

# SET 3: Pure Mathematics

## Tutorial 6

1. Find a positive and a negative angle that each of them is a coterminal with:

(a)  $\frac{2\pi}{5}$  [Ans.  $\frac{12\pi}{5}$  and  $-\frac{8\pi}{5}$ ]

(b)  $36^\circ$  [Ans.  $396^\circ$ ,  $-324^\circ$ ]

2. Convert the following angles from degrees to radians:

(a)  $72^\circ$  [Ans.  $\frac{2\pi}{5}$  radians or 1.26 radians]

(b)  $43^\circ 20'$  [Ans. 0.756 radians]

(c)  $-315^\circ$  [Ans.  $-\frac{7\pi}{8}$  radians or  $-2.75$  radians]

(d)  $-121^\circ 30'45''$  [Ans.  $-2.12$  radians]

3. Convert the following angles from radians to degrees:

(a)  $\frac{5\pi}{6}$  radians [Ans.  $150^\circ$ ]

(b)  $-\frac{4\pi}{3}$  radians [Ans.  $-240^\circ$ ]

(c) 2.357 radians [Ans.  $135.05^\circ$ ]

(d)  $-3.12$  radians [Ans.  $-178.76^\circ$ ]

4. Evaluate the following trigonometric ratios correct to 2 decimal places:

(a)  $\cos 124^\circ$  [Ans.  $-0.56$ ]

(b)  $\sin 2.79$  [Ans. 0.34]

(c)  $\tan 213^\circ 37'$  [Ans. 0.66]

(d)  $\sec (2\pi/5)$  [Ans. 3.24]

(e)  $\csc (3\pi/7)$  [Ans. 1.03]

(f)  $\cot 67^\circ 15'28''$  [Ans. 0.42]

5. Find the following acute angles in degrees:

(a)  $\sec^{-1} 3.19$  [Ans.  $71.73^\circ$ ]

(b)  $\csc^{-1} 1.63$  [Ans.  $37.84^\circ$ ]

(c)  $\cot^{-1} 0.57$  [Ans.  $60.32^\circ$ ]

6. Solve the following trigonometric equations:

(a)  $4 \cos x - 3 = 0$  [Ans.  $41.41^\circ$  and  $318.5^\circ$ ]

(b)  $3 \sin x + 1 = 0$  [Ans.  $199.47^\circ$  and  $340.53^\circ$ ]

(c)  $3 \sec^2 A - 8 = 0$  [Ans.  $52.24^\circ$ ,  $127.76^\circ$ ,  $232.24^\circ$  and  $307.76^\circ$ ]

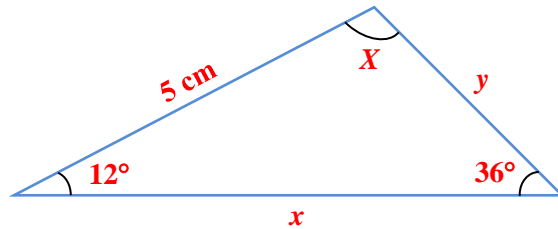
(d)  $2 \sin^2 x - \sin x - 1 = 0$  [Ans.  $90^\circ$ ,  $210^\circ$ ,  $330^\circ$ ]

(e)  $2 \cos^2 B + 6 \cos B - 3 = 0$  [Ans.  $64.11^\circ$  and  $295.59^\circ$ ]

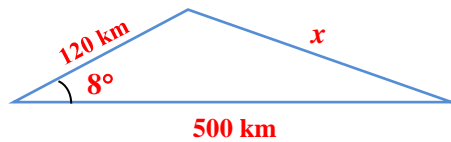
7. Prove the following trigonometric identities:

- (a)  $\frac{1 + \tan B}{1 + \cot B} = \frac{\sec B}{\csc B}$
- (b)  $\cos Z(\cot Z + \tan Z) = \csc Z$
- (c)  $\cos^4 x - \sin^4 x = \cos 2x$
- (d)  $(1 + \cot \alpha)^2 + (1 - \cot \alpha)^2 = 2 \csc^2 \alpha$
- (e)  $2 \cos^2 A - 1 = \cos^2 A - \sin^2 A$

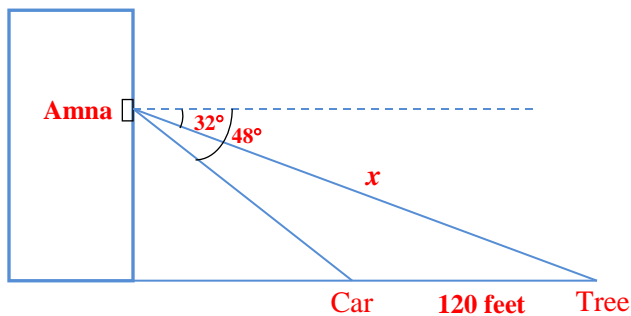
8. Solve the triangle below. [Ans.  $x = 6.32$  cm,  $y = 1.77$  cm and  $X = 132^\circ$ ]



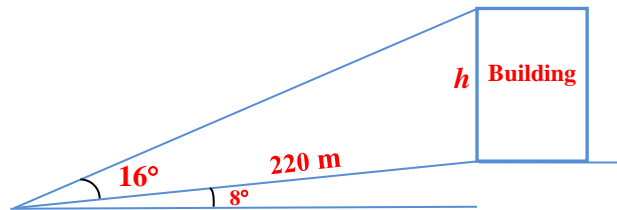
9. Solve for  $x$  in the triangle below. [Ans.  $x = 381.5$  km]



10. From a window, Amna sees two objects: a car and a tree. The angle of depression of the car is 48°, while that of the tree is 32°. If the distance between the car and the tree is 120 feet, find the distance between Amna and the tree. [Ans. 323.5 feet]



11. A building is located at the end of a street that is inclined at an angle of  $8^\circ$  with the horizontal. At a point, 220 meters down the street from the building, the angle subtended by the building is  $16^\circ$ . How tall the building is? [Ans. 66.4 m]



12. A 25 ft long ladder is leaning against a hill. The bottom of the ladder is 12 ft from the hill and the distance from the top of the ladder down the hill is 16 ft. What is the angle at which the hill is inclined to the horizontal? [Ans.  $125.9^\circ$ ]

