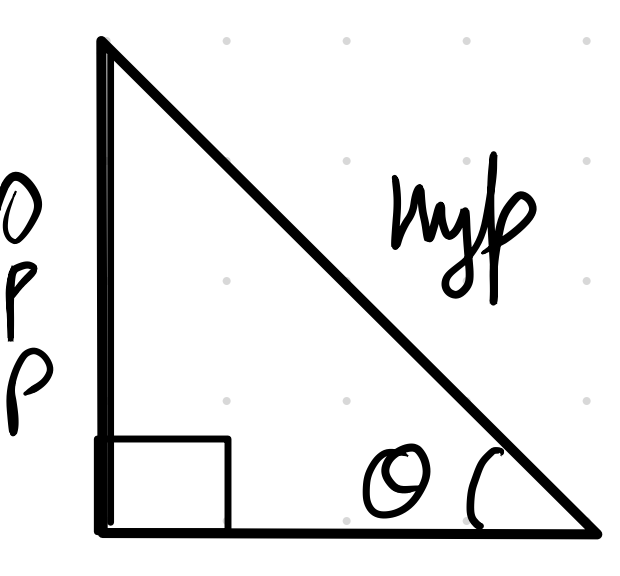
SOH CAH TOA

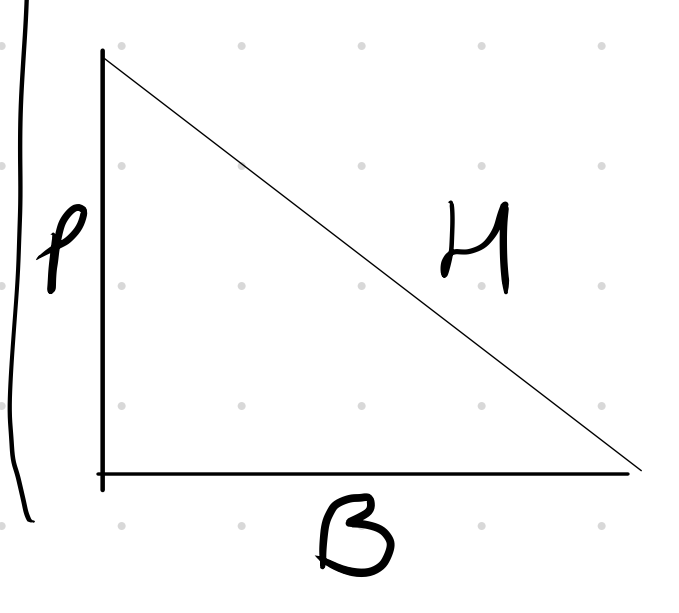


$\sin\theta = \frac{opp}{hyp}$

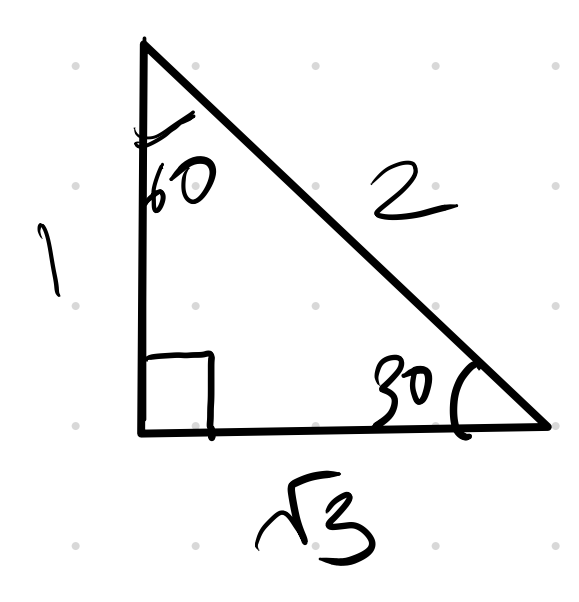
$\cos\theta = \frac{adj}{hyp}$

$\tan\theta = \frac{opp}{Adj}$

sin	cos	tan
$\frac{P}{H}$	$\frac{B}{H}$	$\frac{P}{B}$



Q $\sin(30^\circ)$?

