Answers:

Question 1:

Ans:

$2 \sin x = \cos x$

$\tan x = 0.5$

$x = 26.6, 180 + 26.6$

$x = 26.6°, 206.6°$

Question 2:

Ans:

$\tan x = \frac{4}{3}$

$x = 53.1, 180 + 53.1$

$x = 53.1°, 233.1°$

Question 3:

Ans:

$1 - \sin^2 x + 3 \sin x - 3 = 0$

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

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

$\sin x = 1$ or 2 [no solutions]

$x = 90°$

Question 4:

Ans:

$3\cos^2 x - (1 - \cos^2 x) = 2$
$4\cos^2 x = 3$
$\cos x = \pm\frac{\sqrt{3}}{2}$
$x = 30, 360 - 30$ or $180 - 30, 180 + 30$
$x = 30°, 150°, 210°, 330°$

Question 5:

Ans:

$2(1 - \cos^2 x) + 3\cos x = 3$
$2\cos^2 x - 3\cos x + 1 = 0$
$(2\cos x - 1)(\cos x - 1) = 0$
$\cos x = 0.5$ or 1
$x = 60, 360 - 60$ or $0, 360$
$x = 0, 60°, 300°, 360°$

Question 6:

Ans:

$3(1 - \sin^2 x) = 5(1 - \sin x)$
$3\sin^2 x - 5\sin x + 2 = 0$
$(3\sin x - 2)(\sin x - 1) = 0$
$\sin x = \frac{2}{3}$ or 1
$x = 41.8, 180 - 41.8$ or 90
$x = 41.8°, 90°, 138.2°$

Question 7:

Ans:

$3 \sin x = 2 \tan x$
$3 \sin x \cos x = 2 \sin x$
$\sin x (3 \cos x - 2) = 0$
$\sin x = 0$ or $\cos x = \frac{2}{3}$
$x = 0, 180, 360$ or $48.2, 360 - 48.2$
$x = 0, 48.2°, 180°, 311.8°, 360°$

Question 8:

Ans:

$(1 - \cos^2 x) - 9 \cos x - \cos^2 x = 5$
$2 \cos^2 x + 9 \cos x + 4 = 0$
$(2 \cos x + 1)(\cos x + 4) = 0$
$\cos x = -0.5$ or -4 [no solutions]
$x = 180 - 60, 180 + 60$
$x = 120°, 240°$

Question 9:

Ans:

$3 \sin^2 x = 8 \cos x$
$3(1 - \cos^2 x) = 8 \cos x$
$3 \cos^2 x + 8 \cos x - 3 = 0$
$(3 \cos x - 1)(\cos x + 3) = 0$
$\cos x = \frac{1}{3}$ or -3 [no solutions]
$x = 70.5, 360 - 70.5$
$x = 70.5°, 289.5°$

Question 10:

Ans:

$\cos^2 x = 3 \sin x$

$1 - \sin^2 x = 3 \sin x$

$\sin^2 x + 3 \sin x - 1 = 0$

$\sin x = \frac{-3 \pm \sqrt{9+4}}{2}$

$\sin x = \frac{1}{2}(-3+\sqrt{13})$ or $\frac{1}{2}(-3-\sqrt{13})$ [no sols]

$x = 17.6, 180 - 17.6$

$x = 17.6°, 162.4°$