

A2.A.68: Trigonometric Equations 6: Solve trigonometric equations for all values of the variable from 0° to 360°

- 1 Solve algebraically for all values of θ in the interval $0^\circ \leq \theta \leq 360^\circ$ that satisfy the equation
$$\frac{\sin^2 \theta}{1 + \cos \theta} = 1.$$
- 2 Find all values of x in the interval $0^\circ \leq x < 360^\circ$ that satisfy the equation $4 \cos^2 x - 5 \sin x - 5 = 0$.
Express your answer to the *nearest ten minutes* or *nearest tenth of a degree*.
- 3 Find, to the *nearest ten minutes* or *nearest tenth of a degree*, all values of x in the interval $0^\circ \leq x < 360^\circ$ that satisfy the equation
 $6 \cos^2 x - 5 \sin x - 5 = 0.$
- 4 Find, to the *nearest ten minutes* or *nearest tenth of a degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation
 $4 \cos^2 \theta = 3 + 3 \sin \theta.$
- 5 Find, to the *nearest ten minutes* or *nearest tenth of a degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation
 $5 \sin^2 \theta - 7 \cos \theta + 1 = 0.$
- 6 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation
 $2 \sin^2 \theta + 2 \cos \theta - 1 = 0.$
- 7 Find, to the *nearest tenth of a degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $5 \sin^2 \theta - 9 \cos \theta - 3 = 0.$
- 8 Solve algebraically for all values of θ in the interval $0^\circ \leq \theta < 360^\circ$.
$$2 \sin^2 \theta - 4 \sin \theta = \cos^2 \theta - 2$$

Express your answers to the *nearest degree*.
- 9 In the interval $0^\circ \leq x < 360^\circ$, $\sin x = \cos x$ when x equals
 - 1) 45° , only
 - 2) 45° and 225°
 - 3) 135° and 315°
 - 4) 225° , only
- 10 What is one solution of the equation $(\sin x + \cos x)^2 = 2$?
 - 1) $\frac{\pi}{4}$
 - 2) $\frac{\pi}{3}$
 - 3) $\frac{\pi}{2}$
 - 4) 0

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Answer Section

1 ANS:

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

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

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

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

90, 270. $-\cos^2 \theta - \cos \theta = 0$. The solution $\cos \theta = -1$ is extraneous.

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

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

$$\cos \theta = 0 \quad \cos \theta = -1$$

$$\theta = \cos^{-1}(0)$$

$$\theta = 90^\circ \text{ and } 270^\circ$$

PTS: 4 REF: 080432b

2 ANS:

194.5°, 270°, 345.5° or 194°30', 270°, 345°30'

PTS: 10 REF: 060039siii

3 ANS:

9°40', 170°20', 270° or 9.6°, 170.4°, 270°

PTS: 10 REF: 060239siii

4 ANS:

14°30', 165°30', 270° or 14.5°, 165.5°, 270°

PTS: 10 REF: 080241siii

5 ANS:

53.1°, 306.9° or 53°10', 306°50'

PTS: 10 REF: 069840siii

6 ANS:

111, 249

PTS: 10 REF: 019942siii

7 ANS:

78.5 and 281.5

PTS: 10 REF: 010337siii

8 ANS:

$$19, 90, 161. \quad 2 \sin^2 \theta - 4 \sin \theta = 1 - \sin^2 \theta - 2. \quad 3 \sin \theta - 1 = 0. \quad \sin \theta - 1 = 0.$$

$$\begin{array}{lll} 3 \sin^2 \theta - 4 \sin \theta + 1 = 0 & \sin \theta = \frac{1}{3} & \sin \theta = 1 \\ (3 \sin \theta - 1)(\sin \theta - 1) = 0 & & \theta = 90 \\ & \theta = 19, 161 & \end{array}$$

PTS: 6

REF: 061034b

9 ANS: 2

PTS: 2

REF: 068627siii

10 ANS: 1

PTS: 2

REF: 010025siii