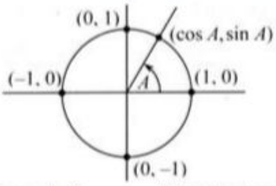
Must use the Index.

Triantánacht — Trigonometry

$\tan A = \dfrac{\sin A}{\cos A}$ $\quad \cot A = \dfrac{\cos A}{\sin A}$

$\sec A = \dfrac{1}{\cos A}$ $\quad \operatorname{cosec} A = \dfrac{1}{\sin A}$



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

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

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

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

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

Nóta: Bíonn $\tan A$ agus $\sec A$ gan sainiú nuair $\cos A = 0$.
Bíonn $\cot A$ agus $\operatorname{cosec} A$ gan sainiú nuair $\sin A = 0$.

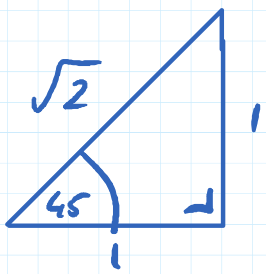
Note: $\tan A$ and $\sec A$ are not defined when $\cos A = 0$.
$\cot A$ and $\operatorname{cosec} A$ are not defined when $\sin A = 0$.

A (céimeanna)	0°	90°	180°	270°	30°	45°	60°	A (degrees)
A (raidiain)	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	A (radians)
$\cos A$	1	0	−1	0	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\cos A$
$\sin A$	0	1	0	−1	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\sin A$
$\tan A$	0	-	0	-	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$\tan A$

1 rad. ≈ 57.296° $\quad$ 1° ≈ 0.01745 rad.

