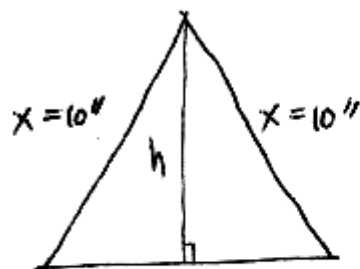


Answer Key

Trigonometry and Logarithms

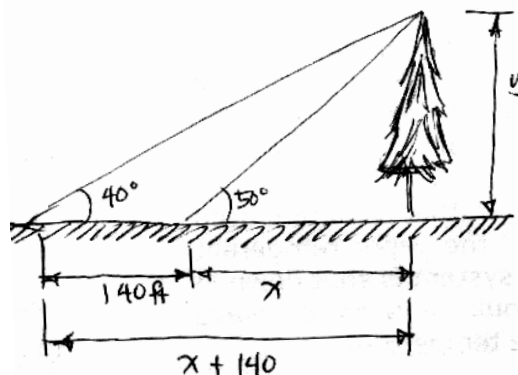


$$h = \frac{\sqrt{3}}{2} X$$

$$h = \frac{\sqrt{3}}{2} (10 \text{ in})$$

$$h = 5\sqrt{3} \text{ in}$$

$$h = 8.6603 \text{ in}$$



$$\tan 40^\circ = \frac{y}{x + 140}$$

$$\tan 50^\circ = \frac{y}{x}$$

$$y = (x + 140) \tan 40^\circ$$

$$y = x \tan 50^\circ$$

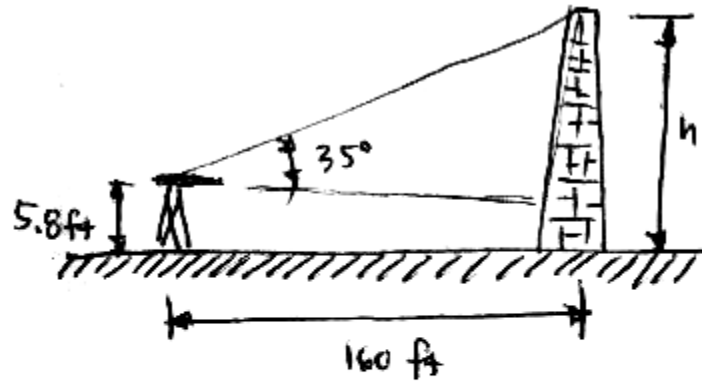
equating to solve for x

$$(x + 140) \tan 40^\circ = x \tan 50^\circ$$

$$0.8391x + 117.4739 = 1.1918x$$

$$0.3527x = 117.4739$$

$$x = 333.0703 \text{ ft}$$



$$\tan 35^\circ = \frac{h - 5.8 \text{ ft}}{160 \text{ ft}}$$

$$h = 117.8332 \text{ ft}$$

Trial and error:

$$\tan(251.6^\circ) = 3.006$$

$$\sin(251.6^\circ) = -0.9489$$

$$\sin \theta = \frac{4}{7}$$

$$\theta = 34.8499^\circ$$

$$\begin{aligned}\cos \theta &= \sin(90^\circ - \theta) \\ &= \sin(90^\circ - 34.8499^\circ)\end{aligned}$$

$$\cos \theta = 0.8207$$

$$\sec \theta = \frac{1}{0.8207}$$

$$\sec \theta = 1.2185$$

$$\begin{aligned}\sin 2\theta &= \cos \theta \\ 2 \cos \theta \sin \theta &= \cos \theta \\ \sin \theta &= \frac{\cos \theta}{2 \cos \theta} \\ \sin \theta &= \frac{1}{2} \\ \theta &= 30^\circ\end{aligned}$$

$$\sec^2 x = \frac{7}{2} \quad ; \quad 1 - \sin^2 x = \cos^2 x$$

$$1 - \sin^2 x = \frac{1}{\sec^2 x}$$

subst:

