



Name: _____ () Class: _____ Date: _____

MA304.5.4 – More Trigonometric Functions

At the end of this unit, you should be able to

- understand and use the functions secant, cosecant and cotangent
- sketch the graphs of the functions secant, cosecant and cotangent
- solve simple trigonometric equations involving secant, cosecant and cotangent
- derive and use the identity $\tan \theta = \frac{\sin \theta}{\cos \theta}$

By taking the reciprocals of the three trigonometric ratios, we obtain three more trigonometric functions.

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\operatorname{cosec} \theta = \frac{1}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

E1. Determine the set of values of θ such that

(a) $\sec \theta$ is not defined.

(b) $\operatorname{cosec} \theta$ is not defined

(c) $\cot \theta$ is not defined

P1. Recall and write down the relationship between $\tan \theta$ and $\tan(90^\circ - \theta)$. How will $\cot \theta$ relate with $\tan(90^\circ - \theta)$?

E2. Given that $\tan \theta = -2$ and $\sin \theta$ is positive, determine the exact value of $\sec \theta$, $\operatorname{cosec} \theta$ and $\cot \theta$.

E3. Without using the calculator, evaluate

(a) $\sec 150^\circ \cot 30^\circ$

(b) $\operatorname{cosec} 60^\circ \sec(-300^\circ)$

P2. Evaluate $\sin \frac{\pi}{3} \cos \frac{2\pi}{3} + 2 \tan \frac{\pi}{3} - \operatorname{cosec} \frac{3\pi}{2}$ and leave your answer in exact form.

E4. Sketch the graphs of $y = |\cos x|$ and $y = 3 \sin x + 1$ on the same diagram for the domain $0^\circ \leq x \leq 360^\circ$.

State the number of solutions in this domain for the following equations:

(a) $|\cos x| + 2 = 3(\sin x + 1)$

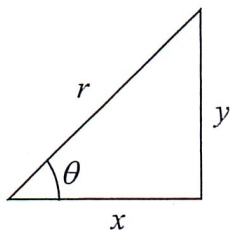
(b) $|\sec x(3 \sin x + 1)| = 1$

P3. Solve the following equations for $-\pi \leq x \leq \pi$,

(a) $\sec x - 1 = \operatorname{cosec} 70^\circ$

(b) $|5 \cot x + 2| = 3$

E5. Using the right-angled triangle, express $\sin \theta$, $\cos \theta$ and $\tan \theta$ in terms of x , y and r .



$$\sin \theta =$$

$$\cos \theta =$$

$$\tan \theta =$$

(a) Hence show that $\tan \theta = \frac{\sin \theta}{\cos \theta}$, $\cos \theta \neq 0$.

(b) Express $\cot \theta$ in terms of $\sin \theta$ and $\cos \theta$.

P4. Solve for $0 \leq x \leq 2\pi$ when $\cos x \sin x = 2 \sin \frac{\pi}{3} \cos^2 x$.