

SOLVING TRIG EQUATIONS

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Lesson Description

In this lesson we:

- Define the concept “general solution” which is used when solving trig equations
- Solve simple trig equations



Summary

If $\sin\theta = m$, then the general solution is

$$\theta = (\text{calc angle}) + k360^\circ \text{ or } \theta = 180^\circ - (\text{calc angle}) + k360^\circ, \quad k \in \mathbb{Z}$$

If $\cos\theta = m$, then the general solution is

$$\theta = (\text{calc angle}) + k360^\circ \text{ or } \theta = -(\text{calc angle}) + k360^\circ, \quad k \in \mathbb{Z}$$

If $\tan\theta = m$, then the general solution is

$$\theta = (\text{calc angle}) + k180^\circ, \quad k \in \mathbb{Z}$$



Test Yourself

Question 1

If $\sin(-A) = \tan 335,3^\circ$ for $A \in [-180^\circ; 180^\circ]$; the size of A is:

- $-27,4^\circ$ or $152,6^\circ$
- $27,4^\circ$ or $152,6^\circ$
- $27,4^\circ$ or $-152,6^\circ$
- $-27,4^\circ$ or $-152,6^\circ$

Question 2

If $\tan x = a^{-1}$ with $a > 0$ and $x \in [0^\circ; 360^\circ]$, then $\sin x = \dots$

- $\frac{1}{\sqrt{1+a^2}}$
- $\frac{-1}{1+a}$ or $\frac{1}{1+a^2}$
- $\frac{1}{\sqrt{1+a^2}}$ or $\frac{-1}{\sqrt{1+a^2}}$
- $1 + a^2$

Question 3

Determine the value of $13\cos 2\theta$ if $\tan\theta = \frac{3}{2}$

- A. -5
- B. 12
- C. -6
- D. 5

Question 4

If $\cos x = \frac{-\sqrt{3}}{2}$ and $0^\circ < x < 180^\circ$, determine the value of $\sin x$.

- A. $\frac{-2}{\sqrt{3}}$
- B. $\frac{1}{2}$
- C. $-\frac{\sqrt{3}}{2}$
- D. $-\frac{1}{2}$

Question 5

Determine the general solution if $\tan(180^\circ - x) \cdot \tan(180^\circ + x) = -1$

- A. $45^\circ + k180^\circ, k \in \mathbb{Z}$
- B. $-45^\circ + k180^\circ, k \in \mathbb{Z}$
- C. $\mp 45^\circ + k180^\circ, k \in \mathbb{Z}$
- D. $135^\circ + k180^\circ, k \in \mathbb{Z}$

Question 6

If $2\cos(\alpha + 40^\circ) = -0,639$, determine the value of α if $\alpha \in [-360^\circ; 0^\circ]$

- A. $-108,6^\circ$ or $-251,4^\circ$
- B. $-148,6^\circ$ or $-211,4^\circ$
- C. $-68,6^\circ$ or $-248,6^\circ$
- D. $-251,4^\circ$ or $-288,6^\circ$

Question 7

The sign of $\sin A$ is the same as the sign of $\cos A$, but opposite to the sign of $\tan A$. Which statement is true?

- A. $0^\circ < A < 90^\circ$
- B. $90^\circ < A < 180^\circ$
- C. $180^\circ < A < 270^\circ$
- D. $270^\circ < A < 360^\circ$

**Improve your Skills****Question 1**

Determine the general solution, correct to 1 decimal place.

1.1 $\cos \theta = -0,102$

1.2 $\frac{\cos \theta}{2} = -0,102$

Question 2

Determine the general solution, correct to 1 decimal place.

2.1 $\sqrt{3} \sin A = 0,785$

2.2 $\sqrt{3} \sin A = -0,785$

Question 3

Determine the general solution, correct to 1 decimal place.

3.1 $\tan \beta + 5 = 15,275$

3.2 $\tan(\beta + 50^\circ) = -15,275$