Warmup

Find the indicated part of $\triangle ABC$.

1. b = 12, c = 10, $\angle A = 38°$, find a $a = 7.41$

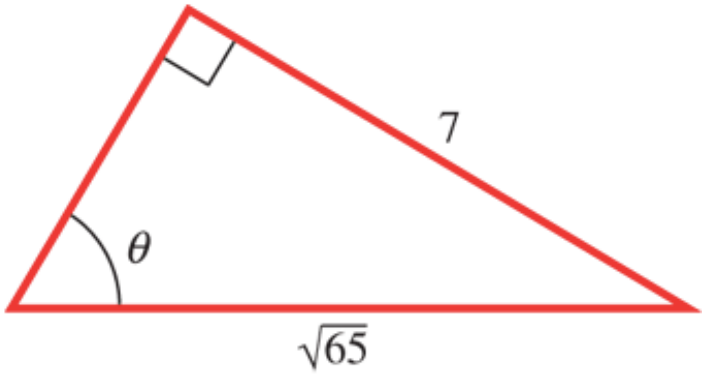
2. a = 30, c = 37, $\angle B = 102.6°$, find b $b = 52.47$

3. a = 14, b = 15, c = 18, find $\angle A$ $\angle A = 49.18°$

4. a = 18, b = 29, c = 16, find the largest angle, smallest angle $\angle B = 116.94°$ $\angle C = 29.46°$

1.3 - Right Triangle Ratios

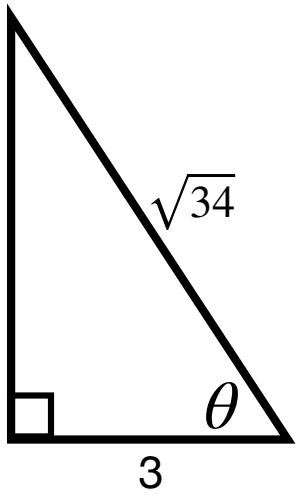
Practice: Give the values of the six trigonometric functions of θ.



$$\sin\theta = \frac{7\sqrt{65}}{65} \qquad \csc\theta = \frac{\sqrt{65}}{7}$$

$$\cos\theta = \frac{4\sqrt{65}}{65} \qquad \sec\theta = \frac{\sqrt{65}}{4}$$

$$\tan\theta = \frac{7}{4} \qquad \cot\theta = \frac{4}{7}$$



$$\sin\theta = \frac{5\sqrt{34}}{34} \qquad \csc\theta = \frac{\sqrt{34}}{5}$$

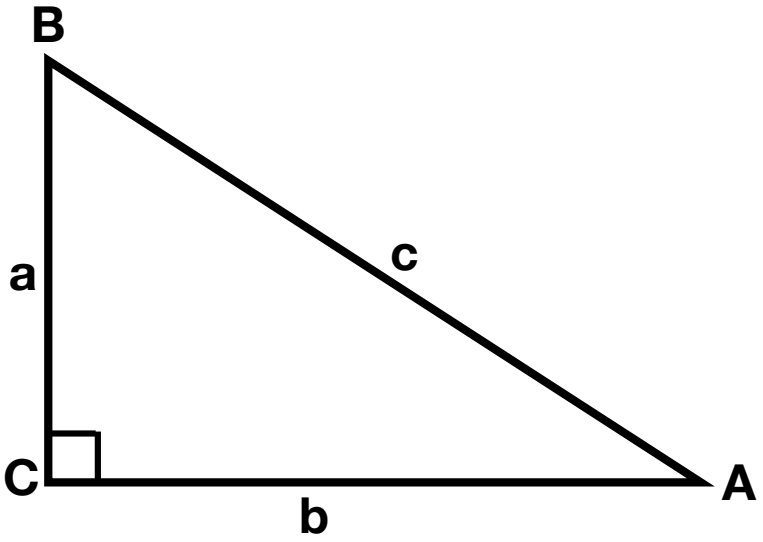
$$\cos\theta = \frac{3\sqrt{34}}{34} \qquad \sec\theta = \frac{\sqrt{34}}{3}$$

