Trigonometry

Definitions

$$\sec x = \frac{1}{\cos x} \quad \text{for } \cos x \neq 0$$

$$\operatorname{cosec} x = \frac{1}{\sin x} \quad \text{for } \sin x \neq 0$$

$$\cot x = \frac{1}{\tan x} \quad \text{for } \tan x \neq 0$$

From AS Maths

$$\sin^2\theta + \cos^2\theta = 1 \quad \text{for all } \theta$$

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

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

$\div \sin^2\theta$

$$\frac{\sin^2\theta}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta}$$

$$1 + \cot^2\theta = \operatorname{cosec}^2\theta$$

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

$\div \cos^2\theta$

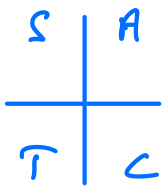
$$\frac{\cos^2\theta}{\cos^2\theta} + \frac{\sin^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta}$$

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

Two new results to be memorised

$$1 + \tan^2\theta = \sec^2\theta$$
$$1 + \cot^2\theta = \operatorname{cosec}^2\theta$$

Exercise 6A



1c) $\sec 300^\circ = \frac{1}{\cos 300^\circ} = \frac{+ve}{+ve}$

$= +ve$

1d) $\cot 200^\circ = \frac{1}{\tan 200} = \frac{+ve}{+ve} = +ve$

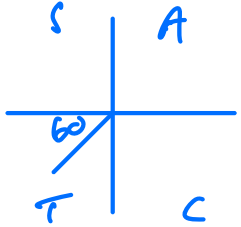
2a) $\sec 100^\circ = \frac{1}{\cos 100^\circ} = -5.76$

2d) $\cot 550^\circ = \frac{1}{\tan 550^\circ} = 5.67$

2g) $\operatorname{cosec} \frac{11\pi}{10} = \frac{1}{\sin \frac{11\pi}{10}} = -3.24$

3a) $\operatorname{cosec} 90^\circ = \frac{1}{\sin 90^\circ} = \frac{1}{1} = 1$

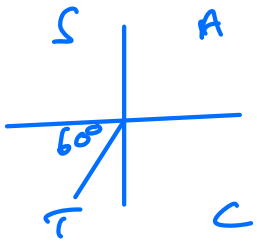
3d) $\sec 240° = \frac{1}{\cos 240°}$



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

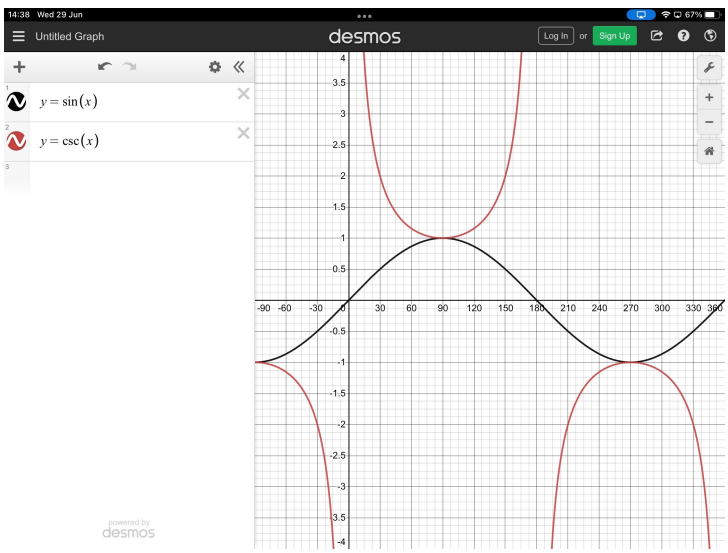
3g) $\sec 60° = \frac{1}{\cos 60°} = \frac{1}{\frac{1}{2}} = 2$

