\pi$

g) $\frac{4\pi}{3}$

c) 3π

h) $\frac{7\pi}{6}$

d) $\frac{\pi}{4}$

i) $\frac{3\pi}{2}$

e) $\frac{\pi}{6}$

j) $\frac{11\pi}{6}$