$$\tan\theta = \frac{5}{3} \qquad \cot\theta = \frac{3}{5}$$

Cofunction Identities

1.3 - Right Triangle Ratios

Cofunction identities



$$\sin A = \frac{a}{c} \qquad \cos B = \frac{a}{c}$$

$$B = 90 - A$$

Cofunction

$$\sin A = \cos(90 - A)$$

$$\cos A = \sin(90 - A)$$

$$\tan A = \frac{a}{b} \qquad \cot B = \frac{a}{b}$$

$$\tan A = \cot(90 - A)$$

$$\cot A = \tan(90 - A)$$

$$\csc A = \sec(90 - A)$$

$$\sec A = \csc(90 - A)$$

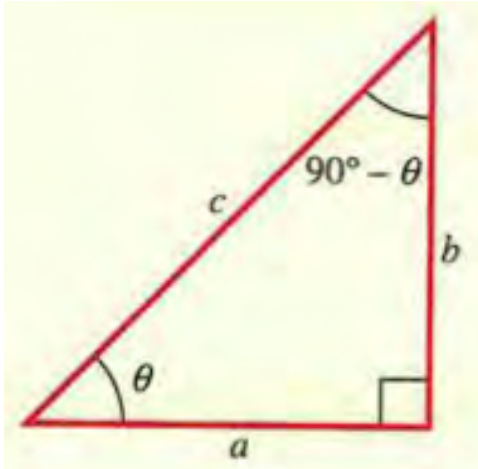
1.3 - Right Triangle Ratios

Cofunction identities

$\sin\theta = \cos(90^\circ - \theta)$ $\quad$ $\cos\theta = \sin(90^\circ - \theta)$

$\tan\theta = \cot(90^\circ - \theta)$ $\quad$ $\cot\theta = \tan(90^\circ - \theta)$

$\sec\theta = \csc(90^\circ - \theta)$ $\quad$ $\csc\theta = \sec(90^\circ - \theta)$



