

F.TF.B.7: Trigonometric Equations 3

- 1 Solve algebraically for all exact values of x in the interval $0 \leq x < 2\pi$: $2\sin^2 x + 5\sin x = 3$
- 2 Solve $2\cos^2 \theta = \cos \theta$ for all values of θ in the interval $0^\circ \leq \theta < 360^\circ$.
- 3 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta \leq 180^\circ$ that satisfy the equation $8\cos^2 \theta - 2\cos \theta - 1 = 0$.
- 4 Find the value of x in the interval $90^\circ < x < 180^\circ$ which satisfies the equation $\cos x - 2\cos x \sin x = 0$.
- 5 Solve $2\cos^2 \theta + \cos \theta - 1 = 0$ for a value of θ in the interval $0^\circ \leq \theta \leq 90^\circ$.
- 6 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta \leq 360^\circ$ which satisfy the equation $3\sin^2 \theta + 2\sin \theta - 1 = 0$.
- 7 Find the positive acute angle which satisfies the equation $\tan^2 \theta - \tan \theta = 0$.
- 8 Find the value of x in the interval $0^\circ \leq x \leq 180^\circ$ which satisfies the equation $\cos^2 x - 2\cos x = 0$.
- 9 Find the measure of the smallest positive angle which satisfies the equation $2\cos^2 \theta + 5\cos \theta - 3 = 0$.
- 10 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ which satisfy the equation $6\sin^2 \theta = 1 - \sin \theta$.
- 11 In the interval $0^\circ \leq x \leq 360^\circ$, what is the total number of values of x that satisfy the equation $2\sin^2 x + \sin x - 1 = 0$?
- 12 Find all values of θ in the interval $0^\circ \leq \theta \leq 360^\circ$ that satisfy the equation $\tan \theta + 2\tan \theta \sin \theta = 0$.
- 13 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $2\tan^2 \theta + \tan \theta - 1 = 0$.
- 14 Find the value of x between 0° and 360° which satisfies the equation $\sin^2 x + 3\sin x + 2 = 0$.
- 15 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $8\sin^2 \theta + 2\sin \theta - 1 = 0$.
- 16 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta \leq 360^\circ$ that satisfy the equation $3\sin^2 \theta + 5\sin \theta = 2$.
- 17 To the *nearest degree*, find all values of x in the interval $0^\circ \leq x \leq 360^\circ$ that satisfy the equation $4\sin^2 x = 5\sin x - 1$.

- 18 Find all values of x in the interval $0^\circ \leq x \leq 360^\circ$ that satisfy the equation $2 \sin^2 x = 1 + \sin x$.
- 19 Find, to the *nearest degree*, all values of x in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $6 \sin^2 x - \sin x = 2$.
- 20 Find, to the *nearest degree*, all values of x in the interval $0^\circ \leq x < 360^\circ$ that satisfy the equation $3 + \tan^2 x = 5 \tan x$.
- 21 Find, to the *nearest degree*, all values of x in the interval $0^\circ \leq x < 360^\circ$ that satisfy the equation $6 \cos^2 x - 7 \cos x + 2 = 0$.
- 22 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $4 \cos^2 \theta - 3 \cos \theta = 1$.
- 23 Find, to the *nearest degree*, all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $3 \sin^2 \theta - \sin \theta - 2 = 0$.
- 24 Find, to the *nearest degree*, all values of x in the interval $0^\circ \leq x < 360^\circ$ that satisfy the equation $3 \sin^2 x - 2 \sin x = 1$.
- 25 Find, to the *nearest ten minutes or nearest tenth of a degree*, all values of A in the interval $0^\circ \leq A < 360^\circ$ that satisfy the equation $4 \sin^2 A + 1 = \sin^2 A + 2$.
- 26 Find, to the *nearest degree*, all positive values of θ less than 360° that satisfy the equation $2 \tan^2 \theta - 2 \tan \theta = 3$.
- 27 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 $4 \sin^2 x - 5 \sin x - 6 = 0$.
- 28 Find all values of x in the interval $0^\circ \leq x \leq 360^\circ$ that satisfy the equation $\cos x \tan x + \cos x = 0$.
- 29 On a monitor, the graphs of two impulses are recorded on the same screen, where $0^\circ \leq x < 360^\circ$. The impulses are given by the following equations:
$$y = 2 \sin^2 x$$
$$y = 1 - \sin x$$
Find all values of x , in degrees, for which the two impulses meet in the interval $0^\circ \leq x < 360^\circ$. [Only an algebraic solution will be accepted.]
- 30 Find the value of θ in the interval $0^\circ \leq \theta \leq 360^\circ$ that satisfies the equation $|\sin \theta - 3| = 2$.

