

Trigonometric Graphs, Identities and Equations

- Section Test (Answers)

1)

$$\cos \theta = 0.3$$

The solutions are in the 1st and 4th quadrants.

$$\theta = 72.5^\circ \text{ and}$$

$$\theta = 360^\circ - 72.5^\circ = 287.5^\circ$$

The solutions are 72.5° and 287.5° (1 d.p.)

2)

$$\tan \theta = 0.5$$

The solutions are in the 1st and 3rd quadrants.

$$\theta = 26.6^\circ \text{ and } \theta = 180^\circ + 26.6^\circ = 206.6^\circ$$

The solutions are 26.6° and 206.6° .

3)

$$2 \sin \theta + 1 = 0$$

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

The solutions are in 3rd and 4th quadrants.

$$\theta = 180^\circ + 30^\circ = 210^\circ \text{ and } \theta = 360^\circ - 30^\circ = 330^\circ$$

The solutions are 210° and 330° .

4)

$$3 \tan \theta - 2 = 0$$

$$\tan \theta = \frac{2}{3}$$

The solutions are in the 1st and 3rd quadrants.

$$\theta = 33.7^\circ \text{ and } \theta = 33.7^\circ - 180^\circ = -146.3^\circ$$

The solutions are 33.7° and -146.3° .

5)

$$2 \cos \theta - \sin \theta = 0$$

$$2 \cos \theta = \sin \theta$$

$$2 = \frac{\sin \theta}{\cos \theta} = \tan \theta$$

The solutions are in the 1st and 3rd quadrants.

$$\theta = 63.4^\circ \text{ and } \theta = 180^\circ + 63.4^\circ = 243.4^\circ$$

The solutions are 63.4° and 243.4° .

6)

$$(2\cos\theta + 1)(\cos\theta - 2) = 0$$

$$\cos\theta = -\frac{1}{2} \text{ or } 2$$

For $\cos\theta = -\frac{1}{2}$, solutions are in the 2nd and 3rd quadrants.

$$\theta = 180^\circ - 60^\circ = 120^\circ \text{ and } \theta = 180^\circ + 60^\circ = 240^\circ$$

There are no real solutions for $\cos\theta = 2$.

The solutions are 120° and 240° .

7)

$$2\sin^2\theta - \sin\theta - 1 = 0$$

$$(2\sin\theta + 1)(\sin\theta - 1) = 0$$

$$\sin\theta = -\frac{1}{2} \text{ or } 1$$

For $\sin\theta = -\frac{1}{2}$, solutions are in the 3rd and 4th quadrants

$$\theta = 180^\circ + 30^\circ = 210^\circ \text{ and } \theta = 360^\circ - 30^\circ = 330^\circ$$

For $\sin\theta = 1$, the only solution is $\theta = 90^\circ$.

Solutions are 90° , 210° and 330° .

8)

$$2\sin\theta\cos\theta - \sin\theta = 0$$

$$\sin\theta(2\cos\theta - 1) = 0$$

$$\sin\theta = 0 \text{ or } \cos\theta = \frac{1}{2}$$

For $\sin\theta = 0$, $\theta = 0^\circ, 180^\circ$ and 360°

For $\cos\theta = \frac{1}{2}$, solutions are in the 1st and 4th quadrants.

$$\theta = 60^\circ \text{ and } \theta = 360^\circ - 60^\circ = 300^\circ$$

The solutions are $0^\circ, 60^\circ, 180^\circ, 300^\circ$ and 360° .

9)

$$\tan^2\theta - 1 = 0$$

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

$$\tan\theta = 1 \text{ or } -1$$

For $\tan\theta = 1$, solutions are in the 1st and 3rd quadrants

$$\theta = 45^\circ \text{ and } 180^\circ + 45^\circ = 225^\circ$$

For $\tan\theta = -1$, solutions are in the 2nd and 4th quadrants

$$\theta = 135^\circ \text{ and } 360^\circ - 45^\circ = 315^\circ$$

The solutions are $45^\circ, 135^\circ, 225^\circ$ and 315° .

10)

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

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

$$2\cos^2 \theta + \cos \theta - 1 = 0$$

$$(2\cos \theta - 1)(\cos \theta + 1) = 0$$

$$\cos \theta = \frac{1}{2} \text{ or } -1$$

For $\cos \theta = \frac{1}{2}$, solutions are in the 1st and 4th quadrants

$$\theta = 60^\circ \text{ and } 300^\circ$$

For $\cos \theta = -1$, solution is $\theta = 180^\circ$.

The solutions are 60° , 180° and 300° .

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