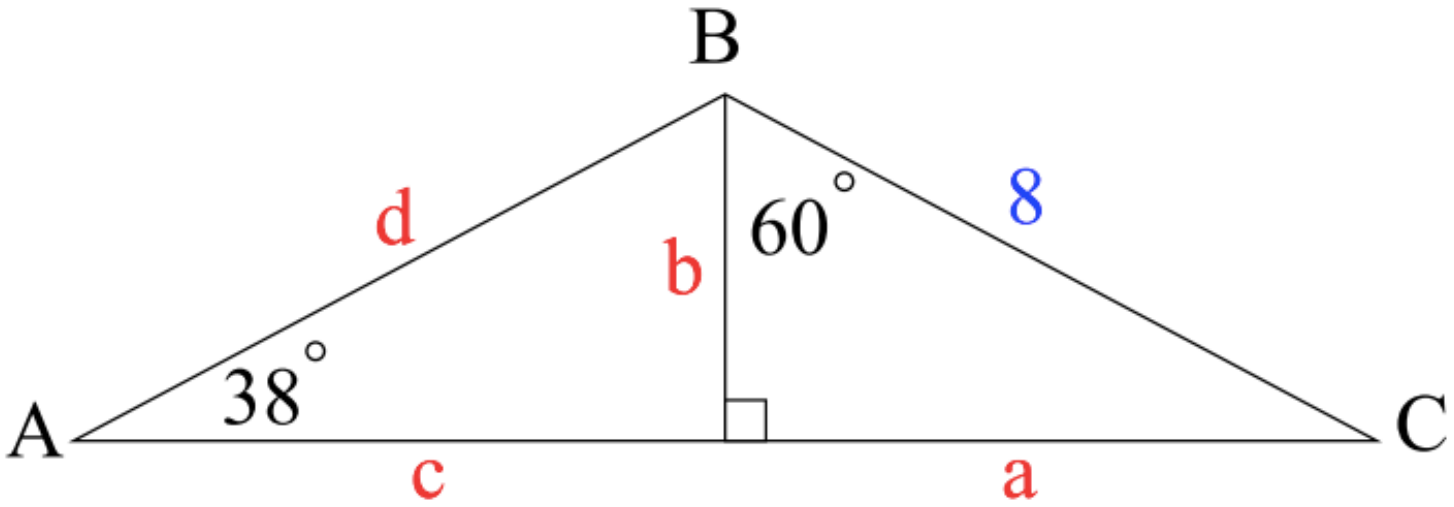
Practice - Convert to cofunction

1. $\sin(34^\circ)$ $\quad$ 2. $\sec(23^\circ)$ $\quad$ 3. $\cot(85^\circ)$

$\cos(56^\circ)$ $\quad$ $\csc(67^\circ)$ $\quad$ $\tan(5^\circ)$

1.3 - Right Triangle Ratios

Practice: Find the missing sides to the nearest tenth.

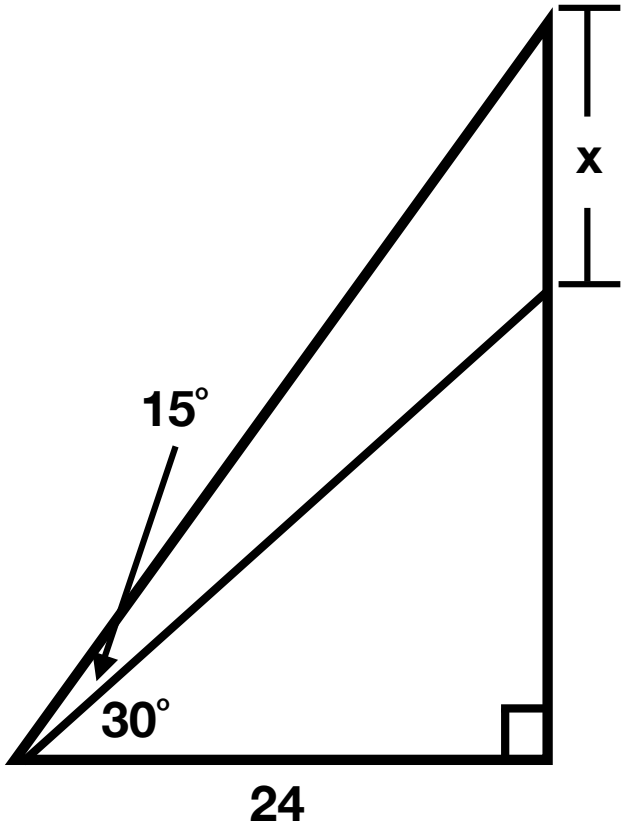


$a = 4\sqrt{3}$ $\quad c = 5.1$

$b = 4$ $\quad d = 6.5$

1.3 - Right Triangle Ratios

Practice: Calculate x.