$$1 - \sin^2 x = \frac{2}{7}$$

$$1 - \sin^2 x = 0.2857$$

$$\begin{aligned}\sin(x-y) &= \sin x \cos y - \sin y \cos x \\ &= (\sin 90^\circ)(\cos y) - (\sin y)(\cos 90^\circ) \\ &= (1)(\cos y) - (\sin y)(0) \\ &= \cos y\end{aligned}$$

$$= \cot^2 x \sin^2 x + \frac{1}{\csc^2 x}$$

$$= \cot^2 x \sin^2 x + \sin^2 x$$

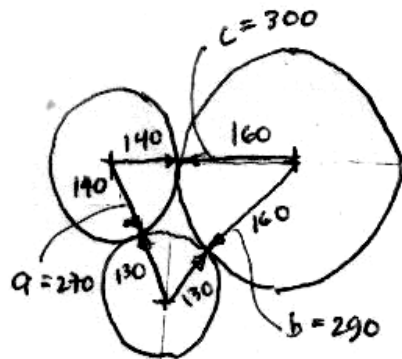
$$= \sin^2 x (\cot^2 x + 1)$$

$$= \sin^2 x (\csc^2 x)$$

$$= \cancel{\sin^2 x} \left(\frac{1}{\cancel{\sin^2 x}} \right)$$

$$= 1$$

$$\begin{aligned}\cos 2\theta &= 1 - 2\sin^2\theta \\ &= 1 - 2\left(\frac{1}{\csc^2\theta}\right) \\ &= 1 - \frac{2}{\csc^2\theta}\end{aligned}$$



$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$270^2 = 290^2 + 300^2 - 2(290)(300) \cos A$$

$$A = 54.4362^\circ$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

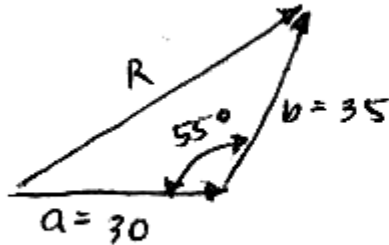
$$290^2 = 270^2 + 300^2 - 2(270)(300) \cos B$$

$$B = 60.8945^\circ$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$300^2 = 270^2 + 290^2 - 2(270)(290) \cos C$$

$$C = 64.6694^\circ$$



$$R^2 = a^2 + b^2 - 2ab \cos R$$

$$R^2 = 30^2 + 35^2 - 2(30)(35) \cos 55^\circ$$

$$R = \sqrt{920.4895}$$

$$R = 30.3396 \text{ units}$$

$$\begin{aligned}c^2 &= a^2 + b^2 - 2ab \cos C \\&= 156^2 + 250^2 - 2(156)(250) \cos 35^\circ\end{aligned}$$

$$c = \sqrt{22942.1406}$$

$$c = 151.4667$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$250^2 = 156^2 + 151.4667^2 - 2(156)(151.4667) \cos B$$

$$\cos B = -0.3221$$

$$B = 108.7902^\circ$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$180^\circ = A + B + C$$

$$180^\circ = 48^\circ + 72^\circ + C$$

$$C = 60^\circ$$

$$\frac{b}{\sin 72^\circ} = \frac{28}{\sin 60^\circ}$$

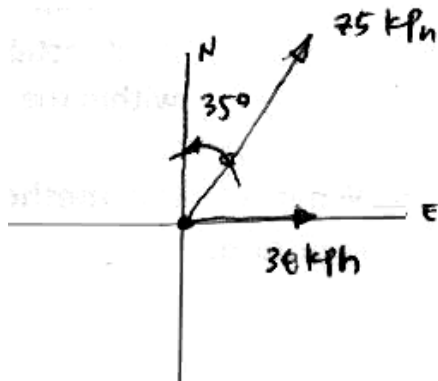
$$b = 30.7492$$

$$\begin{aligned} &= \sec x - (\sec x)(\sin^2 x) \\ &= \sec x [1 - \sin^2 x] \\ &= \sec x \cos^2 x \\ &= \frac{1}{\cancel{\cos x}} (\cos^2 x) \\ &= \cos x \end{aligned}$$

$$37.2^x = 6.45^{x-3}$$

$$x \log 37.2 = (x-3) \log 6.45$$

$$x = -3.1915$$



$$S_1 = \left(30 \frac{\text{km}}{\text{hr}} \right) (3 \text{ hrs}) = 114 \text{ km}$$