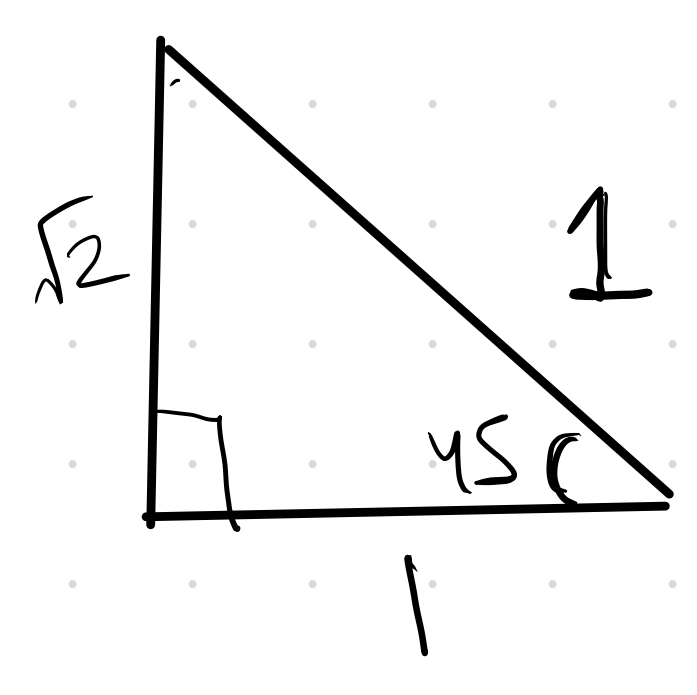


since $\sin 30 = \frac{1}{2} = \frac{opp}{hyp}$

	sin	cos	tan
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	undefined

Q $\cos(\pi/4)$? $= \cos(45^\circ)$

$\frac{\pi}{4} \times \frac{180}{\pi} = 45^\circ$



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

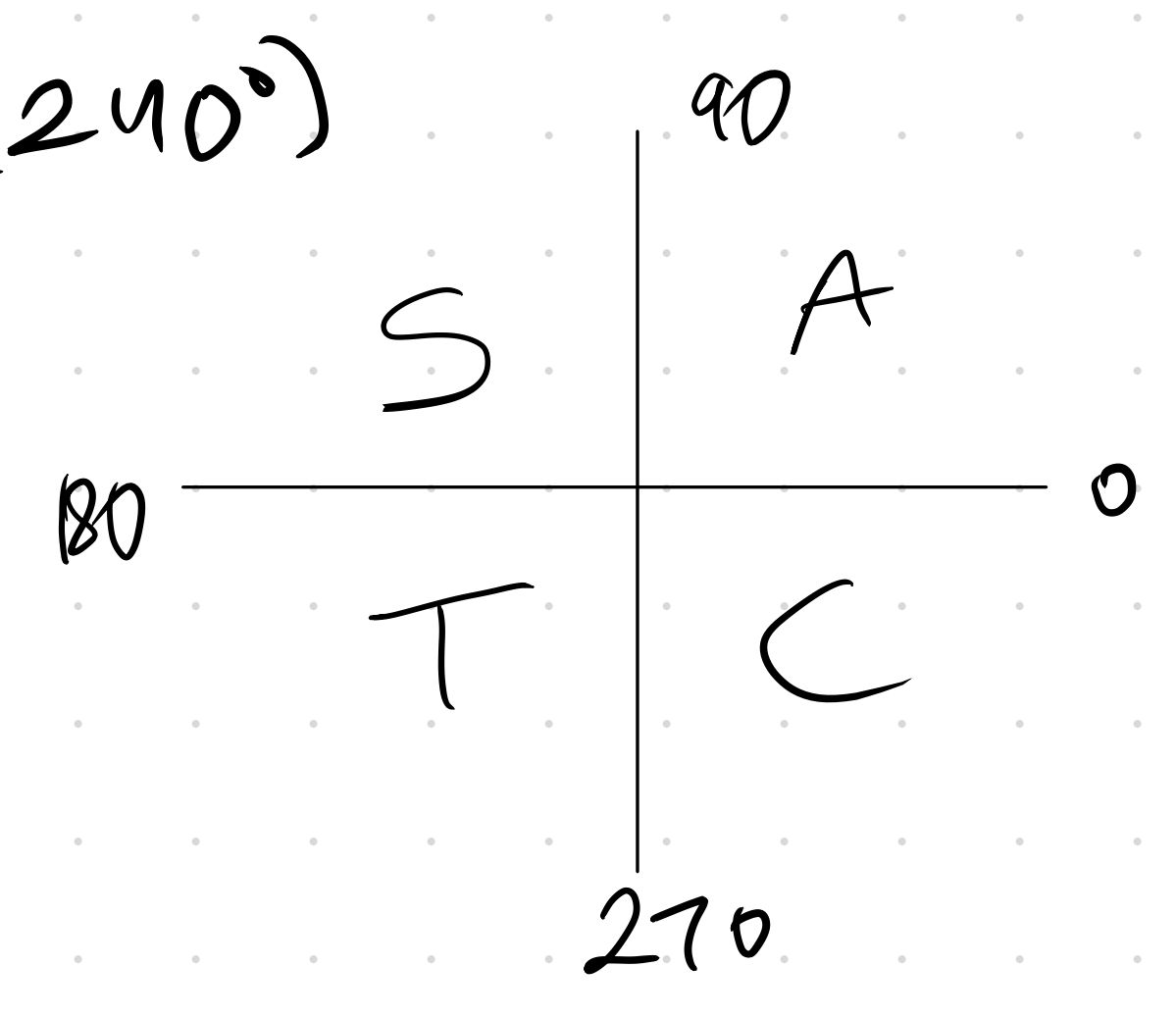
