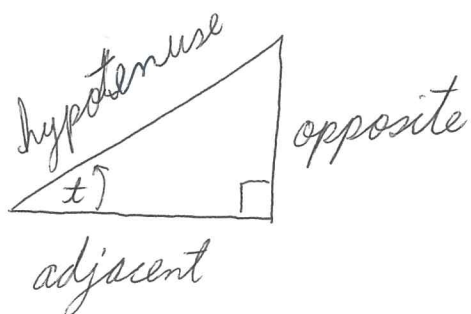


section 7.2

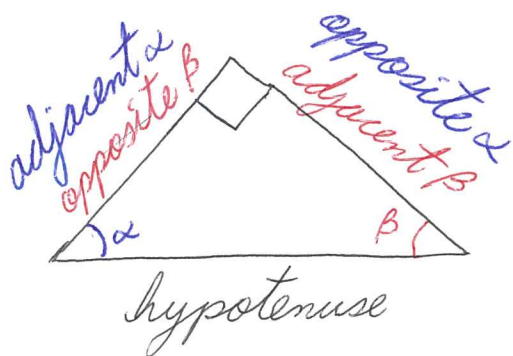
7.2 L1



$$\sin(x) = \frac{\text{opposite}}{\text{hypotenuse}} \quad \csc(x) = \frac{1}{\sin(x)}$$

$$\cos(x) = \frac{\text{adjacent}}{\text{hypotenuse}} \quad \sec(x) = \frac{1}{\cos(x)}$$

$$\tan(x) = \frac{\text{opposite}}{\text{adjacent}} \quad \cot(x) = \frac{1}{\tan(x)}$$

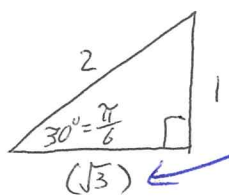


pythagorean theorem

$$(\text{opposite})^2 + (\text{adjacent})^2 = (\text{hypotenuse})^2$$

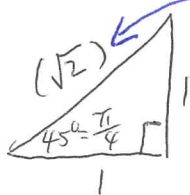
special triangles:

$30^\circ - 60^\circ - 90^\circ$ or $\frac{\pi}{6} - \frac{\pi}{3} - \frac{\pi}{2}$ triangle: remember $\sin(30^\circ) = \sin(\frac{\pi}{6}) = \frac{1}{2}$



use pythagorean thm to find this value

$45^\circ - 45^\circ - 90^\circ$ or $\frac{\pi}{4} - \frac{\pi}{4} - \frac{\pi}{2}$ triangle: remember $\tan(45^\circ) = \tan(\frac{\pi}{4}) = 1 = \frac{1}{1}$

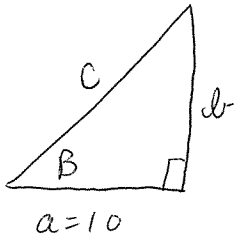


use pythagorean thm to find this value

$$6) \cos(34^\circ) = \sin(90^\circ - 34^\circ) = \underline{\underline{\sin(56^\circ)}}$$

$$8) \csc(21^\circ) = \sec(90^\circ - 21^\circ) = \underline{\underline{\sec(69^\circ)}}$$

$$10) \cos B = \frac{4}{5}, a = 10$$



$$\cos B = \frac{a}{c}$$

$$\left(\frac{4}{5}\right) = \frac{(10)}{c}$$

$$4c = 5(10)$$

$$c = \frac{5(10)}{4} = \frac{5(5)}{2} = \underline{\underline{\frac{25}{2}}}$$

$$a^2 + b^2 = c^2$$

$$(10)^2 + b^2 = \left(\frac{25}{2}\right)^2$$

$$100 + b^2 = \frac{625}{4}$$

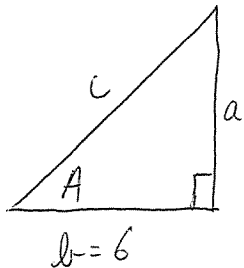
$$b^2 = \frac{625}{4} - 100$$

$$b^2 = \frac{625}{4} + \frac{400}{4} = \frac{225}{4}$$

$$b = \pm \sqrt{\frac{225}{4}} = \pm \frac{15}{2}$$

$$\underline{\underline{b = \frac{15}{2}}}$$

$$12) \tan A = \frac{5}{12}, b = 6$$



$$\tan A = \frac{a}{b}$$

$$\left(\frac{5}{12}\right) = \frac{a}{(6)}$$

$$5(6) = 12a$$

$$\frac{5(6)}{12} = a$$

$$\frac{5(1)}{2} = a$$

$$\underline{\underline{a = \frac{5}{2}}}$$

$$c^2 = a^2 + b^2$$

$$c^2 = \left(\frac{5}{2}\right)^2 + (6)^2$$

$$c^2 = \frac{25}{4} + 36$$

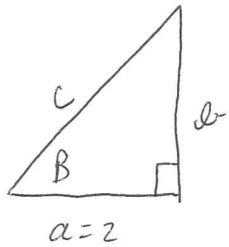
$$c^2 = \frac{25}{4} + \frac{144}{4}$$

$$c^2 = \frac{169}{4}$$

$$c = \pm \sqrt{\frac{169}{4}} = \pm \frac{13}{2}$$

$$\underline{\underline{c = \frac{13}{2}}}$$

$$14) \sin B = \frac{1}{\sqrt{3}}, a = 2$$



the triangle on the right is proportional to the triangle on top.
So, to find b and c :