Clár / Contents

45°



$1^2 + 1^2 = \sqrt{2}$

$\sin 45 = \dfrac{1}{\sqrt{2}}$

$\cos 45 = \dfrac{1}{\sqrt{2}}$

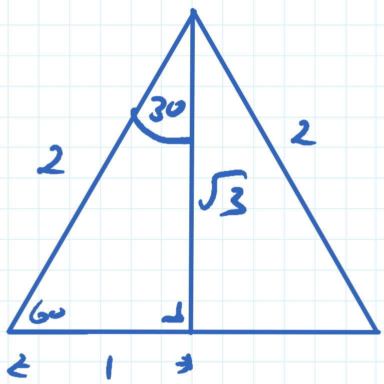
$\tan 45 = 1$

$1^2 + x^2 = 2^2$

$x = \sqrt{3}$

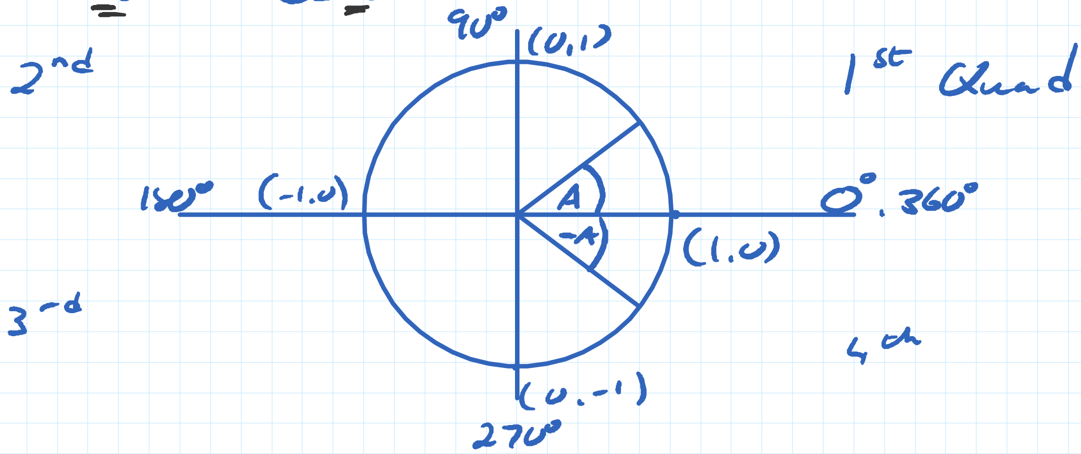
$\sin 60 = \dfrac{\sqrt{3}}{2}$

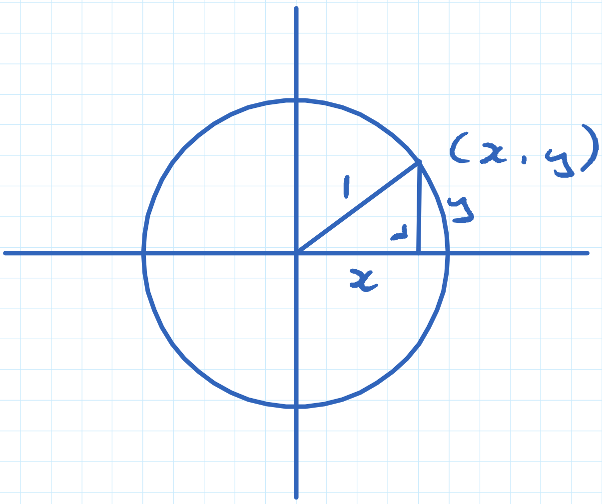
$\cos 30 = \dfrac{\sqrt{3}}{2}$

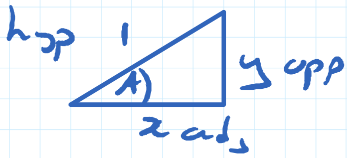


Equilateral of side 2
Bisect the angle which will be the perpendicular bisector.

Unit Circle







$\cos A = x$

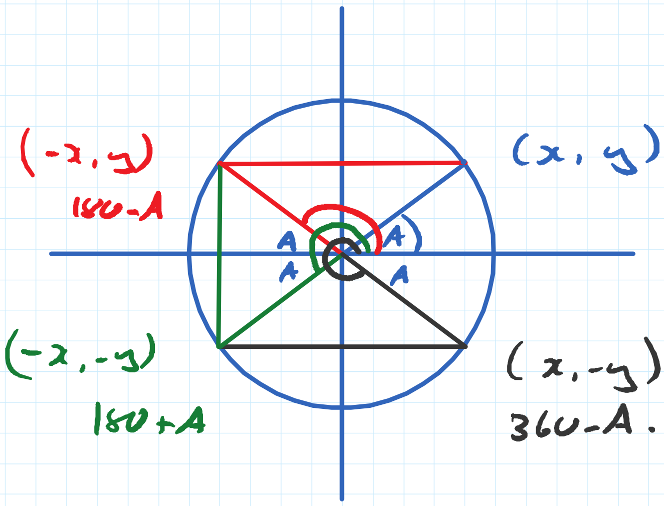
$\sin A = y$

$$(x, y) = (\cos A, \sin A)$$

$$\tan A = \frac{y}{x} = \frac{\sin A}{\cos A}.$$

Cos −
Sin +
Tan −

Cos −
Sin −
Tan +



Cos +
Sin +
Tan +

Cos +
Sin −
Tan −

Learn.

Sin pos	Silly S + C − T −	S + C + T +	All All positive
Tan pos	Tom S − C − T +	S − C + T −	cats Cos pos

$180-\theta$ $\pi-\theta$	θ
$180+\theta$ $\pi+\theta$	$360-\theta$ $2\pi-\theta$

Solve $\quad \sin x = -\frac{\sqrt{3}}{2} \quad 0 \le x \le 360°$

S	A
T ✓	C ✓

$\sin x = -\frac{\sqrt{3}}{2}$

Sin is negative

Where is sin negative?

3rd and 4th

Drop the sign

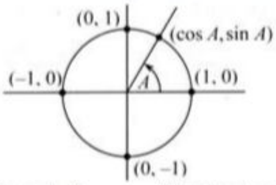
$\sin x = \frac{\sqrt{3}}{2}$ find x

either with cal

or tables.