$\tan\left(\frac{\pi}{4}\right) = 1$

$\sin(a \pm b) = \sin a \cos b \pm \cos a \sin b$

$\cos(a \pm b) = \cos a \cos b \mp \sin a \sin b$

$\tan(a \pm b) = \frac{\tan a \pm \tan b}{1 \mp \tan a \tan b}$

Q $\sin(240^\circ)$

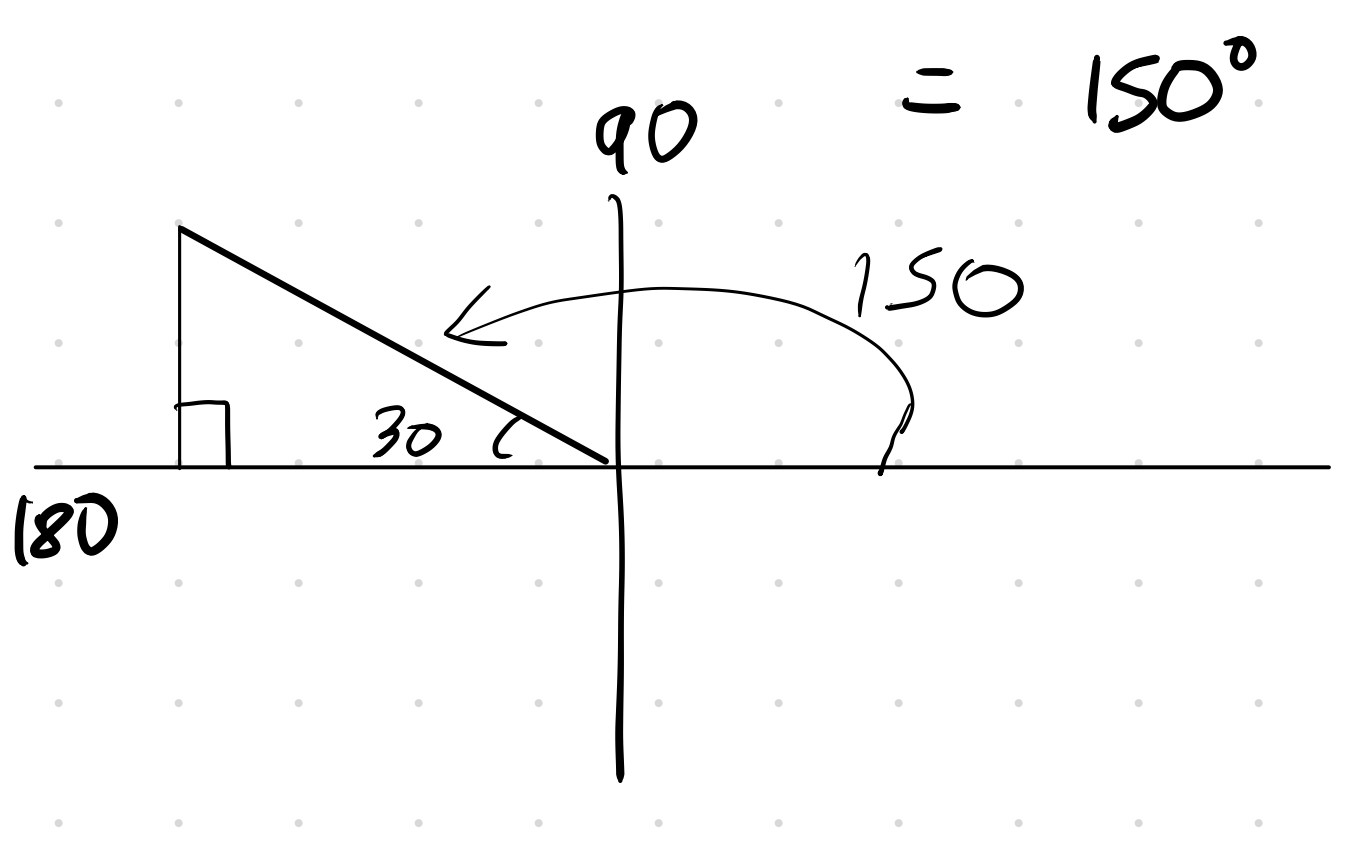


$\sin(240) = -\frac{\sqrt{3}}{2}$

$\cos\left(5\frac{\pi}{6}\right)$?

