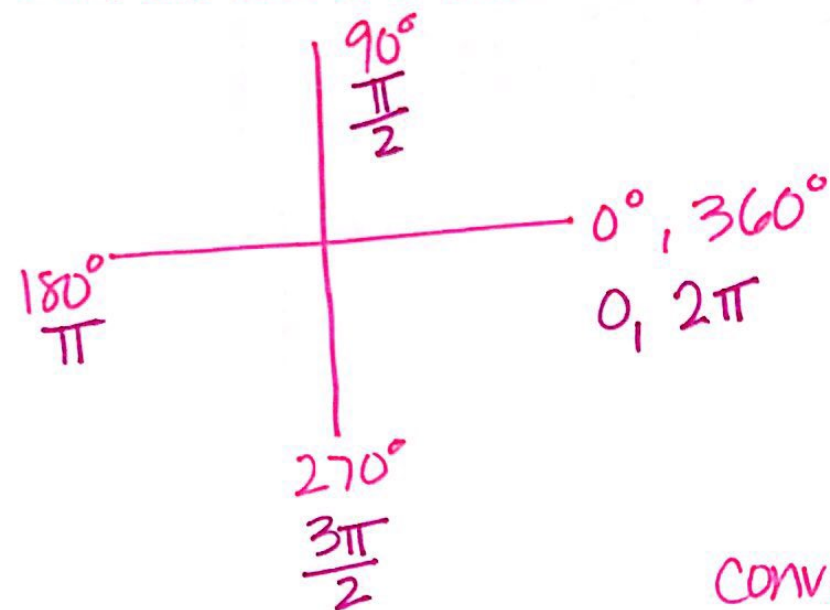


7.2: Angles in Radians



Unit circle
→ radius of 1

$$C = 2\pi r$$

$$C = 2\pi(1)$$

$$C = 2\pi \text{ radians}$$

Conversion factor:
 $180^\circ = \pi \text{ radians}$

Convert to degrees

$$\text{Ex 1) } \frac{2\pi}{9} \left(\frac{180^\circ}{\pi} \right) = \frac{2 \cdot 180^\circ}{9} = \boxed{40^\circ}$$

$$\text{Ex 2) } \frac{18\pi}{7} \left(\frac{180^\circ}{\pi} \right) = \frac{18 \cdot 180^\circ}{7} = \boxed{462.86^\circ}$$

$$\text{You try: } \frac{6\pi}{1} \left(\frac{180^\circ}{\pi} \right) = \frac{6 \cdot 180^\circ}{1} = \boxed{1080^\circ}$$

convert to radians

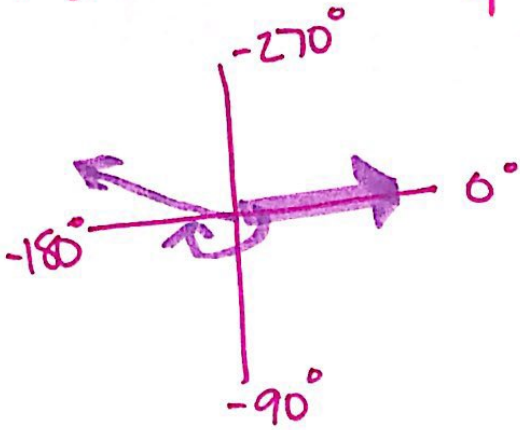
$$\text{Ex 3) } \frac{50^\circ}{1} \left(\frac{\pi}{180^\circ} \right) = \frac{50\pi}{180} = \boxed{\frac{5\pi}{18}}$$

$$\text{You try: } -252^\circ \left(\frac{\pi}{180^\circ} \right) = \frac{-252\pi}{180} = \boxed{\frac{-7\pi}{5}}$$