$\tan A = \dfrac{\sin A}{\cos A}$ $\cot A = \dfrac{\cos A}{\sin A}$

$\sec A = \dfrac{1}{\cos A}$ $\operatorname{cosec} A = \dfrac{1}{\sin A}$



$\cos^2 A + \sin^2 A = 1$
$\sec^2 A = 1 + \tan^2 A$

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

Nóta: Bíonn $\tan A$ agus $\sec A$ gan sainiú nuair $\cos A = 0$.
Bíonn $\cot A$ agus $\operatorname{cosec} A$ gan sainiú nuair $\sin A = 0$.

Note: $\tan A$ and $\sec A$ are not defined when $\cos A = 0$.
$\cot A$ and $\operatorname{cosec} A$ are not defined when $\sin A = 0$.

A (céimeanna)	0°	90°	180°	270°	30°	45°	60°	A (degrees)
A (raidiain)	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	A (radians)
$\cos A$	1	0	−1	0	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\cos A$
$\sin A$	0	1	0	−1	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\sin A$
$\tan A$	0	-	0	-	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$\tan A$

1 rad. ≈ 57.296° 1° ≈ 0.01745 rad.

Clár / Contents

Go to Sin line across to $\frac{\sqrt{3}}{2}$

Go up $\Rightarrow \theta = 60°$

$180-\theta$	θ
$180+\theta$	$360-\theta$

Answers

$x = 240°$ or $300°$.

$\cos\theta = -\frac{\sqrt{3}}{2}$, $0 \le \theta \le 360°$

$180-\theta$ ✓	S	A
$180+\theta$ ✓	T	C

Cos is negative 2nd + 3rd

$\cos\theta = \frac{\sqrt{3}}{2} \Rightarrow$ 1st quad answer

$\theta = 30°$ (reference angle)

$\theta = 150°$ or $210°$.

$\tan A = \frac{1}{\sqrt{2}}$ $0 \le A \le 2\pi$

$\pi-\theta$	S	A ✓	
$\pi+\theta$	T ✓	C	$2\pi-\theta$

Tan is positive 1st + 3rd

$\tan A = \frac{1}{\sqrt{2}}$

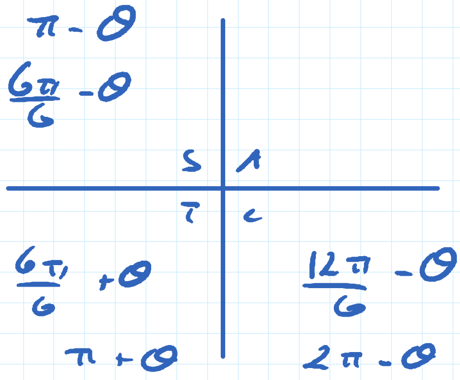
$A = 0.615$

$$= 0.62$$

$$A = 0.62 \quad \text{or} \quad 3.14 + 0.62$$

$$= 0.62 \text{ rads} \quad \text{or} \quad 3.76 \text{ radians.}$$

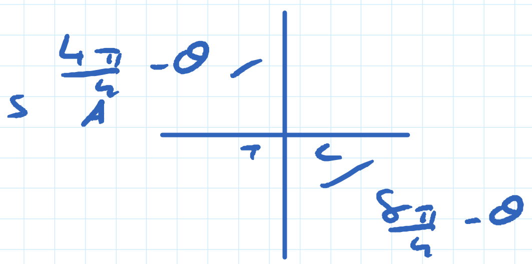
$\sin\theta = \frac{1}{2}$ find $0 \le \theta \le 2\pi$.



$$\sin\theta = \frac{1}{2}$$

$$\theta = \frac{\pi}{6} \quad \text{or} \quad \frac{5\pi}{6}$$

$\tan\theta = -1$ find $0 \le \theta \le 2\pi$.