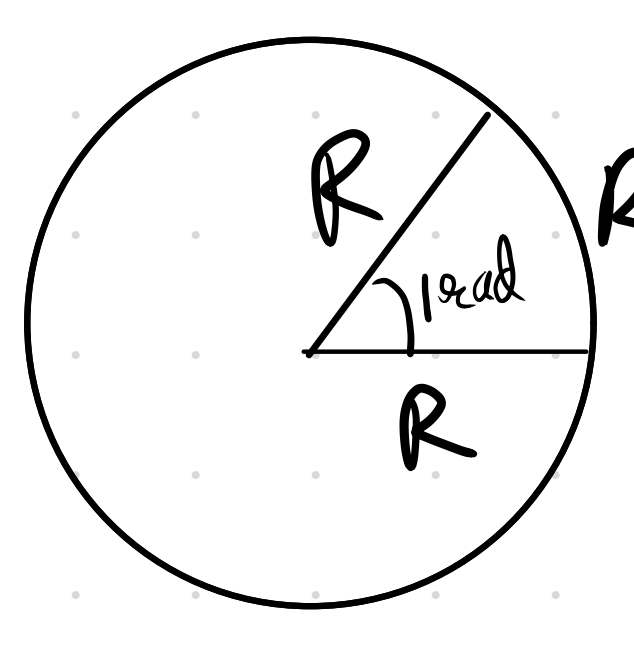
$5\frac{\pi}{6} \times \frac{180}{\pi}$ (180 ÷ 6 = 30)

$= 150^\circ$



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

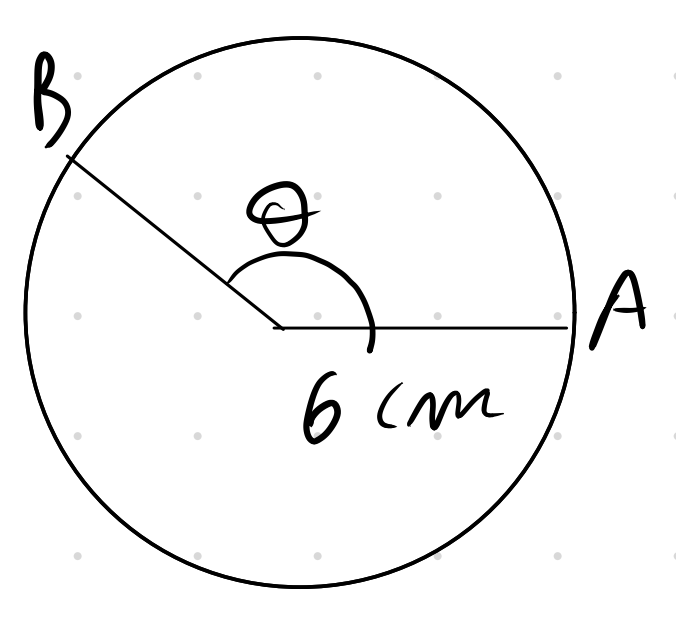
Radian



$1\,rad = \theta$

$\theta = \frac{\text{arc length}}{\text{Radius}}$

Q



AB = 12 cm

$\because \theta = \frac{s}{R} = \frac{12}{6} = 2\,rad$

// $\sin\theta = \sin(360 + \theta)$

$\sin 60 = \sin(420)$

Q $\cos\left(-2\frac{\pi}{3}\right)$

$\cos\left(-2\frac{\pi}{3} \times \frac{180}{\pi}\right)$ (180 ÷ 3 = 60)

$= \cos(-120) = \cos(-60)$

$= -\frac{1}{2}$

ODD

$\sin(-x) = -\sin x$

$\csc(-x) = \csc x$

$\tan(-x) = -\tan x$

$\cot(-x) = -\cot x$

$\sec(-x) = \sec x$

$\cos(-x) = \cos x$

Relation

$\tan x = \frac{\sin x}{\cos x} = \frac{1}{\cot x} = \frac{\sec x}{\operatorname{cosec} x}$

$\cot x = \frac{\cos x}{\sin x} = \frac{1}{\tan x} = \frac{\operatorname{cosec} x}{\sec x}$

$\sec x = \tan x \operatorname{cosec} x = \frac{1}{\cos x} = \frac{\operatorname{cosec} x}{\cot x}$

$\operatorname{cosec} x = \frac{\sec x}{\tan x} = \frac{1}{\sin x} = \sec x \cot x$

