

Trigonometry Practice Questions

Trig Ratios

1. State the value of each of the following:

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

b) $\cos 60^\circ$
 $= \frac{1}{2}$

c) $\tan 45^\circ$
 $= 1$

d) $\sec 45^\circ$
 $= \sqrt{2}$

e) $\csc 70^\circ$
 $= 1.0642$

f) $\cot 30^\circ$
 $= \sqrt{3}$

g) $\sin 0^\circ$
 $= 0$

h) $\cos 0^\circ$
 $= 1$

i) $\tan 0^\circ$
 $= 0$

2. Find the value of θ

a) $\tan \theta = 1$
 $= 45^\circ$

b) $\cos \theta = \frac{1}{\sqrt{2}}$
 $= 45^\circ$

c) $\sin \theta = \frac{1}{2}$
 $= 30^\circ$

d) $\sec \theta = 2$
 $= 60^\circ$

e) $\csc \theta = \frac{2}{\sqrt{3}}$
 $= 60^\circ$

f) $\cot \theta = \frac{1}{\sqrt{3}}$
 $= 60^\circ$

3. One ship observes a second ship 6km away to the north-east. The first ship sights a flare due east. For the second ship, the flare is due south. How far is each ship from the flare?

Each ship is 4.2426 km away from the flare.

4. In a baseball diamond, each baseline is 27.4m long. If the pitcher stands at the centre of the diamond, how far is she from each base?

She is 19.3747 m away from each base.

5. A guy wire is fastened 6.2 m from the base of a hydro pole. Find the length of the guy wire and how far up the pole it is fastened for each of the following angles of elevation.

a) 45°

8.7681 m

b) 30°

7.1591 m

c) 60°

12.4 m

6. Triangle ABC contains a right angle at C. Find the value of $\sin A$ if:

a) $\cos B = \frac{\sqrt{3}}{2}$

$\sin A = \frac{\sqrt{3}}{2}$

b) $\tan B = 0.25$

$\sin A = 0.9701$

c) $\sec B = 2$

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

Co-terminal angles and CAST

7. Considering that $\cos a = \frac{3}{7}$ where $0 \leq a \leq 180$ and $\sin b = \frac{\sqrt{7}}{4}$ where $0 \leq b \leq 90$, determine the value of each of the following trigonometric expressions.