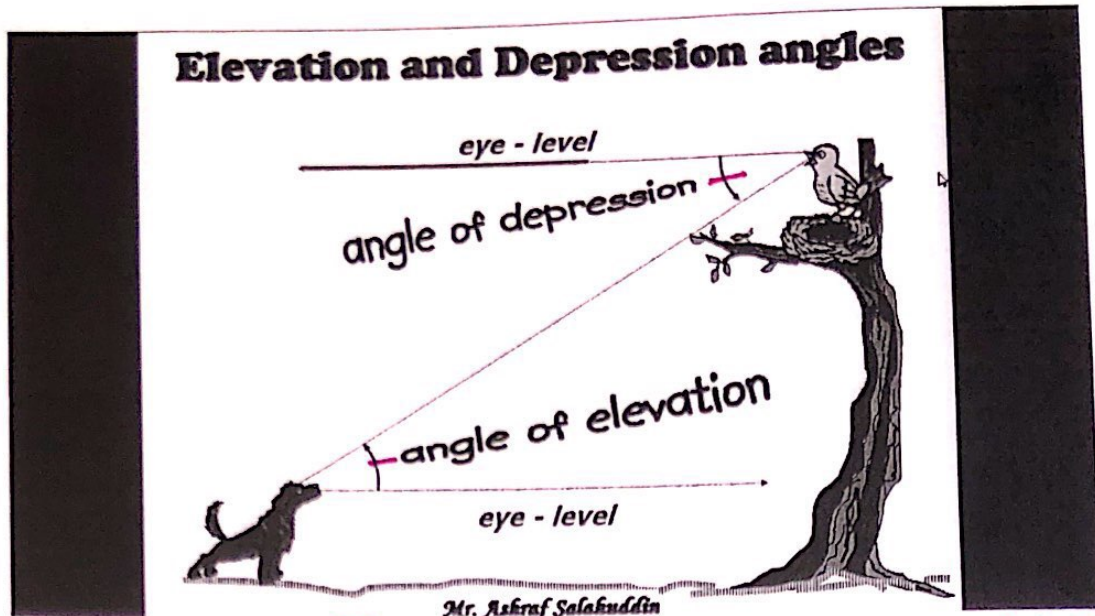
Ex 4) Sketch $\frac{\pi}{3} \left(\frac{180^\circ}{\pi} \right) = \frac{180^\circ}{3} = 60^\circ$



You try: Sketch $-\frac{10\pi}{9} \left(\frac{180^\circ}{\pi} \right) = -200^\circ$

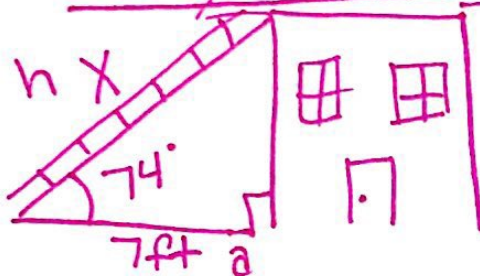


Elevation and Depression angles



SOH CAH TOA

EX1. A ladder leaning against a house makes an angle of 74° with the ground. The foot of the ladder is 7 feet from the foot of the house. How long is the ladder?

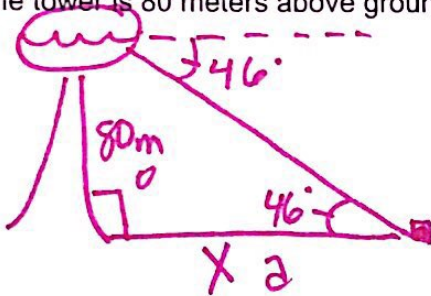


$$x \cdot \cos 74 = \frac{7}{x} \cdot x$$

$$\frac{x \cdot \cos 74}{\cos 74} = \frac{7}{\cos 74}$$

$$x = 25.40 \text{ ft}$$

EX2. From the top of a tower, the angle of depression to a stake on the ground is 46° . The top of the tower is 80 meters above ground. How far is the stake from the foot of the tower?

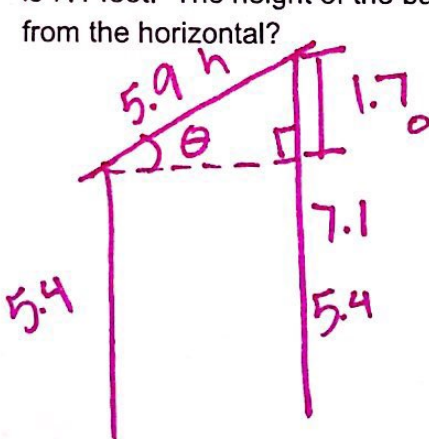


$$x \cdot \tan 46 = \frac{80}{x} \cdot x$$

$$\frac{x \cdot \tan 46}{\tan 46} = \frac{80}{\tan 46}$$

$$x = 77.26 \text{ m}$$

EX3. A toolshed has a slanted roof that is 5.9 feet long. The height of the front edge of the roof is 7.1 feet. The height of the back edge of the roof 5.4 feet. At what angle does the roof rise from the horizontal?



$$\sin \theta = \frac{1.7}{5.9}$$

$$\theta = \sin^{-1} \left(\frac{1.7}{5.9} \right)$$

$$\theta = 16.75^\circ$$