// sin x & cos x are complementary

$\sin(90 - \theta) = \cos\theta$ & $\cos(90 - \theta) = \sin\theta$

Tangent & cotangent are complementary

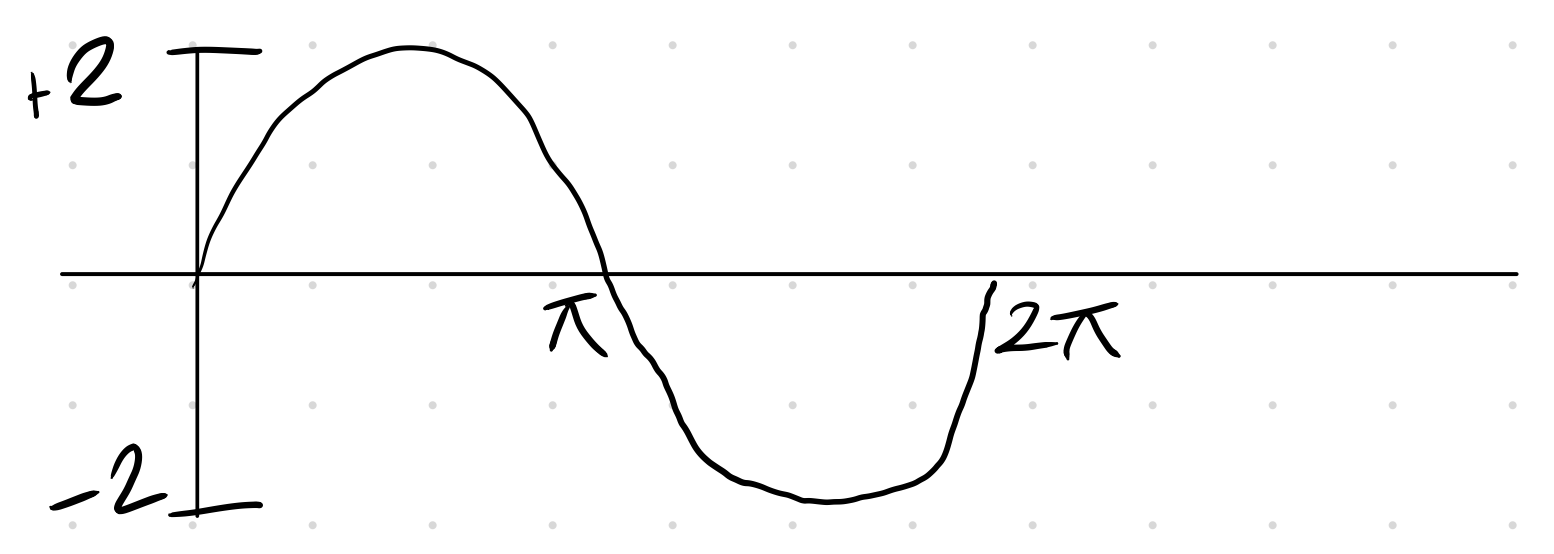
$\tan(90 - \theta) = \cot\theta$ & $\cot(90 - \theta) = \tan\theta$

Secant & cosecant are complementary

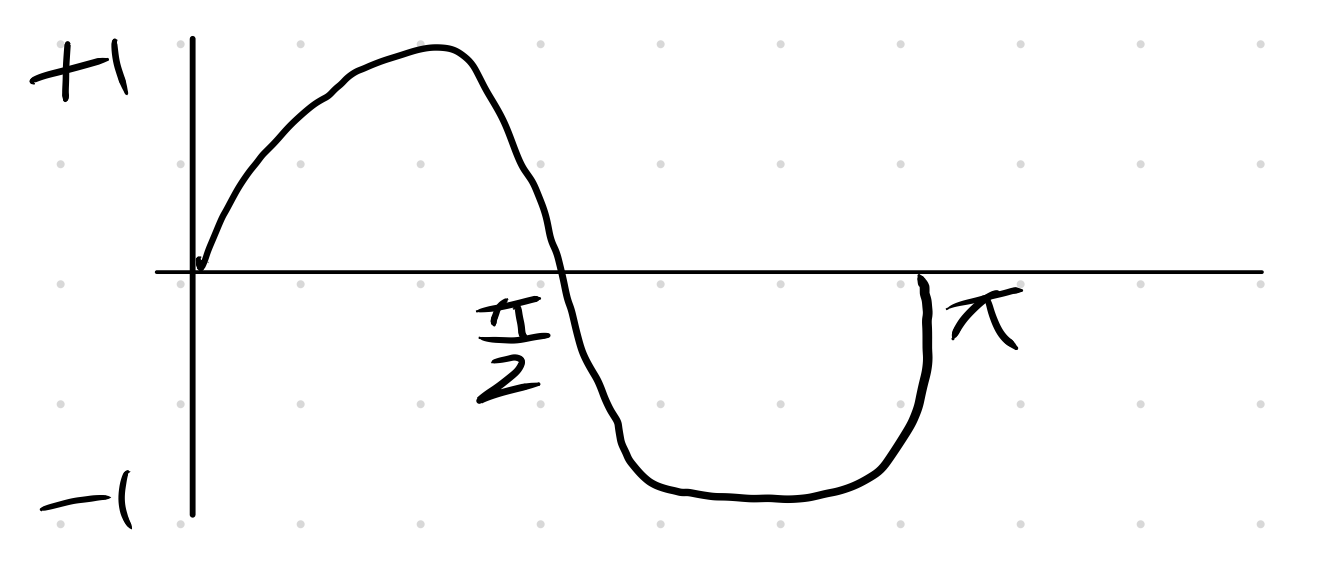
$\operatorname{cosec}(90 - \theta) = \sec\theta$ & $\sec(90 - \theta) = \operatorname{cosec}\theta$