a) $\sin a$
 $= 0.9035$

b) $\tan a$
 $= 2.1082$

c) $\sec a$
 $= 2.3333$

d) $\csc a$
 $= 1.1068$

e) $\cot a$
 $= \frac{3\sqrt{7}}{7}$

f) $\cos b$
 $= \frac{3}{4}$

g) $\tan b$
 $= \frac{\sqrt{7}}{3}$

h) $\sec b$
 $= \frac{4}{3}$

i) $\csc b$
 $= \frac{4\sqrt{7}}{7}$

j) $\cot b$
 $= \frac{3\sqrt{7}}{7}$

8. If $\cos x = \frac{12}{13}$ and $0 \leq x \leq 90$, determine the value of each of the following:

a) $\sin x$
 $= \frac{5}{13}$

b) $\sec x$
 $= \frac{13}{12}$

c) $\tan x$
 $= \frac{5}{12}$

d) $\csc x$
 $= \frac{13}{5}$

e) $\cot x$
 $= \frac{12}{5}$

9. If $\tan x = \sqrt{3}$ and $180 \leq x \leq 360$, determine the value of each of the following:

a) $\cos x$

$$= -\frac{1}{2}$$

b) $\cot x$

$$= \frac{\sqrt{3}}{3}$$

c) $\csc x$

$$= -\frac{2\sqrt{3}}{3}$$

d) $\sin x$

$$= -\frac{\sqrt{3}}{2}$$

e) $\sec x$

$$= -2$$

10. Given $\sin \theta = 0.788$, find the values of θ over $0 \leq x \leq 360$.

$$\theta_1 = 52^\circ$$

$$\theta_2 = 128^\circ$$

11. Given $\cos \theta = -0.2588$, find the values of θ over $360 \leq x \leq 720$.

$$\theta_1 = 105^\circ$$

$$\theta_2 = 255^\circ$$

Radians and Arc Length

12. Express each of the following angle measures in radians. Express each answer in terms of π .

a) 350°

$$= \frac{35\pi}{18} \text{ rad}$$

b) 5°

$$= \frac{\pi}{36} \text{ rad}$$

c) 140°

$$= \frac{7\pi}{9} \text{ rad}$$

d) 25°

$$= \frac{5\pi}{36} \text{ rad}$$

e) 70°

$$= \frac{7\pi}{18} \text{ rad}$$

f) -10°

$$= -\frac{\pi}{18} \text{ rad}$$

13. Express each of the following angle measures in degrees.

a) $\frac{\pi}{6} \text{ rad}$

$$= 30^\circ$$

b) $\frac{5\pi}{12} \text{ rad}$

$$= 75^\circ$$

c) $\frac{3\pi}{20} \text{ rad}$

$$= 27^\circ$$

d) 7 rad

$$= 401.07^\circ$$

e) $-\frac{\pi}{5} \text{ rad}$

$$= -36^\circ$$

f) -2 rad

$$= -114.59^\circ$$

14. In which quadrant will the arc representing each real number terminate?

a) -0.5
4

b) $\frac{\pi}{6}$
1

c) $\frac{2\pi}{3}$
2

d) $\frac{-7\pi}{5}$
2

e) 2
2

f) 8
2

g) -10
2

h) -17.8
1

15. Given $\cos \theta = \frac{-\sqrt{2}}{2}$, find the values of θ over $0 \leq \theta \leq 2\pi$.

$$\theta_1 = \frac{3\pi}{4} \text{ rad}$$

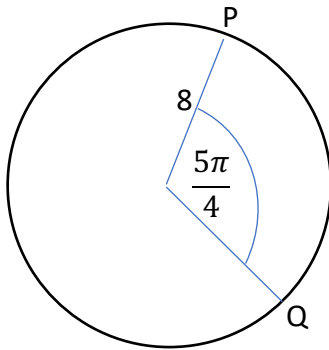
$$\theta_2 = \frac{5\pi}{4} \text{ rad}$$

16. Given $\tan \theta = \sqrt{3}$, find the values of θ over $\pi \leq \theta \leq 2\pi$.

$$\theta_1 = \frac{\pi}{3} \text{ rad}$$

$$\theta_2 = \frac{4\pi}{3} \text{ rad}$$

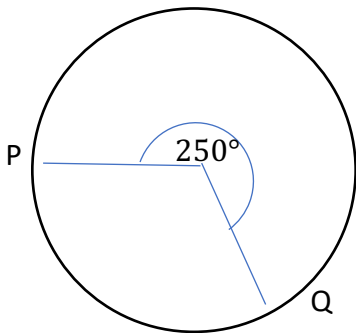
17. What is the arc length of PQ



$$\text{Arc length} = 10\pi$$

18. What is the arc length of PQ, given the radius of the circle is 6.

$$\text{Arc length} = \frac{25\pi}{3}$$



The Unit Circle

17. Without using a calculator, give the coordinates of the trigonometric point corresponding to a central angle that measures:

a) 0°
 $(1, 0)$

b) -90°
 $(0, -1)$

c) 180°
 $(-1, 0)$

d) 240°
 $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

e) 330°
 $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

f) $\frac{\pi}{6}$
 $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

g) $\frac{4\pi}{3}$
 $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

h) $\frac{11\pi}{6}$
 $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

i) $-\frac{\pi}{3}$
 $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

18. If R is a point on the unit circle, give the possible values for the missing coordinate.

a) $R\left(\frac{\sqrt{2}}{2}, ?\right)$

$\frac{\sqrt{2}}{2}$ and $-\frac{\sqrt{2}}{2}$

b) $R\left(?, \frac{-1}{2}\right)$

$\frac{\sqrt{3}}{2}$ and $-\frac{\sqrt{3}}{2}$

19. For each trigonometric point P, determine all the possible values for the unknown coordinate.

a) $P\left(\frac{-5}{6}, ?\right)$

$$\frac{\sqrt{11}}{6} \text{ and } -\frac{\sqrt{11}}{6}$$

b) $R\left(?, \frac{3}{5}\right)$

$$\frac{4}{5} \text{ and } -\frac{4}{5}$$

20. Given $\cos \theta = \frac{4}{5}$, find all possible values of θ over $0^\circ \leq \theta$.

$$\theta_1 = 36.87^\circ + 360n$$

$$\theta_2 = 323.13^\circ + 360n$$

21. Given $\sin \theta = \frac{8}{9}$, find all possible values of θ over $0 \text{ rad} \leq \theta$.

$$\theta_1 = 1.09\text{rad} + 2\pi n$$

$$\theta_2 = 2.05\text{rad} + 2\pi n$$

Trig Identities

22. Simplify each of the following expressions.

$$\begin{aligned} \text{a) } & (1 - \cos^2 x)(\cot^2 x) \\ & = \cos^2 x \end{aligned}$$

$$\begin{aligned} \text{b) } & \sec^2 x - \tan^2 x \\ & = 1 \end{aligned}$$

$$\begin{aligned} \text{c) } & \csc^2 x - \cot^2 x \\ & = 1 \end{aligned}$$

$$\begin{aligned} \text{d) } & \frac{1 + \tan^2 x}{\sec^2 x} \\ & = 1 \end{aligned}$$

$$\begin{aligned} \text{e) } & \tan^2 x - \tan^2 x \sin^2 x \\ & = \sin^2 x \end{aligned}$$

$$\begin{aligned} \text{f) } & \sec^2 x - \tan^2 x - \cos^2 x \\ & = \sin^2 x \end{aligned}$$

23. Prove:

$$\frac{\cos^2 x - \cos^4 x}{\sin^2 x - \sin^4 x} = 1$$

24. Prove:

$$(1 - \sin^2 x)(1 + \cot^2 x) = \cot^2 x$$

25. Prove:

$$\frac{\sin x + \cos x \cdot \cot x}{\cot x} = \sec x$$

26. Prove:

$$(\sec y - \tan y)^2 = \frac{1 - \sin y}{1 + \sin y}$$

27. Prove

$$\frac{\sec x}{\cos x} - \frac{\tan x}{\cot x} = 1$$