$$x = 24 - 8\sqrt{3} \approx 10.14$$

Other Trigonometric Functions

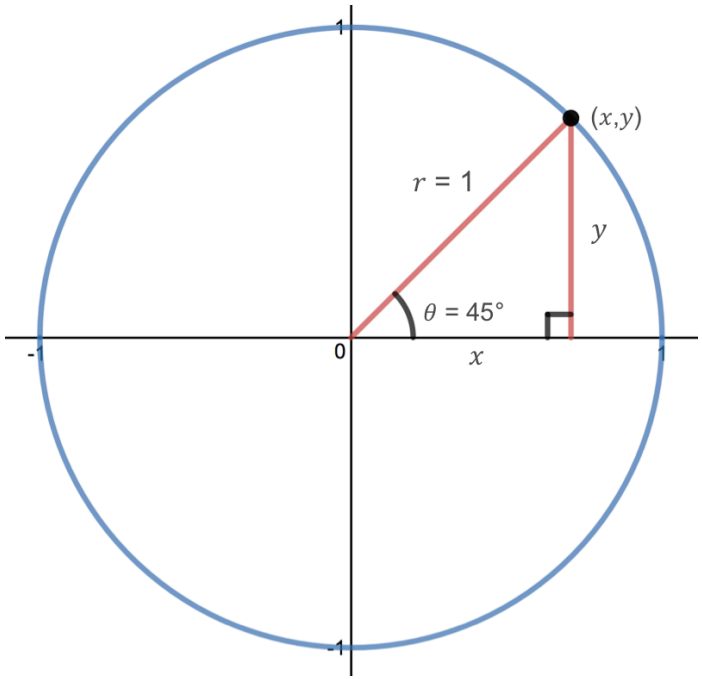
Other Trig Functions

Find the sin, cos, tan of 45°

$$\sin 45^\circ = \frac{\sqrt{2}}{2}$$

$$\cos 45^\circ = \frac{\sqrt{2}}{2}$$

$$\tan 45^\circ = 1$$



$$\csc 45^\circ = \frac{1}{\sin 45^\circ} = \frac{2}{\sqrt{2}} = \sqrt{2}$$

$$\sec 45^\circ = \frac{1}{\cos 45^\circ} = \sqrt{2}$$

$$\cot 45^\circ = \frac{1}{\tan 45^\circ} = 1$$

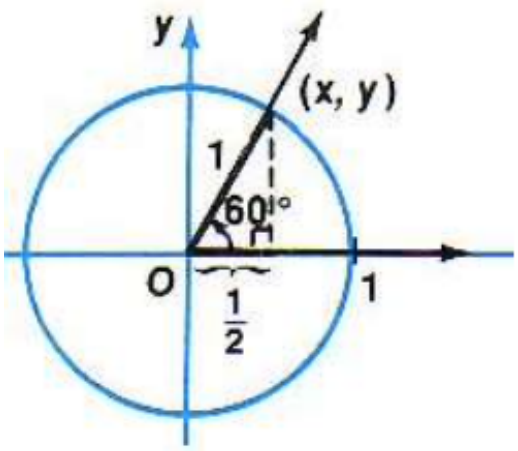
Other Trig Functions

Find the sin, cos, tan of 60°

$$\sin 60^\circ = \frac{\sqrt{3}}{2}$$

$$\cos 60^\circ = \frac{1}{2}$$

$$\tan 60^\circ = \sqrt{3}$$



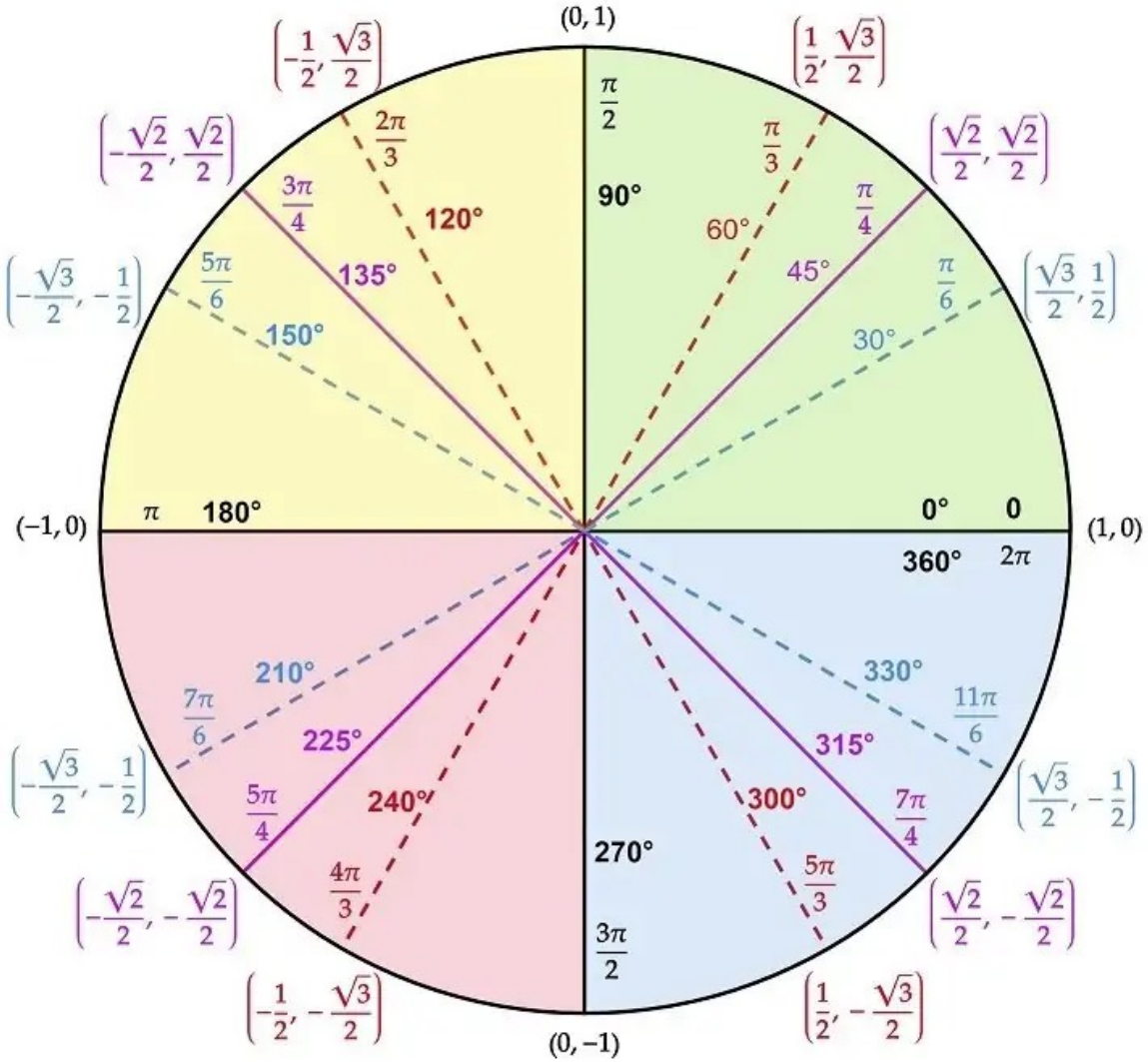
$$\csc 60^\circ = \frac{1}{\sin 60^\circ} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$\sec 60^\circ = \frac{1}{\cos 60^\circ} = \frac{2}{1} = 2$$

$$\cot 60^\circ = \frac{1}{\tan 60^\circ} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

Other Trig Functions

Unit Circle



Other Trig Functions

$$\csc 60^\circ = \frac{1}{\sin 60^\circ} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$\cot 60^\circ = \frac{1}{\tan 60^\circ} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\sec 60^\circ = \frac{1}{\cos 60^\circ} = \frac{2}{1} = 2$$

$$\tan 60^\circ = \frac{\sin 60^\circ}{\cos 60^\circ} = \sqrt{3}$$

Practice - without a calculator

1. $\sec(135^\circ)$ $-\sqrt{2}$
2. $\csc(30^\circ)$ 2
3. $\cot(-60^\circ)$ $-\frac{\sqrt{3}}{3}$
4. $\tan(90^\circ)$ *undefined*