Graphs

$y = 2\sin x$



$y = \sin(2x)$



standard form $y = A\sin(Bx + C) + D$

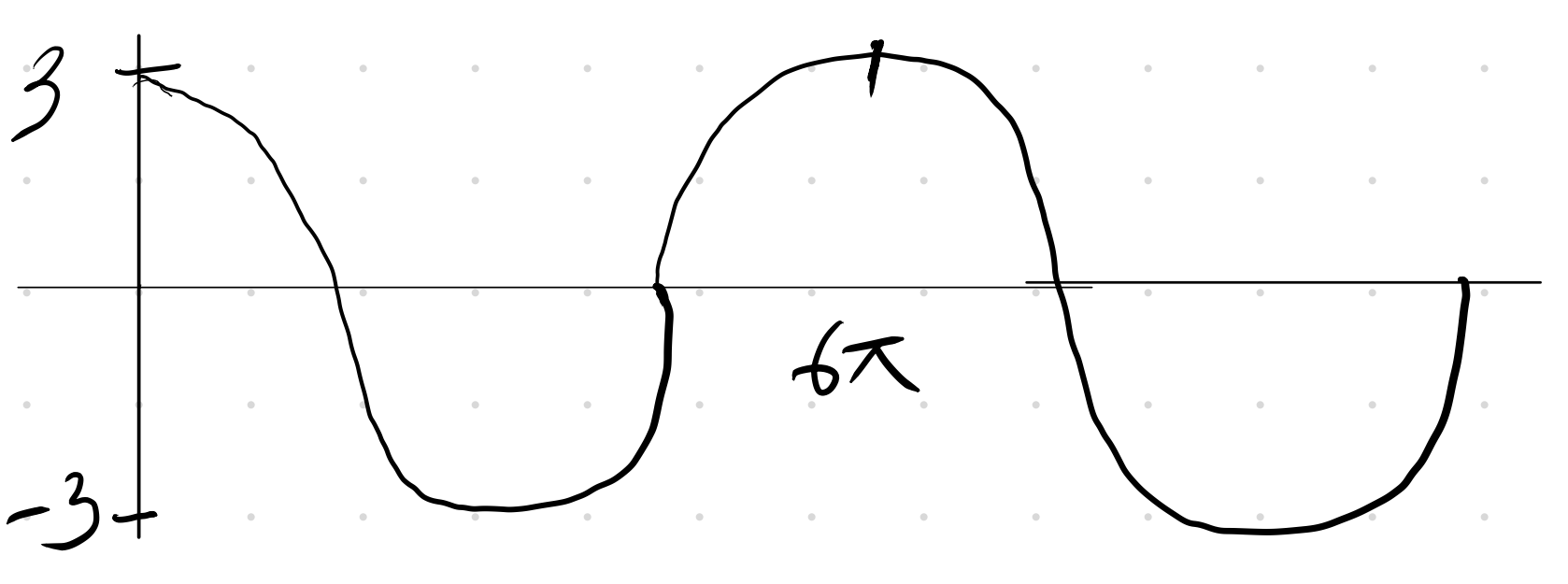
A = amplitude B = helps finding period

C = phase shift (horizontal) D = vertical phase shift