$$\frac{b}{(2)} = \frac{(1)}{(\sqrt{2})}$$

$$(\sqrt{2})b = (2)(1)$$

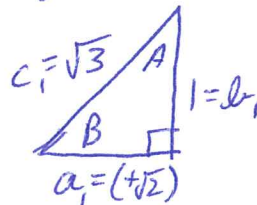
$$b = \frac{2}{\sqrt{2}} = \frac{(\sqrt{2})(\sqrt{2})}{\sqrt{2}} = \underline{\underline{\sqrt{2}}}$$

$$\frac{c}{(2)} = \frac{(\sqrt{3})}{(\sqrt{2})}$$

$$(\sqrt{2})c = (2)(\sqrt{3})$$

$$c = \frac{(2)(\sqrt{3})}{\sqrt{2}} = \frac{(\sqrt{2})(\sqrt{2})(\sqrt{3})}{\sqrt{2}} = \underline{\underline{(\sqrt{2})(\sqrt{3}) = \sqrt{6}}}$$

using $\sin B = \frac{1}{\sqrt{3}}$, one possible triangle is



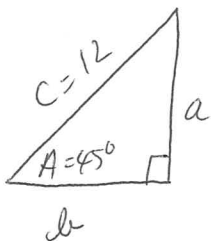
$$(a_1)^2 + (1)^2 = (\sqrt{3})^2$$

$$a_1^2 + 1 = 3$$

$$a_1^2 = 2$$

$$a_1 = \pm \sqrt{2} \rightarrow a_1 = +\sqrt{2}$$

$$16) c = 12, \angle A = 45^\circ \rightarrow \tan A = \tan(45^\circ) = 1 = \frac{1}{1}$$



$$\sin(45^\circ) = \frac{a}{c}$$

$$\left(\frac{1}{\sqrt{2}}\right) = \frac{a}{(12)}$$

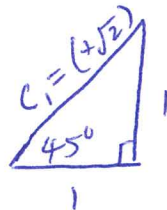
$$\frac{12}{\sqrt{2}} = a$$

$$a = \frac{(6)(2)}{\sqrt{2}} = \frac{(6)(\sqrt{2})(\sqrt{2})}{\sqrt{2}} = \underline{\underline{6\sqrt{2}}}$$

$$\cos(45^\circ) = \frac{b}{c}$$

$$\left(\frac{1}{\sqrt{2}}\right) = \frac{b}{(12)}$$

$$\frac{12}{\sqrt{2}} = b \rightarrow b = \frac{(6)(2)}{\sqrt{2}} = \frac{(6)(\sqrt{2})(\sqrt{2})}{\sqrt{2}} = \underline{\underline{6\sqrt{2}}}$$



$$(c_1)^2 = (1)^2 + (1)^2$$

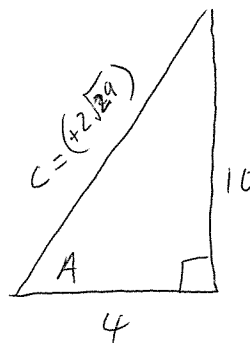
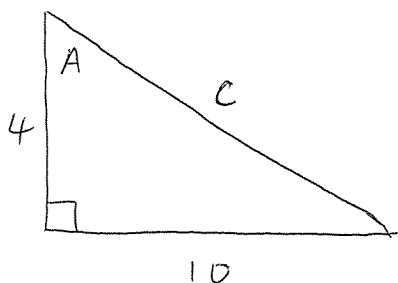
$$c_1^2 = 1 + 1 = 2$$