3j) $\cot \frac{4\pi}{3} = \frac{1}{\tan \frac{4\pi}{3}} = \frac{1}{\sqrt{3}}$

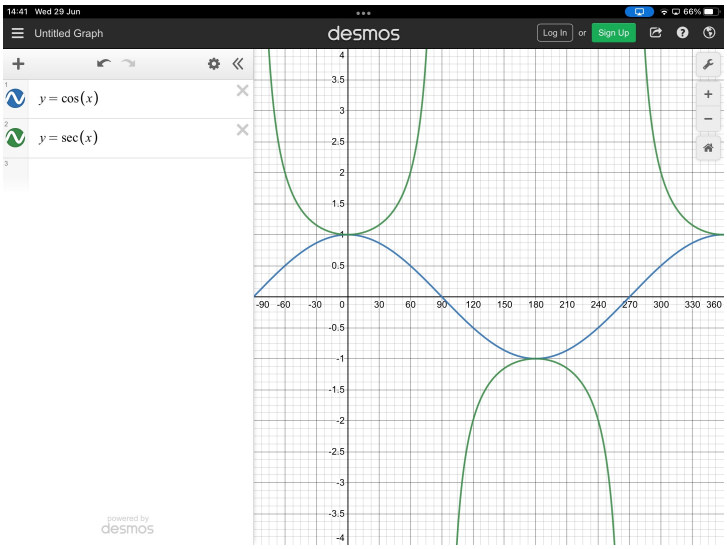


Classwork – Complete Exercise 6A

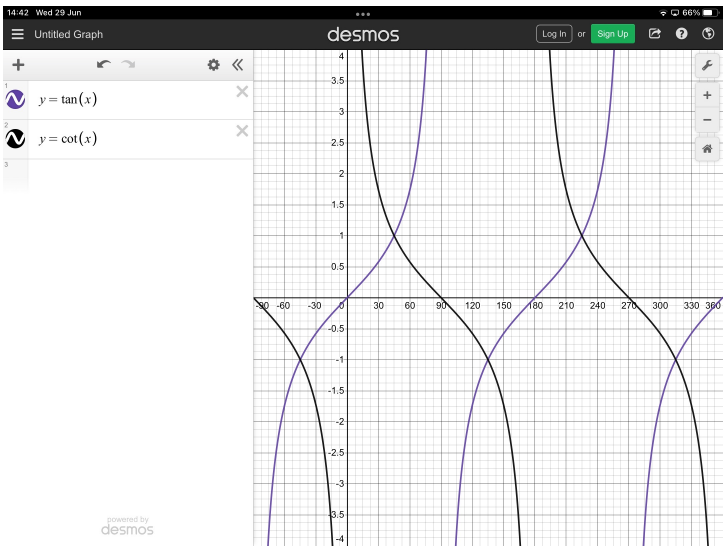
Graphs of $y = \sin x$, $\operatorname{cosec} x$



Graphs of $y = \cos x$, $\sec x$



Graphs of $y = \tan x$, $\cot x$



Domains and Ranges

$y = \sin x$ Domain $x \in \mathbb{R}$

Range $-1 \leq y \leq 1$

$y = \cos x$ Domain $x \in \mathbb{R}$

Range $-1 \leq y \leq 1$

$y = \tan x$ Domain $\{x \in \mathbb{R} : x \neq \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2} \ldots\}$

Range $y \in \mathbb{R}$

$y = \operatorname{cosec} x$ Domain $\{x \in \mathbb{R} : x \neq 0, \pm\pi, \pm 2\pi, \pm 3\pi, \ldots\}$

Range $\{y \geq 1\} \cup \{y \leq -1\}$

$y = \sec x$ Domain $\{x \in \mathbb{R} : x \neq \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \pm\frac{5\pi}{2}, \ldots\}$

Range $\{y \geq 1\} \cup \{y \leq -1\}$

$y = \cot x$ Domain $\{x \in \mathbb{R} : \pm\pi, \pm\frac{3\pi}{2}, \pm\frac{5\pi}{2} \ldots\}$

Range $\{y \in \mathbb{R}\}$

Set Notation

$\exists$	there exists
$\forall$	for all
$:$	such that
$\in$	is a member of
$\subseteq$	is a subset of
$\subset$	is a proper subset of
