Function name	Abbreviation	Value
sine of θ	$\sin\theta$	b/c
cosine of θ	$\cos\theta$	a/c
tangent of θ	$\tan\theta$	b/a
cosecant of θ	$\csc\theta$	c/b
secant of θ	$\sec\theta$	c/a
cotangent of θ	$\cot\theta$	a/b

"SOH CAH TOA"

Reciprocal Identities

$$\csc\theta = \frac{1}{\sin\theta} \qquad \sec\theta = \frac{1}{\cos\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$

Quotient Identities

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad\qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

$$b^2 + a^2 = c^2$$
$$\frac{b^2}{c^2} + \frac{a^2}{c^2} = \frac{c^2}{c^2}$$
$$\left(\frac{b}{c}\right)^2 + \left(\frac{a}{c}\right)^2 = 1$$

$$\sin^2\theta + \cos^2\theta = 1$$

$$\sin^2\theta + \cos^2\theta = 1$$

$$\tan^2\theta + 1 = \sec^2\theta$$

$$1 + \cot^2\theta = \csc^2\theta$$

θ (Degrees)

$$\sin\theta = \cos(90^\circ - \theta)$$
$$\cos\theta = \sin(90^\circ - \theta)$$
$$\tan\theta = \cot(90^\circ - \theta)$$
$$\cot\theta = \tan(90^\circ - \theta)$$
$$\sec\theta = \csc(90^\circ - \theta)$$
$$\csc\theta = \sec(90^\circ - \theta)$$
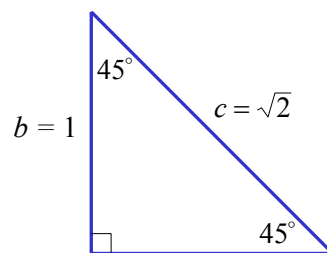
θ (Radians)

$$\sin\theta = \cos(\pi/2 - \theta)$$
$$\cos\theta = \sin(\pi/2 - \theta)$$
$$\tan\theta = \cot(\pi/2 - \theta)$$
$$\cot\theta = \tan(\pi/2 - \theta)$$
$$\sec\theta = \csc(\pi/2 - \theta)$$
$$\csc\theta = \sec(\pi/2 - \theta)$$

$$c^2 = a^2 + b^2 \quad c^2 = 1^2 + 1^2 = 2$$
$$c = \sqrt{2}$$

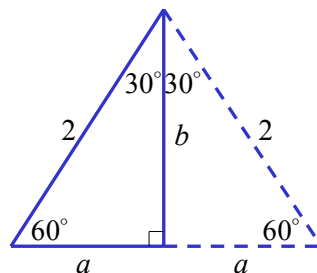$$\sin 45^\circ = \sin\frac{\pi}{4} = \frac{b}{c} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$
$$\cos 45^\circ = \cos\frac{\pi}{4} = \frac{a}{c} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$
$$\tan 45^\circ = \tan\frac{\pi}{4} = \frac{b}{a} = \frac{1}{1} = 1$$
$$\cot 45^\circ = \cot\frac{\pi}{4} = \frac{a}{b} = \frac{1}{1} = 1$$
$$\csc 45^\circ = \csc\frac{\pi}{4} = \frac{c}{b} = \frac{\sqrt{2}}{1} = \sqrt{2}$$
$$\sec 45^\circ = \sec\frac{\pi}{4} = \frac{c}{a} = \frac{\sqrt{2}}{1} = \sqrt{2}$$

$$2a = 2 \text{ so } a = 1 \quad 2^2 = 1^2 + b^2$$
$$c^2 = a^2 + b^2 \quad b^2 = 2^2 - 1^2 = 4 - 1 = 3$$
$$b = \sqrt{3}$$

$$\sin 60^\circ = \sin\frac{\pi}{3} = \frac{b}{c} = \frac{\sqrt{3}}{2} \quad \cos 60^\circ = \cos\frac{\pi}{3} = \frac{a}{c} = \frac{1}{2}$$
$$\tan 60^\circ = \tan\frac{\pi}{3} = \frac{\sin 60^\circ}{\cos 60^\circ} = \frac{\sqrt{3}/2}{1/2} = \frac{\sqrt{3}}{1} = \sqrt{3}$$
$$\cot 60^\circ = \cot\frac{\pi}{3} = \frac{1}{\tan 60^\circ} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$
$$\csc 60^\circ = \csc\frac{\pi}{3} = \frac{1}{\sin 60^\circ} = \frac{1}{\sqrt{3}/2} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$
$$\sec 60^\circ = \sec\frac{\pi}{3} = \frac{1}{\cos 60^\circ} = \frac{1}{1/2} = 2$$

$$\sin 30^\circ = \sin\frac{\pi}{6} = \frac{a}{c} = \frac{1}{2} \quad \cos 30^\circ = \cos\frac{\pi}{6} = \frac{b}{c} = \frac{\sqrt{3}}{2}$$
$$\tan 30^\circ = \tan\frac{\pi}{6} = \frac{\sin 30^\circ}{\cos 30^\circ} = \frac{1/2}{\sqrt{3}/2} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$
$$\cot 30^\circ = \cot\frac{\pi}{6} = \frac{1}{\tan 30^\circ} = \frac{1}{1/\sqrt{3}} = \sqrt{3}$$
$$\csc 30^\circ = \csc\frac{\pi}{6} = \frac{1}{\sin 30^\circ} = \frac{1}{1/2} = 2$$
$$\sec 30^\circ = \sec\frac{\pi}{6} = \frac{1}{\cos 30^\circ} = \frac{1}{\sqrt{3}/2} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

Use a calculator to find the approximate value of

(a) $\sin 52°$ (b) $\tan \dfrac{\pi}{5}$ (c) $\sec \dfrac{\pi}{5}$