

①

Solve the trigonometric equation

$$\cos \theta + \sec \theta = \frac{5}{2}, \quad 0^\circ \leq \theta < 360^\circ.$$

②

Prove the validity of the trigonometric identity

$$\sqrt{2+2\cos 2\theta} \equiv a \cos \theta \quad \text{state } a$$

③

Prove that $\frac{1 + \tan^2 x}{1 - \tan^2 x} \equiv a \sec 2x$ state a

④

Use your answer to Question 3 to solve the equation

$$\frac{1 + \tan^2 x}{1 - \tan^2 x} + 2 = 0$$

$$0 \leq x < 2\pi$$

Give your answers in terms of π

⑤

Prove that $\frac{1 + \cot^2 \theta}{\cot \theta} \equiv a \operatorname{cosec} 2\theta$ state a

⑥

$$6\sec^2 2x + 5 \tan 2x = 12, \quad 0 \leq \theta < \pi.$$

Find the solutions of the above trigonometric equation, giving the answers in radians correct to two decimal places.

⑦

Solve the trigonometric equation

$$4 - 4\cos 2\theta = \operatorname{cosec} \theta, \quad 0 \leq \theta < 2\pi,$$

giving the answers in terms of π .

⑧

Prove that $\tan \theta + \cot \theta \equiv a \operatorname{cosec} 2\theta$ state a $\theta \neq \frac{k\pi}{2}, k \in \mathbb{Z}$

⑨

Use your answer to Question 8 to

find, in terms of π , the solutions of the equation

$$\tan \theta + \cot \theta = 4, \quad 0 \leq \theta < 2\pi,$$

giving the answers in terms of π .

10

Solve the following trigonometric equation

$$\frac{2 + \cos 2x}{3 + \sin^2 2x} = \frac{2}{5}, \text{ for } 0^\circ \leq x < 360^\circ,$$

11

Solve the following trigonometric equation

$$\sin 2\theta = \cot \theta, \quad 0 \leq \theta \leq 180^\circ.$$

12

$$\frac{\sin 2x}{1 - \cos 2x} = \tan x, \quad 0 \leq x < 2\pi.$$

Find the solutions of the above trigonometric equation, giving the answers in radians in terms of π .

13

$$\cos 3x \equiv p \cos^3 x + q \cos x.$$

Prove the validity of the above trigonometric identity by writing $\cos 3x$ as $\cos(2x+x)$. State p and q .

14

Use your answer to question 13 to

solve the trigonometric equation

$$8\cos^3 x - 6\cos x + 1 = 0, \quad 0 \leq x < 2\pi,$$

giving the answers in terms of π .

15

Solve the trigonometric equation

$$2(1 - \cos 2\theta) = \tan \theta, \quad 0 \leq \theta \leq 180^\circ.$$

16

$$\sin 3x \equiv p \sin x + q \sin^3 x.$$

Prove the validity of the above trigonometric identity, by writing $\sin 3x$ as $\sin(2x+x)$. State p and q .

17

$$\cot^2 x - \tan^2 x = 8 \cot 2x, \quad 0 \leq x < 180.$$

Find the solutions of the above trigonometric equation, giving the answers in **degrees**.