

**Part 1: Be prepared to complete these problems without the use of a calculator!**

Determine the exact values of the six trigonometric functions of the angle  $\theta$ .

1.  $\theta = \frac{3\pi}{4}$

$$\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$$

$$\csc \frac{3\pi}{4} = \sqrt{2}$$

$$\cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2}$$

$$\sec \frac{3\pi}{4} = -\sqrt{2}$$

$$\tan \frac{3\pi}{4} = -1$$

$$\cot \frac{3\pi}{4} = -1$$

2.  $\theta = 240^\circ$

$$\sin 240^\circ = -\frac{\sqrt{3}}{2}$$

$$\csc 240^\circ = -\frac{2\sqrt{3}}{3}$$

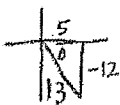
$$\cos 240^\circ = -\frac{1}{2}$$

$$\sec 240^\circ = -2$$

$$\tan 240^\circ = \sqrt{3}$$

$$\cot 240^\circ = \frac{\sqrt{3}}{3}$$

3.  $(5, -12)$  is on the terminal side of an angle in standard position. Determine the exact values of  $\sin$ ,  $\cos$ , and  $\tan$  of the angle.



$$\sin \theta = -\frac{12}{13}$$

$$\cos \theta = \frac{5}{13}$$

$$\tan \theta = -\frac{12}{5}$$

4. State the quadrant in which  $\theta$  lies.

a)  $\sin \theta < 0, \cos \theta < 0$   
3, 4

3

b)  $\sin \theta > 0, \tan \theta < 0$   
1, 2

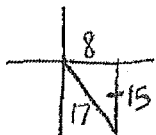
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c)  $\cot \theta > 0, \cos \theta > 0$   
1, 3

1

5. Use the given information to determine sine, cosine, and tangent of  $\theta$ , unless already given.

a)  $\tan \theta = -\frac{15}{8}; \sin \theta < 0$   
2, 4



$$\sin \theta = -\frac{15}{17}$$

$$\cos \theta = \frac{8}{17}$$

b)  $\sec \theta = -2; 0 \leq \theta \leq \pi$

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

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

$$\tan \theta = -\sqrt{3}$$

c)  $\sin \theta = 0; \sec \theta = -1$

$$\cos \theta = -1$$

$$\tan \theta = 0$$

6. Evaluate the trigonometric function of the quadrant angle.

a)  $\sec \pi = \frac{1}{-1} = -1$   
 $(-1, 0)$

b)  $\cot \left(\frac{\pi}{2}\right) = \frac{0}{1} = 0$   
 $\frac{x}{y} (0, 1)$

Evaluate each without using a calculator.

7.  $\tan 225^\circ$

$$= 1$$

8.  $\cos (-750^\circ)$   
 $+1080$

$$= \cos 330^\circ = \frac{\sqrt{3}}{2}$$

9.  $\sin (-240^\circ)$   
 $+360$

$$= \sin 120^\circ = \frac{\sqrt{3}}{2}$$

10.  $\tan \left(\frac{5\pi}{3}\right) = -\sqrt{3}$

11.  $\sin \left(-\frac{\pi}{6}\right)$   
 $+2\pi$

$$\sin \frac{11\pi}{6} = -\frac{1}{2}$$

12.  $\cos \left(\frac{11\pi}{4}\right)$   
 $-2\pi$

$$\cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2}$$

13. Find the acute angle that satisfies the given equation. Answer in both degrees and radians.

a)  $\cos \theta = \frac{1}{2}$

$$\theta = 60^\circ, \frac{\pi}{3}$$

b)  $\cot \theta = \frac{\sqrt{3}}{3}$

$$\theta = 60^\circ, \frac{\pi}{3}$$

Part 2: You will be able to use a calculator for problems like these.

1. Convert  $260^\circ$  to radian measure.

$$260^\circ \cdot \frac{\pi}{180^\circ} = \frac{13\pi}{9} \text{ rad}$$

2. Convert  $\frac{5\pi}{8}$  to degree measure.

$$\frac{5\pi}{8} \cdot \frac{180}{\pi} = 112.5^\circ$$

State the quadrant in which the terminal side of the angle lies, and find its reference angle. Answer the question in the units that it is given.

3.  $105^\circ$  (2)

$$\bar{\theta} = 180 - 105$$

$$\bar{\theta} = 75^\circ$$

4.  $-310^\circ$  (1)

$$+360$$

$$\text{coterm} = 50^\circ$$

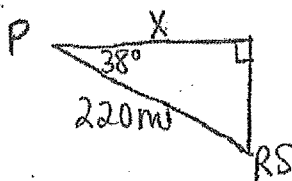
$$\bar{\theta} = 50^\circ$$

5.  $\frac{9\pi}{5}$  (4)

$$\bar{\theta} = 2\pi - \frac{9\pi}{5}$$

$$\bar{\theta} = \frac{\pi}{5}$$

6. DME (Distance Measuring Equipment) is standard avionic equipment on a commercial airplane. This equipment measures the distance from a plane to a radar station. If the distance from a plane to a radar station is 220 miles and the angle of depression is  $38^\circ$ , find the number of ground miles from a point directly below the plane to the radar station.

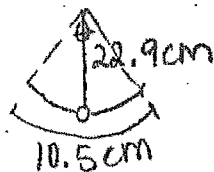


$$\cos 38^\circ = \frac{x}{220}$$

$$x = 220 \cos 38^\circ$$

$$x \approx 173.362 \text{ mi}$$

7. A pendulum is 22.9 centimeters long, and the bob at the end of the pendulum travels 10.5 centimeters. Find the degree measure of the angle through which the pendulum swings.



$$s = r\theta$$

$$10.5 = 22.9\theta$$

$$\frac{10.5}{22.9} = \theta$$

$$\frac{105}{229} \text{ rad} = \theta$$

$$\frac{105}{229} \cdot \frac{180}{\pi} = 26.271^\circ$$