

$$1. 4\cos^2\theta - 3 = 0$$

soln.

$$\text{Let } \cos(\theta) = u$$

$$4u^2 - 3 = 0$$

$$4u^2 - 3 = 0: u = \frac{\sqrt{3}}{2}, u = -\frac{\sqrt{3}}{2}$$

Substitute back. $u = \cos(\theta)$

$$\cos(\theta) = \frac{\sqrt{3}}{2}, \cos(\theta) = -\frac{\sqrt{3}}{2}$$

$$\cos(\theta) = \frac{\sqrt{3}}{2}: \theta = \frac{\pi}{6} + 2\pi n, \theta = \frac{11\pi}{6} + 2\pi n$$

$$\cos(\theta) = -\frac{\sqrt{3}}{2}: \theta = \frac{5\pi}{6} + 2\pi n, \theta = \frac{7\pi}{6} + 2\pi n$$

$$\Rightarrow \theta = \frac{\pi}{6} + 2\pi n, \theta = \frac{11\pi}{6} + 2\pi n,$$

$$\theta = \frac{5\pi}{6} + 2\pi n, \theta = \frac{7\pi}{6} + 2\pi n.$$

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

soln.

$$\text{Let } \sin(\theta) = u$$

$$2u^2 - u - 1 = 0$$

Using quadratic formula.

$$u_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 2, b = -1, c = -1, u_{1,2} = \frac{-(-1) \pm \sqrt{(-1)^2 - 4 \cdot 2 \cdot (-1)}}{2 \cdot 2}$$

$$u = \frac{-1(-1) + \sqrt{(-1)^2 - 4 \cdot 2 \cdot (-1)}}{2 \cdot 2}; 1$$

$$u_2 = \frac{(-1)(-1) - \sqrt{(-1)^2 - 4 \cdot 2 \cdot (-1)}}{2 \cdot 2} = -\frac{1}{2}$$

$$\therefore u = 1, u = -\frac{1}{2}$$

Substitute back. $u = \sin(\theta)$

$$\sin(\theta) = 1, \sin(\theta) = -\frac{1}{2}$$

$$\sin(\theta) = 1 \Rightarrow \theta = \frac{\pi}{2} + 2\pi n$$

$$\sin(\theta) = -\frac{1}{2}: \theta = \frac{7\pi}{6} + 2\pi n, \theta = \frac{11\pi}{6} + 2\pi n$$

$$\Rightarrow \frac{\pi}{2} + 2\pi n, \theta = \frac{7\pi}{6} + 2\pi n, \theta = \frac{11\pi}{6} + 2\pi n.$$

$$3) \tan(\theta)\sin\theta + \sin\theta = 0.$$

soln.

$$\text{factor } \tan(\theta)\sin\theta + \sin\theta: \sin(\theta)(\tan\theta + 1)$$

$$\Rightarrow \sin(\theta)(\tan\theta + 1) = 0$$

Solving each part separately.

$$\sin(\theta) = 0.$$

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

$$\sin(\theta) = 0 \Rightarrow \theta = 2\pi n, \theta = \pi + 2\pi n$$

$$\tan(\theta) + 1 = 0 \Rightarrow \frac{3\pi}{4} + \pi n$$

$$\Rightarrow \theta = 2\pi n, \theta = \pi + 2\pi n, \theta = \frac{3\pi}{4} + \pi n.$$

4. Find the exact value.

$$\sin\left(-\frac{5\pi}{12}\right)$$

Soln.

use the property of: $\sin(-x) = -\sin(x)$

$$\begin{aligned}\sin\left(-\frac{5\pi}{12}\right) &= -\sin\left(\frac{5\pi}{12}\right) \\ &= -\sin\left(\frac{5\pi}{12}\right)\end{aligned}$$

$$\begin{aligned}\sin\left(\frac{5\pi}{12}\right) &= \frac{\sqrt{2} + \sqrt{6}}{4} \\ &= -\frac{(\sqrt{2} + \sqrt{6})}{4}\end{aligned}$$

(5) Find the general solution.

$$2\sin(2\theta) = 1$$

divide both sides by 2.