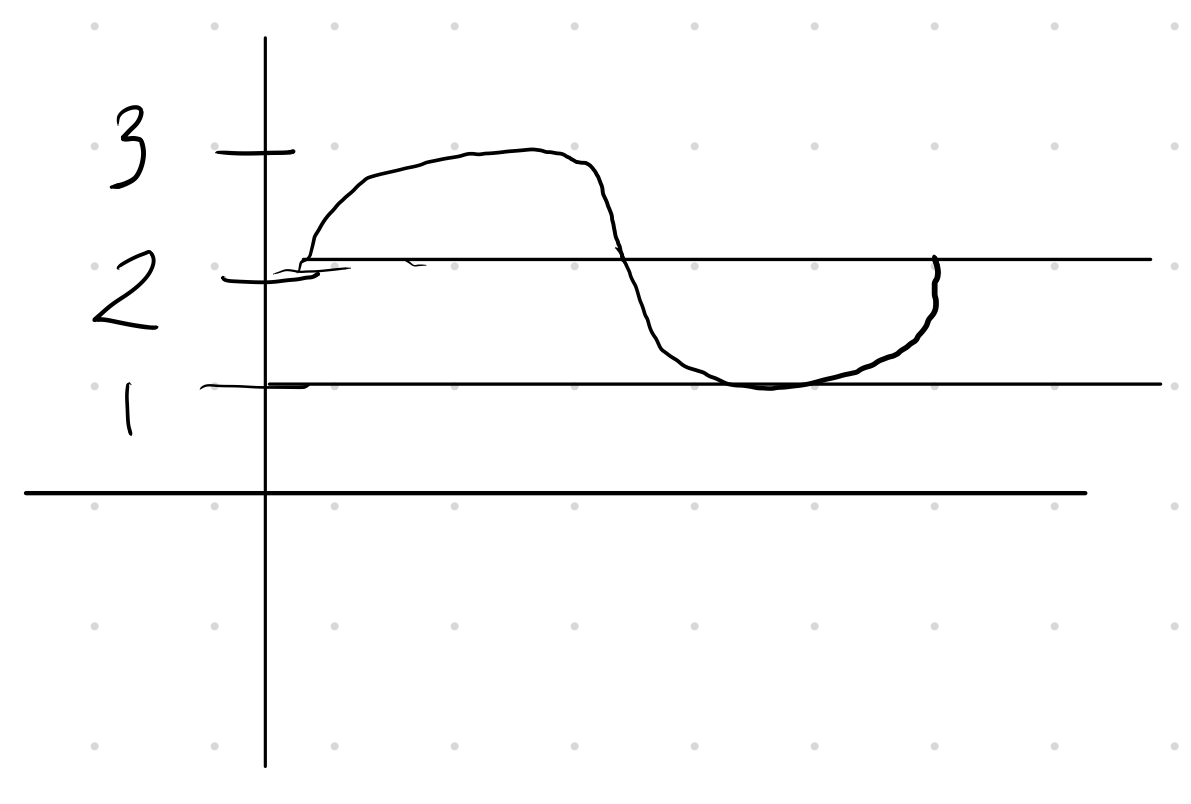
Period $= \frac{2\pi}{B}$

Q Graph $3\cos\left(\frac{1}{3}x\right)$

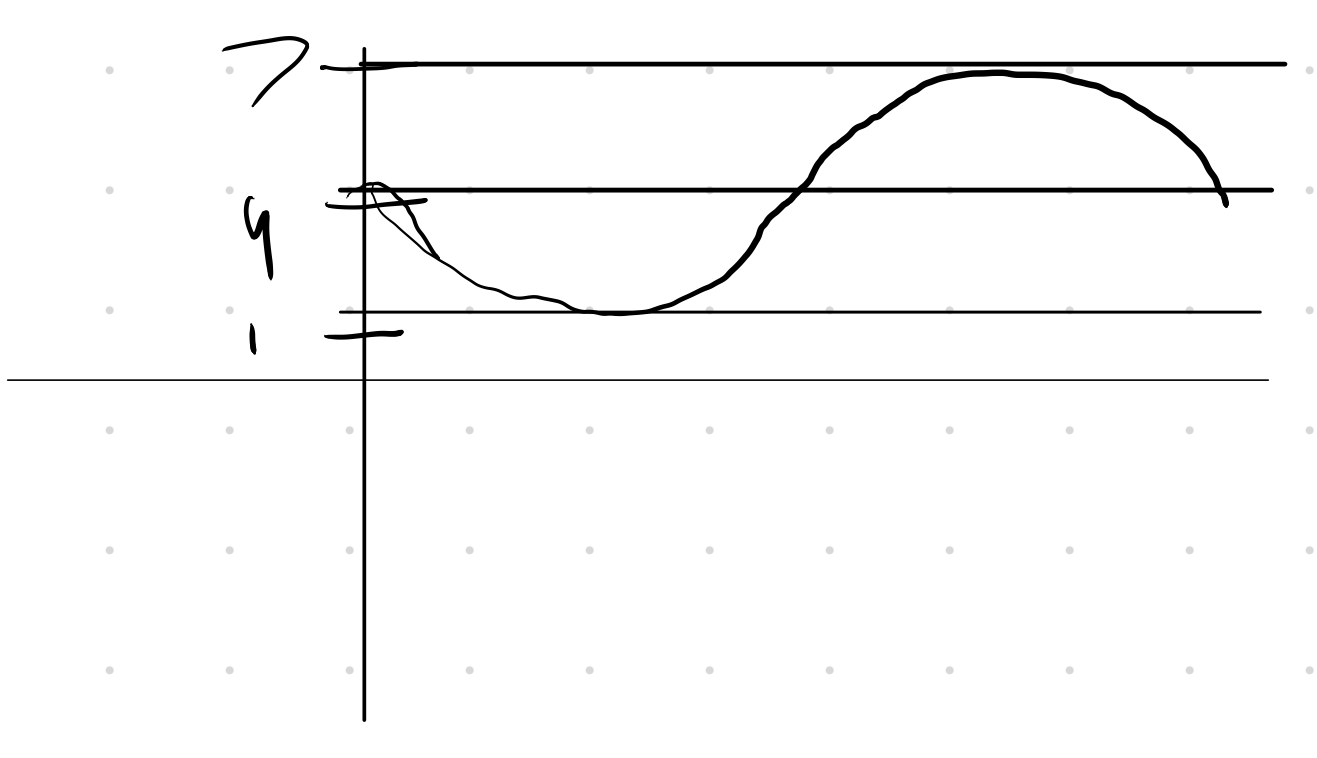
$P = \frac{2\pi}{\frac{1}{3}} = 6\pi$



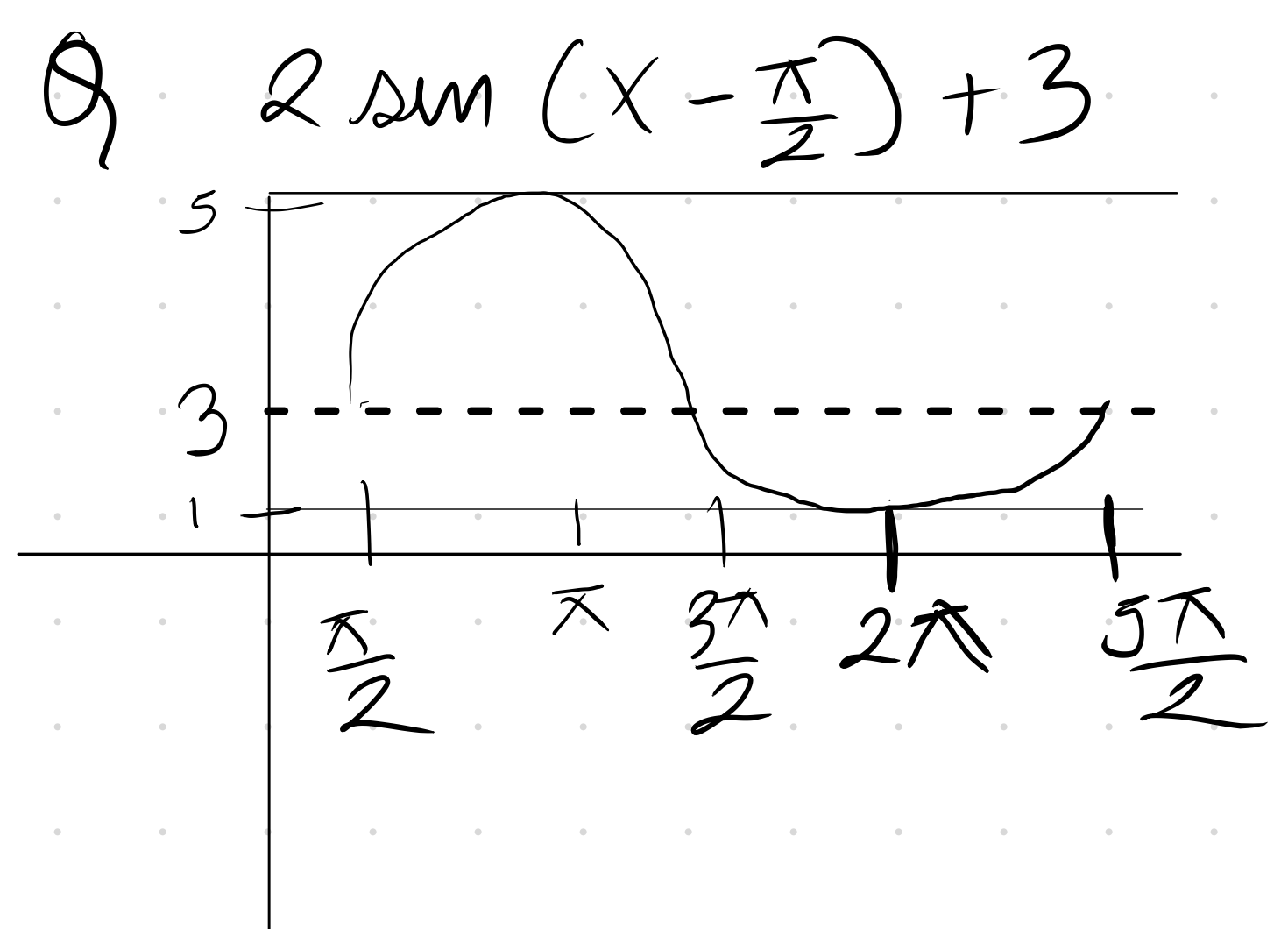
Q $\sin x + 2$



$-3\sin x + 4$



Q $2\sin\left(x - \frac{\pi}{2}\right) + 3$



$x - \frac{\pi}{2} = 0$

$x = \frac{\pi}{2}$

$P = \frac{2\pi}{B} = 2\pi$

$\frac{\pi}{2} + 2\pi = \frac{5\pi}{2}$