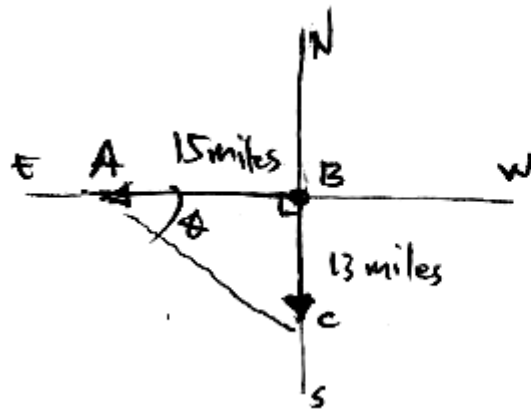
$$S_2 = \left(75 \frac{\text{km}}{\text{hr}} \right) (3 \text{ hrs}) = 225 \text{ km}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = 114^2 + 225^2 - 2(114)(225) \cos 55^\circ$$

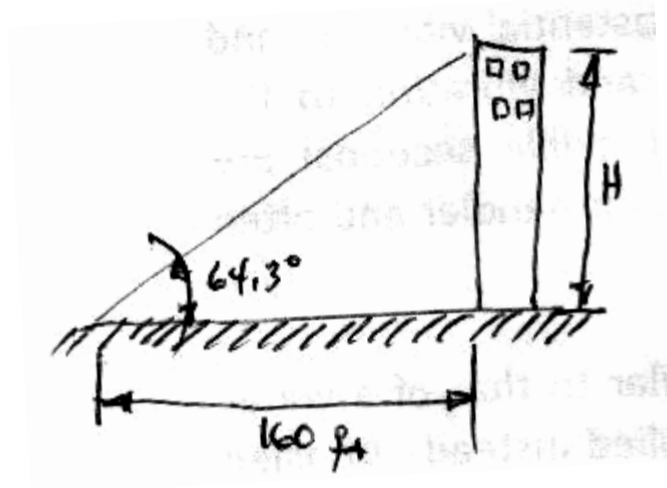
$$a = \sqrt{34196.5288}$$

$$a = 184.9230 \text{ km}$$



$$\tan \theta = \frac{13 \text{ miles}}{15 \text{ miles}}$$

$$\theta = 40.9143^\circ$$



$$\tan 64.3^\circ = \frac{H}{160 \text{ ft}}$$

$$H = 332.4554 \text{ ft}$$

$$\log x + \log (x - 24) = 2 \log 9$$

$$\log [x(x - 24)] = \log 9^2$$

$$x^2 - 24x - 81 = 0$$

$$x_1 = 27$$

$$x_2 = -3$$

$$= e^{\log_e 8}$$

$$= e^{\ln 8}$$

$$= 8$$

$$8 = \log_2 X$$

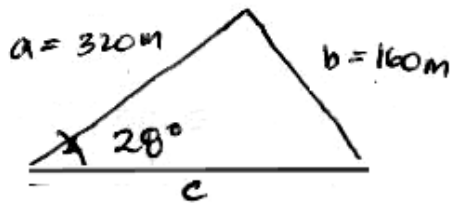
$$X = 2^8$$

$$X = 256$$

$$x = \log_3 81$$

$$x = \log_3 3^4$$

$$x = 4$$



$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$(160\text{m})^2 = (320\text{m})^2 + c^2 - 2(320\text{m})c(\cos 28^\circ)$$

$$c = 227.4916\text{m}$$

$$\log 9.25 = 0.96614$$

$$\log 1 = 0$$