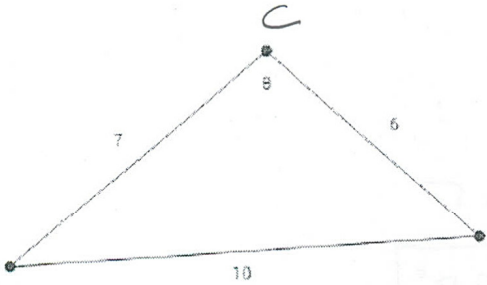


1. Find  $\theta$ .



$$\cos \theta = \frac{7^2 + 6^2 - 10^2}{2(7)(6)}$$

$$\cos \theta = \frac{-5}{28}$$

$$\theta \approx \cos^{-1}\left(\frac{-5}{28}\right)$$

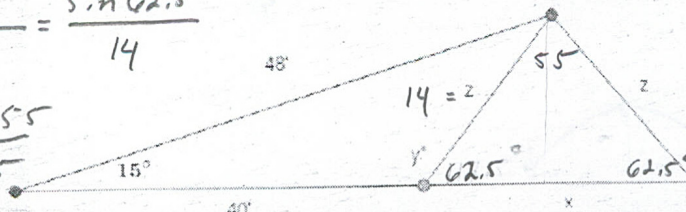
$$\theta \approx 100.3^\circ$$

2. Find  $x$ ,  $y$  and  $z$ .

$$\frac{\sin 55^\circ}{x} = \frac{\sin 62.5^\circ}{14}$$

$$x = \frac{14 \sin 55^\circ}{\sin 62.5^\circ}$$

$$x \approx 12.9$$



$$z^2 = 48^2 + 40^2 - 2(48)(40)\cos 15^\circ$$

$$z^2 \approx 194.8$$

$$z \approx 14.0$$

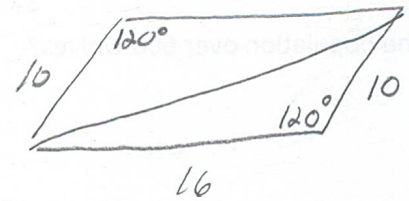
$$\frac{\sin 15^\circ}{14} = \frac{\sin y^\circ}{48}$$

$$0.8873 \approx \sin y$$

$$y = 180 - 62.5 = 117.5^\circ$$

Pair in the SSA

3. A parallelogram has sides of 10 and 16 inches with an included angle of  $60^\circ$ . Find the length of the longest diagonal in the parallelogram.



$$c^2 = 16^2 + 10^2 - 2(10)(16)\cos 120^\circ$$

$$c^2 = 516$$

$$c \approx 22.7$$

4. Prove:  $\frac{(1 - \sin \theta)(1 + \sin \theta)}{\sin \theta \cos \theta} = \cot \theta$

$$\frac{1 + \sin \theta - \sin \theta - \sin^2 \theta}{\sin \theta \cos \theta} = \cot \theta$$

$$\frac{1 - \sin^2 \theta}{\sin \theta \cos \theta}$$

$$\frac{\cos^2 \theta}{\sin \theta \cos \theta} = \cot \theta$$

$$\frac{\cos \theta}{\sin \theta} = \cot \theta \checkmark$$

5. Solve:  $5 - 3\sin(2\theta) = 4$  over  $0^\circ \leq \theta < 360^\circ$ . Show your work.

$$-3\sin 2\theta = -1$$

$$\sin 2\theta = \frac{1}{3}$$

$$2\theta = \sin^{-1}\left(\frac{1}{3}\right)$$

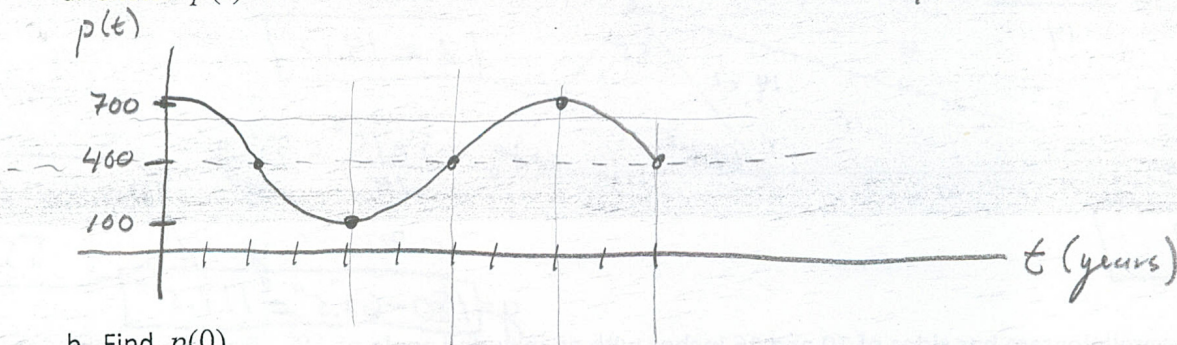
$$2\theta = 19.5, 159.5, 379.5, 519.5$$

$$\theta = 9.8^\circ, 79.8^\circ, 189.8^\circ, 259.8^\circ$$

6. A population of wolves at a park is given by the equation  $p(t) = 400 - 300 \sin\left[\frac{\pi}{4}(t-2)\right]$ , where  $t$  is the number of years since the beginning of the count.

$$\text{period} = \frac{2\pi}{\frac{\pi}{4}} = 8$$

a. Sketch  $p(t)$  over  $0 \leq t \leq 10$ .



b. Find  $p(0)$ .

$$p(0) = 700$$

c. What percent of the 8 year cycle is the population over 600 wolves?

7. Solve:  $3 + 4\sin^2 \theta = 4$  over  $0^\circ \leq \theta < 360^\circ$

$$4\sin^2 \theta = 1$$

$$\sin^2 \theta = \frac{1}{4}$$

$$\sin \theta = \pm \frac{1}{2}$$

$$\theta = 30^\circ, 150^\circ, 210^\circ, 330^\circ$$