$$c_1 = \pm \sqrt{2} \rightarrow c_1 = +\sqrt{2}$$

$$\text{and } \sin A = \sin(45^\circ) = \frac{1}{\sqrt{2}}$$

$$\cos A = \cos(45^\circ) = \frac{1}{\sqrt{2}}$$

7.24



$$c^2 = (10)^2 + (4)^2$$

$$c^2 = 100 + 16$$

$$c^2 = 116$$

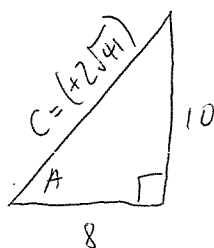
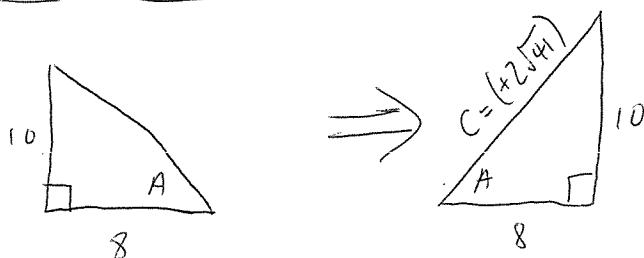
$$c = \pm \sqrt{116} = \pm \sqrt{(4)(29)}$$

$$c = \pm 2\sqrt{29} \rightarrow \underline{\underline{c = +2\sqrt{29}}}$$

$$18) \cos A = \frac{4}{2\sqrt{29}} = \underline{\underline{\frac{2}{\sqrt{29}}}}$$

$$20) \csc A \quad \sin A = \frac{10}{2\sqrt{29}} = \frac{5}{\sqrt{29}} \quad \csc A = \frac{1}{\sin A} = \frac{1}{\left(\frac{5}{\sqrt{29}}\right)} = \underline{\underline{\frac{\sqrt{29}}{5}}}$$

$$22) \cot A \quad \tan A = \frac{10}{4} = \frac{5}{2} \quad \cot A = \frac{1}{\tan A} = \frac{1}{\left(\frac{5}{2}\right)} = \underline{\underline{\frac{2}{5}}}$$



$$c^2 = (10)^2 + (8)^2$$

$$c^2 = 100 + 64$$

$$c^2 = 164$$

$$c = \pm \sqrt{164} = \pm \sqrt{(4)(41)}$$

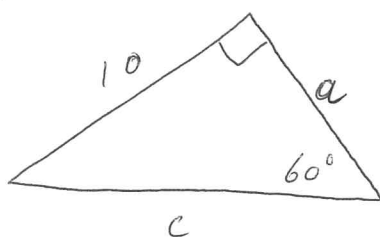
$$c = \pm 2\sqrt{41} \rightarrow \underline{\underline{c = +2\sqrt{41}}}$$

$$24) \cos A = \frac{8}{2\sqrt{41}} = \underline{\underline{\frac{4}{\sqrt{41}}}}$$

$$26) \csc A \quad \sin A = \frac{10}{2\sqrt{41}} = \frac{5}{\sqrt{41}} \quad \csc A = \frac{1}{\sin A} = \frac{1}{\left(\frac{5}{\sqrt{41}}\right)} = \underline{\underline{\frac{\sqrt{41}}{5}}}$$

$$28) \cot A \quad \tan A = \frac{10}{8} = \frac{5}{4} \quad \cot A = \frac{1}{\tan A} = \frac{1}{\left(\frac{5}{4}\right)} = \underline{\underline{\frac{4}{5}}}$$

30)



$$\frac{10}{a} = \tan(60^\circ)$$

$$\frac{10}{c} = \sin(60^\circ)$$

$$\frac{10}{a} = \left(\frac{\sqrt{3}}{1}\right)$$

$$\frac{10}{c} = \left(\frac{\sqrt{3}}{2}\right)$$

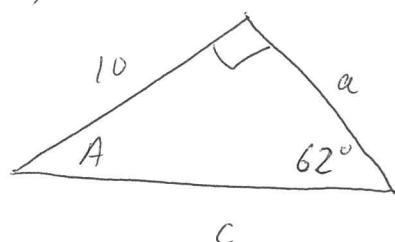
$$10 = (\sqrt{3})a$$

$$(10)(2) = (\sqrt{3})c$$

$$\underline{\underline{\frac{10}{\sqrt{3}} = a}}$$

$$\underline{\underline{\frac{20}{\sqrt{3}} = c}}$$

32)



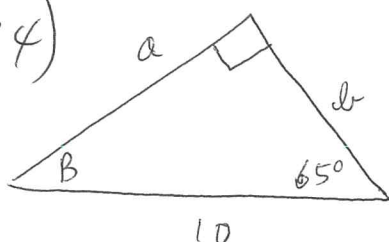
$$\frac{10}{a} = \tan(62^\circ)$$

$$\frac{10}{c} = \sin(62^\circ)$$

$$\underline{\underline{\frac{10}{\tan(62^\circ)} = a}}$$

$$\underline{\underline{\frac{10}{\sin(62^\circ)} = c}}$$

34)



