F.TF.B.7: Trigonometric Equations 5

1 Solve algebraically for all values of θ in the interval $0° \le \theta \le 360°$ that satisfy the equation $\frac{\sin^2\theta}{1+\cos\theta} = 1$.

2 Find all values of x in the interval $0° \le x < 360°$ 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 $0° \le x < 360°$ 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 $0° \le \theta < 360°$ 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 $0° \le \theta < 360°$ 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 $0° \le \theta < 360°$ 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 $0° \le \theta < 360°$ that satisfy the equation $5\sin^2\theta - 9\cos\theta - 3 = 0$.

8 Solve algebraically for all values of θ in the interval $0° \le \theta < 360°$.

$$2\sin^2\theta - 4\sin\theta = \cos^2\theta - 2$$

Express your answers to the *nearest degree*.

9 In the interval $0° \le x < 360°$, $\sin x = \cos x$ when x equals

1) 45º, only
2) 45º and 225º
3) 135º and 315º
4) 225º, 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 θ = -1 is extraneous.

$$\cos^2\theta + \cos\theta = 0$$
$$\cos\theta(\cos\theta + 1) = 0$$
$$\cos\theta = 0 \quad \cos\theta = -1$$
$$\theta = \cos^{-1}(0)$$
$$\theta = 90° \text{ and } 270°$$

REF: 080432b

2 ANS:
194.5º, 270º, 345.5º or 194º30', 270º, 345º30'

REF: 060039siii

3 ANS:
9º40’, 170º20’, 270º or 9.6º, 170.4º, 270º

REF: 060239siii

4 ANS:
14º30’, 165º30’, 270º or 14.5º, 165.5º, 270º

REF: 080241siii

5 ANS:
53.1º, 306.9º or 53º10', 306º50'

REF: 069840siii

6 ANS:
111, 249

REF: 019942siii

7 ANS:
78.5 and 281.5

REF: 010337siii

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

$3\sin^2\theta - 4\sin\theta + 1 = 0$ $\sin\theta = \frac{1}{3}$ $\sin\theta = 1$

$(3\sin\theta - 1)(\sin\theta - 1) = 0$ $\theta = 90$

$\theta = 19, 161$

REF: 061034b
9 ANS: 2 REF: 068627siii
10 ANS: 1 REF: 010025siii