

Solving trig equations - finding all solutions - Answers

Solving trig equations - all solutions - Answers (p22)

3a) $2\sin x^\circ = 1$

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

$x^\circ = \sin^{-1}(\frac{1}{2}) = \underline{30^\circ}, \underline{180-30} = \underline{150^\circ}$

\checkmark S	A \checkmark
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T	C

b) $3\cos x^\circ = 2$

$\cos x^\circ = \frac{2}{3}$

$x^\circ = \cos^{-1}(\frac{2}{3}) = \underline{48^\circ}, \underline{360-48} = \underline{312^\circ}$

S	A \checkmark
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T	C \checkmark

c) $3\tan x^\circ = 5$

$\tan x^\circ = \frac{5}{3}$

$x^\circ = \tan^{-1}(\frac{5}{3}) = \underline{59^\circ}, \underline{180+59} = \underline{239^\circ}$

S	A \checkmark
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
\checkmark T	C

d) $2\cos x^\circ = -1$

$\cos x^\circ = -\frac{1}{2}$
 $\cos^{-1}(\frac{1}{2}) = 60^\circ$

$x^\circ = 180-60 = \underline{120^\circ}, \underline{180+60} = \underline{240^\circ}$

\checkmark S	A
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T	C

e) $2\tan x^\circ = -8$

$\tan x^\circ = -4$

$\tan^{-1}(4) = 76^\circ$

$x^\circ = 180-76 = \underline{104^\circ}, \underline{360-76} = \underline{284^\circ}$

\checkmark S	A
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T	C \checkmark

f) $4\sin x^\circ = -3$

$\sin x^\circ = -\frac{3}{4}$

$\sin^{-1}(\frac{3}{4}) = 49^\circ$

$x^\circ = 180+49 = \underline{229^\circ}, \underline{360-49} = \underline{311^\circ}$

S	A
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
\checkmark T	C \checkmark

g) $5\tan x^\circ = 23.5$

$\tan x^\circ = 4.7$

$x^\circ = \tan^{-1}(4.7) = \underline{78^\circ}, \underline{180+78} = \underline{258^\circ}$

S	A \checkmark
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T \checkmark	C

h) $5\sin x^\circ = 2$

$\sin x^\circ = \frac{2}{5}$

$x^\circ = \sin^{-1}(\frac{2}{5}) = \underline{24^\circ}, \underline{180-24} = \underline{156^\circ}$

S	A \checkmark
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T	C

i) $6\cos x^\circ = 1$

$\cos x^\circ = \frac{1}{6}$

$x^\circ = \cos^{-1}(\frac{1}{6}) = \underline{80^\circ}, \underline{360-80} = \underline{280^\circ}$

S	A \checkmark
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T	C \checkmark

j) $8\sin x^\circ = -3$

$\sin x^\circ = -\frac{3}{8}$

$\sin^{-1}(\frac{3}{8}) = 22^\circ$

$x^\circ = 180+22 = \underline{202^\circ}, \underline{360-22} = \underline{338^\circ}$

S	A
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
\checkmark T	C \checkmark

k) $11\cos x^\circ = -9$

$\cos x^\circ = -\frac{9}{11}$

$\cos^{-1}(\frac{9}{11}) = 35^\circ$

$x^\circ = 180-35 = \underline{145^\circ}, \underline{180+35} = \underline{215^\circ}$

S	A
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T \checkmark	C \checkmark

l) $10\tan x^\circ = -9$

$\tan x^\circ = -\frac{9}{10}$

$\tan^{-1}(\frac{9}{10}) = 42^\circ$

$x^\circ = 180-42 = \underline{138^\circ}, \underline{360-42} = \underline{318^\circ}$

S	A
$\frac{180-x}{180+x}$	$\frac{x}{360-x}$
T \checkmark	C \checkmark

Solving trig equations - finding all solutions - Answers

4a) $\sin x^\circ - 1 = 0$

$\sin x^\circ = 1$

$x^\circ = \sin^{-1}(1) = \underline{90^\circ}$ (1 solution)

S	A
180-x	x
T	C
180+x	360-x

b) $\cos 2x^\circ + 1 = 0$

$\cos 2x^\circ = -1$

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

$x^\circ = 180 - 0 = \underline{180^\circ}$ (1 solution)

S	A
180-x	x
T	C
180+x	360-x

c) $\tan x^\circ - 1 = 0$

$\tan x^\circ = 1$

$x^\circ = \tan^{-1}(1) = \underline{45^\circ}, 180 + 45 = \underline{225^\circ}$

S	A
180-x	x
T	C
180+x	360-x

d) $2\sin x^\circ + 1 = 0$

$\sin x^\circ = -\frac{1}{2}$

$\sin^{-1}(-\frac{1}{2}) = 30^\circ$

$x^\circ = 180 + 30 = \underline{210^\circ}, 360 - 30 = \underline{330^\circ}$

S	A
180-x	x
T	C
180+x	360-x

e) $2\cos 2x^\circ - 1 = 0$

$\cos 2x^\circ = \frac{1}{2}$

$x^\circ = \cos^{-1}(\frac{1}{2}) = \underline{60^\circ}, 360 - 60 = \underline{300^\circ}$

S	A
180-x	x
T	C
180+x	360-x

f) $2\tan 2x^\circ - 1 = 0$

$\tan 2x^\circ = \frac{1}{2}$

$2x^\circ = \tan^{-1}(\frac{1}{2}) = \underline{27^\circ}, 180 + 27 = \underline{207^\circ}$