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Answer Section

1 ANS:

$$2\sin^2 x + 5\sin x - 3 = 0$$

$$(2\sin x - 1)(\sin x + 3) = 0$$

$$\sin x = \frac{1}{2}$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

REF: 011436a2

2 ANS:

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

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

$$\cos \theta = 0, \frac{1}{2}$$

$$\theta = 90, 270, 60, 300$$

REF: 061638a2

3 ANS:

$$8x^2 - 2x - 1 = 0$$

$$(4x + 1)(2x - 1) = 0$$

60, 104. Substitute x for $\cos \theta$. $4x + 1 = 0$ $2x - 1 = 0$. Substitute back $\cos \theta$ for x .

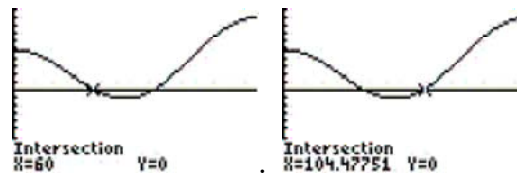
$$x = -\frac{1}{4} \quad x = \frac{1}{2}$$

$$\cos \theta = -\frac{1}{4} \quad \cos \theta = \frac{1}{2}$$

$$\theta = \cos^{-1}\left(-\frac{1}{4}\right) \quad \theta = \cos^{-1}\left(\frac{1}{2}\right)$$

$$\theta \cong 104^\circ \quad \theta = 60^\circ$$

Plot1 Plot2 Plot3
 $\sqrt{Y1} \cos(X)^2 - 2\cos(X) - 1$
 $\sqrt{Y2} = 0$
 $\sqrt{Y3} =$
 $\sqrt{Y4} =$
 $\sqrt{Y5} =$
 $\sqrt{Y6} =$



REF: 010727b

4 ANS:

$$150^\circ$$

REF: 068116siii

5 ANS:

$$60^\circ$$

REF: 068411siii

- 6 ANS:
19°, 161°, 270°

REF: 068440siii
- 7 ANS:
45

REF: 018515siii
- 8 ANS:
90°

REF: 068513siii
- 9 ANS:
60°

REF: 088513siii
- 10 ANS:
19, 161, 210, 330

REF: 088542siii
- 11 ANS:
3

REF: 018605siii
- 12 ANS:
0°, 180°, 210°, 330°, 360°

REF: 018637siii
- 13 ANS:
27°, 135°, 207°, 315°

REF: 088636siii
- 14 ANS:
270°

REF: 018718siii
- 15 ANS:
14°, 166°, 210°, 330°

REF: 068837siii
- 16 ANS:
19, 161

REF: 018942siii
- 17 ANS:
14, 90, 166

REF: 069041siii

18 ANS:
90°, 210°, 330°

REF: 089038siii

19 ANS:
42, 138, 210, 330

REF: 069442siii

20 ANS:
35°, 77°, 215, 257°

REF: 019540siii

21 ANS:
48, 60, 300, 312

REF: 069538siii

22 ANS:
0, 104, 256

REF: 019638siii

23 ANS:
90, 222, 318

REF: 019737siii

24 ANS:
90, 199, 341

REF: 089739siii

25 ANS:
35.3°, 144.7°, 215.3°, 324.7° or 35°20', 144°40', 215°20', 324°40'

REF: 069937siii

26 ANS:
61, 141, 241, 321

REF: 010040siii

27 ANS:
228°40' and 311°20' or 228.6° and 311.4°

REF: 010140siii

28 ANS:
90°, 135°, 270°, 315°

REF: 080139siii

29 ANS:

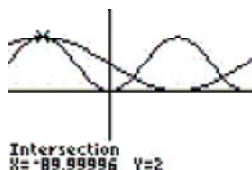
$$2 \sin^2 x = 1 - \sin x \quad (2x-1)(x+1) = 0 \quad \sin x = \frac{1}{2} \quad \sin x = -1$$

$$2 \sin^2 x + \sin x - 1 = 0 \quad 2x-1=0 \quad x+1=0 \quad \sin^{-1}\left(\frac{1}{2}\right) = 30^\circ \text{ or } 150^\circ$$

$$x = \frac{1}{2} \quad x = -1 \quad \sin^{-1}(-1) = 270^\circ$$

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Plot1 Plot2 Plot3
\Y1=2sin(X)^2
\Y2=1-sin(X)
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
    
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REF: 060233b

30 ANS:
90°

REF: 088512siii