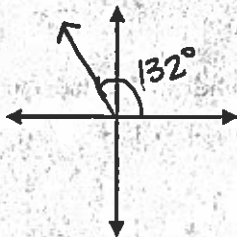


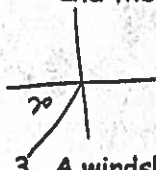
1. Sketch  $132^\circ$  in standard position. In which quadrant does the terminal arm lie? What is the reference angle?



Quadrant: II

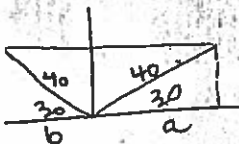
$$\text{Reference Angle: } \frac{180^\circ - 132^\circ}{= 48^\circ}$$

2. Determine the measure of an angle in standard position given that its reference angle is  $20^\circ$  and the terminal arm lies in quadrant III.



$$180^\circ + 20^\circ = 200^\circ$$

3. A windshield wiper has a length of 40 cm. The wiper rotates from a resting position at  $30^\circ$ , in standard position, to  $150^\circ$ . Determine the exact horizontal distance that the tip of the wiper travels in one swipe.



$$\cos 30^\circ = \frac{a}{40}$$

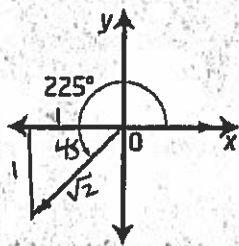
$$a = 34.6^\circ$$

$$\cos 30^\circ = \frac{b}{40}$$

$$b = 34.6^\circ$$

horizontal distance  
 $(34.6)(2)$   
 $= 69.2 \text{ cm}$

4. Determine the exact value of the sine, cosine, and tangent ratios for the given angle.

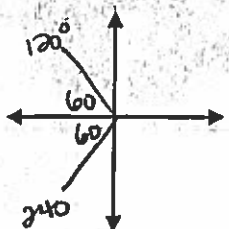


$$\sin 225^\circ = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\cos 225^\circ = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\tan 225^\circ = 1$$

5. Solve the equation  $\cos \theta = -\frac{1}{2}$ , for  $0^\circ \leq \theta < 360^\circ$ .



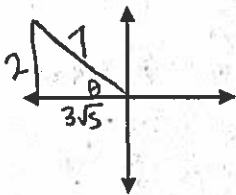
$$\cos \theta = -\frac{1}{2}$$

$$\theta = 120^\circ, 240^\circ$$

$$\text{ref } \angle = 60^\circ$$

6. Suppose  $\theta$  is an angle in standard position with terminal arm in quadrant II, and  $\sin \theta = \frac{2}{7}$ .

Determine the exact values for  $\cos \theta$  and  $\tan \theta$ .



$$7^2 - 2^2 = b^2$$

$$49 - 4 = b^2$$

$$45 = b^2$$

$$\sqrt{45} = b$$

$$b = 3\sqrt{5}$$

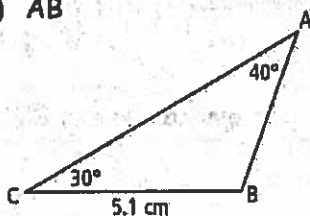
$$\cos \theta = \frac{3\sqrt{5}}{7}$$

$$\tan \theta = \frac{2}{3\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

$$\tan \theta = \frac{2\sqrt{5}}{15}$$

7. Determine the length of the indicated side or angle in each triangle. Round to the nearest tenth.

a) AB

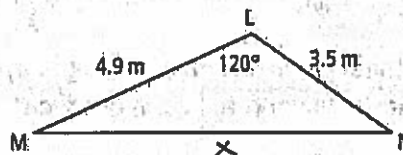


$$\frac{\sin 40}{5.1} = \frac{\sin 30}{AB}$$

$$AB = \frac{5.1(\sin 30)}{\sin 40}$$

$$AB = 4.0 \text{ cm}$$

b) MN



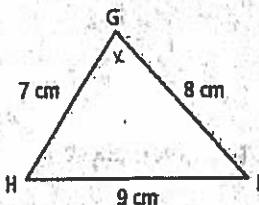
$$x^2 = 4.9^2 + 3.5^2 - 2(4.9)(3.5)\cos 120^\circ$$

$$x^2 = 24.01 + 12.25 + 17.15$$

$$x^2 = 53.41$$

$$x = 7.3 \text{ m}$$

c)  $\angle G$



$$9^2 = 7^2 + 8^2 - 2(7)(8)\cos x$$

$$81 - 49 - 64 = -112 \cos x$$

$$\frac{-32}{-112} = \frac{-112 \cos x}{-112}$$

$$-0.2857 = \cos x$$

$$x = 73.4^\circ$$

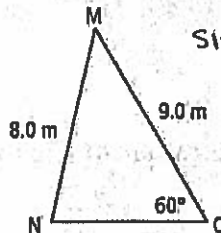
d)  $\angle N$  SSA

$$\frac{\sin 60}{8} = \frac{\sin N}{9}$$

$$\sin N = 0.9743$$

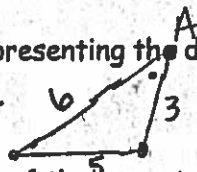
$$N = 77^\circ$$

$$N = 103^\circ$$



8. A gear system inside a toy consists of three circular gears. The radii of the three gears are 4 cm, 2 cm, and 1 cm, respectively.

a) Sketch a triangle representing the distances between the centres of the gears.



b) What is the measure of the largest angle between the centres of the gears, to the nearest tenth of a degree?

$$6^2 = 3^2 + 5^2 - 2(3)(5)\cos x$$

$$36 = 9 + 25 - 30\cos x$$

$$2 = -30\cos x$$

$$-0.0666 \dots = \cos x$$

$$x = 93.8^\circ$$