S	A
180-x	x
T	C
180+x	360-x

g) $4\cos x^\circ - 3 = 0$

$\cos x^\circ = \frac{3}{4}$

$x^\circ = \cos^{-1}(\frac{3}{4}) = \underline{41^\circ}, 360 - 41 = \underline{319^\circ}$

S	A
180-x	x
T	C
180+x	360-x

h) $3\sin x^\circ - 2 = 0$

$\sin x^\circ = \frac{2}{3}$

$x^\circ = \sin^{-1}(\frac{2}{3}) = \underline{42^\circ}, 180 - 42 = \underline{138^\circ}$

S	A
180-x	x
T	C
180+x	360-x

i) $5\cos x^\circ + 2 = 0$

$\cos x^\circ = -\frac{2}{5}$

$\cos^{-1}(-\frac{2}{5}) = 66^\circ$

$x^\circ = 180 - 66 = \underline{114^\circ}, 180 + 66 = \underline{246^\circ}$

S	A
180-x	x
T	C
180+x	360-x

j) $3\tan 2x^\circ - 2 = 0$

$\tan 2x^\circ = \frac{2}{3}$

$x^\circ = \tan^{-1}(\frac{2}{3}) = \underline{34^\circ}, 180 + 34 = \underline{214^\circ}$

S	A
180-x	x
T	C
180+x	360-x

k) $3\cos 2x^\circ + 1 = 0$

$\cos 2x^\circ = -\frac{1}{3}$

$\cos^{-1}(-\frac{1}{3}) = 71^\circ$

$x^\circ = 180 - 71 = \underline{109^\circ}, 180 + 71 = \underline{251^\circ}$

S	A
180-x	x
T	C
180+x	360-x

l) $7\sin 2x^\circ + 3 = 0$

$\sin 2x^\circ = -\frac{3}{7}$

$\sin^{-1}(-\frac{3}{7}) = 25^\circ$

$x^\circ = 180 + 25 = \underline{205^\circ}, 360 - 25 = \underline{335^\circ}$

S	A
180-x	x
T	C
180+x	360-x

Solving trig equations - finding all solutions - Answers

5a) $4\cos x^\circ + 3 = 2$
 $\cos x^\circ = -\frac{1}{4}$
 $\cos^{-1}\left(-\frac{1}{4}\right) = 76^\circ$

\checkmark S	A
\checkmark T	C

$x^\circ = 180 - 76 = 104^\circ, 180 + 76 = 256^\circ$

b) $10\sin x^\circ - 4 = 3$
 $\sin x^\circ = \frac{7}{10}$

\checkmark S	A
\checkmark T	C

$x^\circ = \sin^{-1}\left(\frac{7}{10}\right) = 44^\circ, 180 - 44 = 136^\circ$

c) $2\tan x^\circ - 3 = 17$
 $\tan x^\circ = 10$

S	A
\checkmark T	C

$x^\circ = \tan^{-1}(10) = 84^\circ, 180 + 84 = 264^\circ$

d) $7 + 10\cos x^\circ = 12$
 $\cos x^\circ = \frac{1}{2}$

S	A
\checkmark T	C

$x^\circ = \cos^{-1}\left(\frac{1}{2}\right) = 60^\circ, 360 - 60 = 300^\circ$

e) $2\tan x^\circ + 3 = 5$
 $\tan x^\circ = 1$

S	A
\checkmark T	C

$x^\circ = \tan^{-1}(1) = 45^\circ, 180 + 45 = 225^\circ$

f) $17 - 5\cos x^\circ = 20$
 $\cos x^\circ = -\frac{3}{5}$
 $\cos^{-1}\left(-\frac{3}{5}\right) = 53^\circ$

\checkmark S	A
\checkmark T	C

$x^\circ = 180 - 53 = 127^\circ, 180 + 53 = 233^\circ$

g) $5\sin x^\circ + 3 = 5$
 $\sin x^\circ = \frac{2}{5}$

\checkmark S	A
\checkmark T	C

$x^\circ = \sin^{-1}\left(\frac{2}{5}\right) = 24^\circ, 180 - 24 = 156^\circ$

h) $21 + 2\cos x^\circ = 20$
 $\cos x^\circ = -\frac{1}{2}$
 $\cos^{-1}\left(-\frac{1}{2}\right) = 60^\circ$

\checkmark S	A
\checkmark T	C

$x^\circ = 180 - 60 = 120^\circ, 180 + 60 = 240^\circ$

i) $2\sin x^\circ - 1.6 = 0$
 $\sin x^\circ = 0.8$

\checkmark S	A
\checkmark T	C

$x^\circ = \sin^{-1}(0.8) = 53^\circ, 180 - 53 = 127^\circ$

j) $3\cos x^\circ + \sqrt{2} = 0$
 $\cos x^\circ = -\frac{\sqrt{2}}{3}$
 $\cos^{-1}\left(-\frac{\sqrt{2}}{3}\right) = 62^\circ$

\checkmark S	A
\checkmark T	C

$x^\circ = 180 - 62 = 118^\circ, 180 + 62 = 242^\circ$

k) $7\sin x^\circ - 1 = 4$
 $\sin x^\circ = \frac{5}{7}$

\checkmark S	A
\checkmark T	C

$x^\circ = \sin^{-1}\left(\frac{5}{7}\right) = 46^\circ, 180 - 46 = 134^\circ$

l) $2\sin x^\circ + \sqrt{3} = 2\sqrt{2}$
 $\sin x^\circ = \frac{2\sqrt{2} - \sqrt{3}}{2}$

\checkmark S	A
\checkmark T	C

$x^\circ = \sin^{-1}\left(\frac{2\sqrt{2} - \sqrt{3}}{2}\right) = 33^\circ, 180 - 33 = 147^\circ$