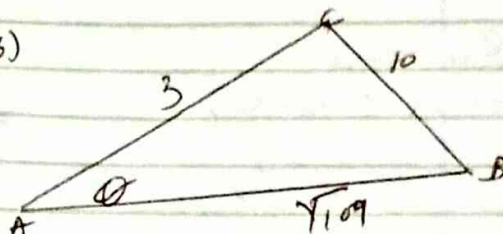
$$\frac{2\sin(2\theta)}{2} = \frac{1}{2}$$

$$\text{Simplify} \Rightarrow \sin(2\theta) = \frac{1}{2}$$

General solution for $\sin(2\theta) = \frac{1}{2}$

$$2\theta = \frac{\pi}{6} + 2\pi n, 2\theta = \frac{5\pi}{6} + 2\pi n$$

(6)

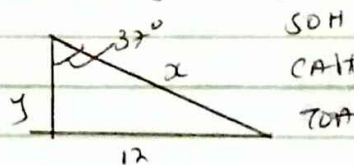


$$\angle A = 16.41^\circ = 0.287 \text{ rad}$$

$$\angle B = 73.3^\circ = 1.279 \text{ rad}$$

$$\angle C = 90^\circ = 1 \text{ rad.}$$

(7) Solve the right triangle.

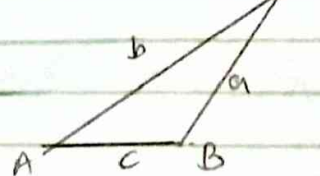


$$\sin 37^\circ = \frac{12}{x}, x = \frac{12}{\sin 37^\circ} = \underline{19.93}$$

$$\tan 37^\circ = \frac{12}{y}, y = \frac{12}{\tan 37^\circ} = \underline{15.92}$$

(8) Solve triangle.

$$a = 75, b = 100, \angle A = 30^\circ$$



$$a = 75$$

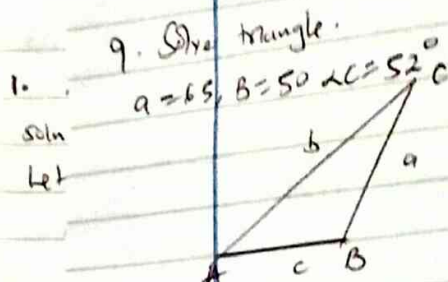
$$b = 100$$

$$c = 51.564$$

$$\angle A = 45.51^\circ$$

$$\angle B = 104.8^\circ$$

$$\angle C = 30^\circ$$



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Sub

$a = 65$ $\angle A = 78.97^\circ$
 $b = 50$ $\angle B = 49.028^\circ$
 $c = 52.184$ $\angle C = 52^\circ$

Co

10. Value of remaining trigon. functions.

cos

$\cot \theta = \frac{1}{4}, \sin \theta < 0$

cos

$\sin \theta = \frac{4\sqrt{17}}{17}$

$\Rightarrow \cos \theta = \frac{\sqrt{17}}{17}$

$\tan \theta = 4$

$\cot \theta = \frac{1}{4}$

$\sec \theta = \sqrt{17}$

$\csc \theta = \frac{\sqrt{17}}{4}$

Us. (ii) (a) $\sin^{-1} \frac{1}{2} = \frac{\pi}{6}$

(b) $\cos^{-1} 0 = \frac{\pi}{2}$

a

(c) $\sin^{-1} \left(\sin \frac{4\pi}{3} \right) = -\frac{\pi}{3}$

U

(d) $\cos^{-1} (\cos(-135^\circ)) = -135^\circ = -\frac{3\pi}{4}$

U

(e) $\tan^{-1}(-1) = -\frac{\pi}{4}$