Other Trig Functions

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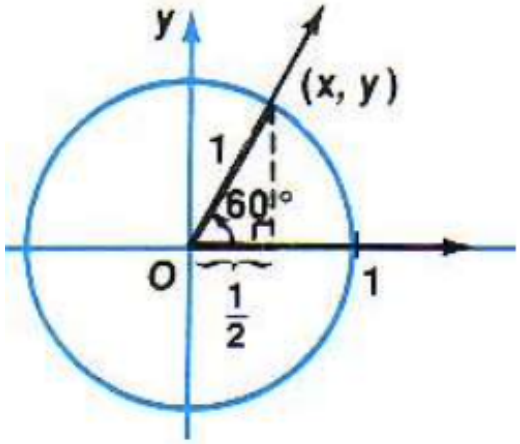
Find the sin, cos, tan of 60°

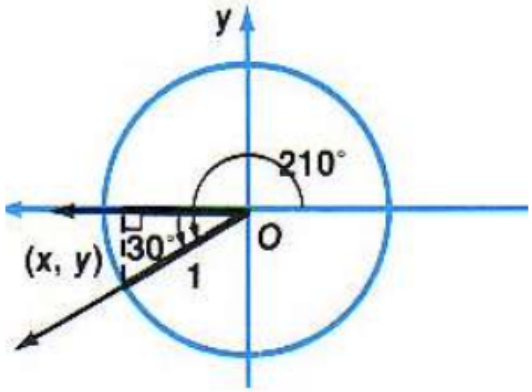


$$\sin 60^\circ = \frac{\sqrt{3}}{2}$$

$$\cos 60^\circ = \frac{1}{2}$$

$$\tan 60^\circ = \sqrt{3}$$

Find the sin, cos, tan of 210°



$$\sin 210^\circ = -\frac{1}{2}$$

$$\cos 210^\circ = -\frac{\sqrt{3}}{2}$$

$$\tan 210^\circ = \frac{\sqrt{3}}{3}$$

Practice - without a calculator

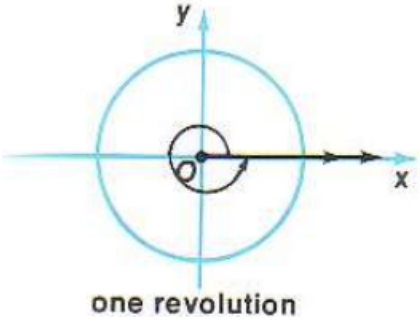
1. $\tan(270^\circ)$ — *undefined*

2. $\cot(90^\circ)$ — 0

3. $\sec(\pi)$ — -1

3.1.2 - Degrees vs. Radians

Find the least positive angle that is coterminal



one revolution

$$\frac{2\pi}{360^\circ} = \frac{\pi}{180^\circ}$$

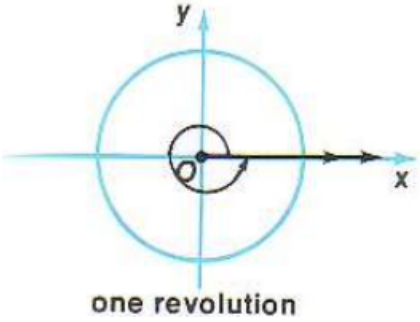
1920° $= 1920^\circ - 5(360^\circ) = 120^\circ$

-495° $= -495^\circ + 2(360^\circ) = 225^\circ$

$\frac{41\pi}{6}$ $= \frac{41\pi}{6} - 6\pi = \frac{5\pi}{6}$

3.1.2 - Degrees vs. Radians

Find the least positive angle that is coterminal



$$\frac{2\pi}{360^\circ} = \frac{\pi}{180^\circ}$$

$1920^\circ \quad = 1920^\circ - 5(360^\circ) = 120^\circ$

$-495^\circ \quad = -495^\circ + 2(360^\circ) = 225^\circ$

$$\frac{41\pi}{6} \quad = \frac{41\pi}{6} - 6\pi = \frac{5\pi}{6}$$

Practice

1. $\tan(3270^\circ)$ $\quad \frac{\sqrt{3}}{3}$

2. $\cos(-2385^\circ)$ $\quad -\frac{\sqrt{2}}{2}$

3. $\sin(\frac{-295\pi}{3})$ $\quad -\frac{\sqrt{3}}{2}$