

Trigonometric Identities Review

Answer key Final answers only. Try first, then check.

CORE SKILLS

K1 a) $\tan x$
b) 1
c) $\cos x$

K2 a) $\sin \theta = -\frac{24}{25}$
b) $\tan \theta = \frac{24}{7}, \csc \theta = -\frac{25}{24}$
c) $\sin^2 x$

K3 a) $\frac{13}{85}$
b) $-\frac{36}{85}$
c) $2 + \sqrt{3}$

K4 a) $-\frac{4\sqrt{5}}{9}$
b) $\cos 2A = \frac{1}{9}, \tan 2A = -4\sqrt{5}$
c) $\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}; \tan 30^\circ = \frac{\sqrt{3}}{3}$

K5 a) $x = 0, \frac{\pi}{3}, \frac{5\pi}{3}, 2\pi$
b) $x = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{3\pi}{2}$
c) $x = \frac{\pi}{6}, \frac{5\pi}{6}$

REAL WORLD

A1 a) $\tan \theta = \frac{\frac{8}{x} - \frac{3}{x}}{1 + \frac{8}{x} \cdot \frac{3}{x}} = \frac{5x}{x^2 + 24}$
b) $x = 4$ m or $x = 6$ m; $\theta \approx 26.6^\circ$ at both
c) Nowhere: $\tan \theta = 1$ gives $x^2 - 5x + 24 = 0$, with discriminant $-71 < 0$. The mural never fills 45° from eye level.

A2 a) $6 \sin \theta + 6 \cos \theta = 8$, so $(\sin \theta + \cos \theta)^2 = \frac{16}{9}, 1 + \sin 2\theta = \frac{16}{9}$ and $\sin 2\theta = \frac{7}{9}$
b) $\theta \approx 25.5^\circ$: height ≈ 2.59 m; $\theta \approx 64.5^\circ$: height ≈ 5.41 m
c) No: 25.5° and 64.5° are both outside $[70^\circ, 80^\circ]$. At 75° : $3\sqrt{6} \approx 7.35$ m.

A3 a) $d(\theta) = \frac{400 \sin 2\theta}{9.8}; \theta = 45^\circ; 40.8$ m
b) $\theta \approx 23.7^\circ$ or $\theta \approx 66.3^\circ$
c) Only 23.7° ($h \approx 3.3$ m). At 66.3° , $h \approx 17.1$ m: the ball hits the roof.

THINK IT THROUGH

T1 a) LS = -1, RS = 1: the claim is not an identity.
b) $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$
c) The student started from the claim and squared both sides; squaring can turn a false equation ($-1 = 1$) into a true one. It proves $(\sin x - \cos x)^2 = 1 - \sin 2x$, i.e. $|\sin x - \cos x| = \sqrt{1 - \sin 2x}$.

-
- T2**
- a) $a = \frac{1}{2}, b = -\frac{1}{2}$
 - b) $R = 2, \alpha = \frac{\pi}{3}$
 - c) The two terms never peak together ($\sin x = 1$ forces $\cos x = 0$). Largest value 2, at $x = \frac{\pi}{6}$.

BOSS LEVEL

- Boss**
- a) $8 \sin 20^\circ \cos 20^\circ \cos 40^\circ \cos 80^\circ = 4 \sin 40^\circ \cos 40^\circ \cos 80^\circ = 2 \sin 80^\circ \cos 80^\circ = \sin 160^\circ$
 - b) $P = \frac{1}{8}$
 - c) $-\frac{1}{8}$
-

Free worksheet · vertexmath.ca · Free to print and share for classroom use

Free to print, copy, adapt and share for classroom use · CC BY-NC 4.0 · © VertexMath



vertexmath.ca

Hints, answers &
more worksheets