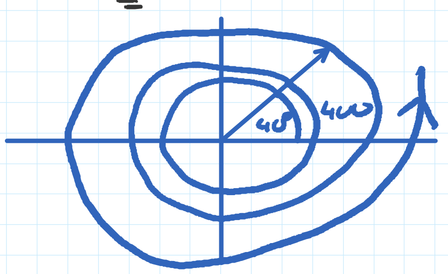


$$\tan\theta = 1$$

$$\theta = \frac{\pi}{4}$$

$$\theta = \frac{3\pi}{4} \quad \text{or} \quad \frac{7\pi}{4}$$

Revolutions.



$$40 = 400° = 760$$

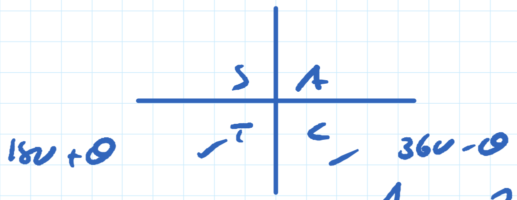
$$= 40 + 360n$$

$n = 0 \Rightarrow$ no full revolution

$n = 1 \Rightarrow 1$ revolution

$n = 2 \Rightarrow 2$ revolution.

$\sin A = -\frac{\sqrt{3}}{2}$ find A in degrees



$\sin A = \frac{\sqrt{3}}{2}$

$A = 60°$

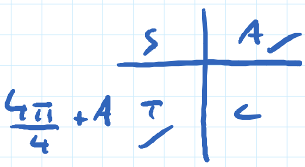
$A = 240 + 360n$

$A = 300 + 360n$

where $n \in N \Rightarrow$ number of rotations.

These are called the general solutions.

$\tan\theta = 1$ find θ in radians.



$\tan\theta = 1$

$\theta = \frac{\pi}{4} + 2n\pi$

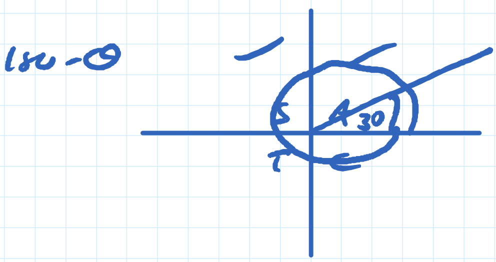
$\theta = \frac{5\pi}{4} + 2n\pi$

$A = 50$ find $\sin 3A$.

First $3A \Rightarrow 3(50) = 150$

Second $\sin 150 = \frac{1}{2}$.

$\sin 3A = \frac{1}{2}$ find $0 \le A \le 180°$



$0 \le 3A \le 540$

$3A = 30°$ $3A = 150$

$A = 10°$ $A = 50°$

$3A = 390$ $3A = 510$

$A = 130°$ $A = 170°$

$\cancel{3A = 750}$

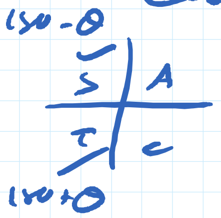
$30° = 390° = 750 = 1110$

$\cos 2A = -\frac{1}{2}$ find $0 \le A \le 360°$.

$0 \le 2A \le 720$

$\cos 2A = \frac{1}{2}$ $\quad 2A = 60°$

$\boxed{\text{Rubbish. } A = 30,\ 180-30,\ 180+30}$



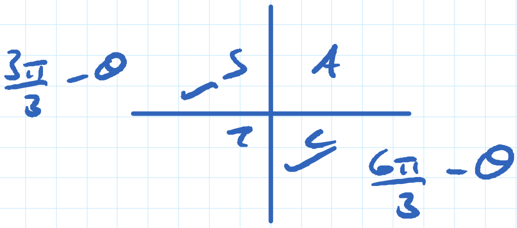
$2A = 120$ or 240 or 480 or 600

$A = 60$ or 120 or 240 or 300

$\cancel{2A = 840}$

$\tan 2A = -\sqrt{3}$ $\quad 0 \le A \le \pi$

$0 \le 2A \le 2\pi$



$\tan 2A = \sqrt{3}$

$2A = \frac{\pi}{3}$

$\frac{2\pi}{3} + \frac{6\pi}{3}$

$2A = \frac{2\pi}{3}$ or $\frac{5\pi}{3}$ or $\cancel{\frac{8\pi}{3}}$

$A = \frac{\pi}{3}$ or $\frac{5}{6}\pi$