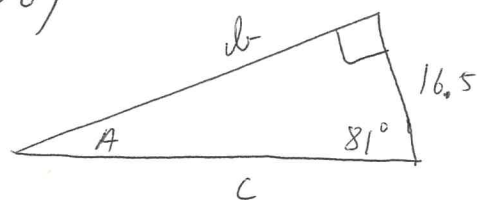
$$\frac{a}{10} = \sin(65^\circ)$$

$$\frac{b}{10} = \cos(65^\circ)$$

$$\underline{\underline{a = 10 \sin(65^\circ)}}$$

$$\underline{\underline{b = 10 \cos(65^\circ)}}$$

36)



$$\frac{b}{(16.5)} = \tan(81^\circ)$$

$$\frac{(16.5)}{c} = \cos(81^\circ)$$

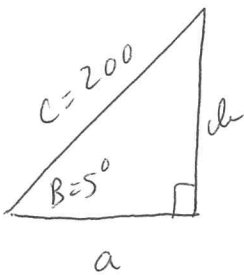
$$\underline{\underline{b = (16.5) \tan(81^\circ)}}$$

$$\underline{\underline{\frac{16.5}{\cos(81^\circ)} = c}}$$

exercises 32-56 is shown for exact answers
(no calculator)

38) $c = 200$, $\angle B = 5^\circ$

7.26



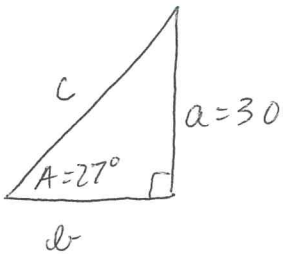
$$\frac{b}{200} = \sin(5^\circ)$$

$$\frac{a}{200} = \cos(5^\circ)$$

$$\underline{b = 200 \sin(5^\circ)}$$

$$\underline{a = 200 \cos(5^\circ)}$$

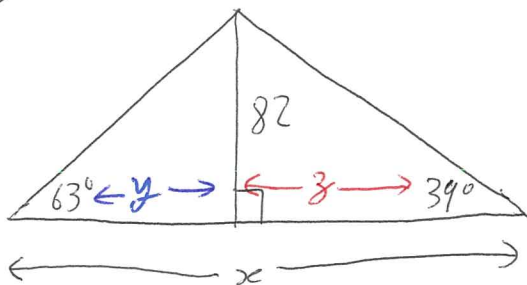
40) $a = 30$, $\angle A = 27^\circ$ $\frac{30}{b} = \tan(27^\circ)$ $\frac{30}{c} = \cos(27^\circ)$



$$\underline{\frac{30}{\tan(27^\circ)} = b}$$

$$\underline{\frac{30}{\cos(27^\circ)} = c}$$

42)

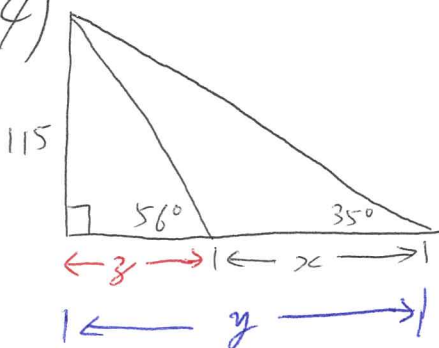


$$\frac{82}{y} = \tan(63^\circ) \quad \frac{82}{z} = \tan(39^\circ)$$

$$\frac{82}{\tan(63^\circ)} = y \quad \frac{82}{\tan(39^\circ)} = z$$

$$\underline{x = y + z = \left(\frac{82}{\tan(63^\circ)} \right) + \left(\frac{82}{\tan(39^\circ)} \right)}$$

44)



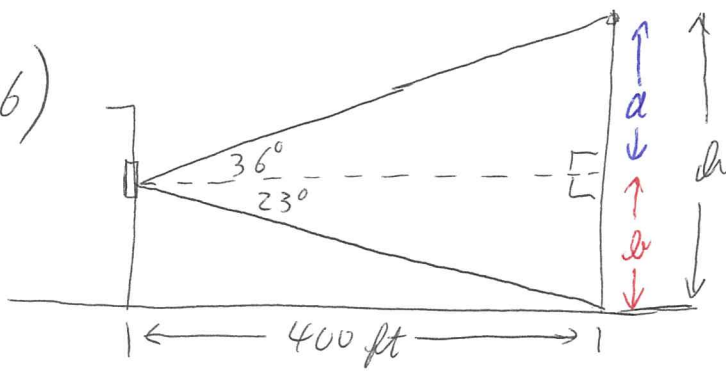
$$\frac{115}{y} = \tan(35^\circ) \quad \frac{115}{z} = \tan(56^\circ)$$

$$\frac{115}{\tan(35^\circ)} = y \quad \frac{115}{\tan(56^\circ)} = z$$

$$\underline{x = y - z = \left(\frac{115}{\tan(35^\circ)} \right) - \left(\frac{115}{\tan(56^\circ)} \right)}$$

46)

7.2 | 7



$$\frac{a}{400} = \tan(36^\circ)$$

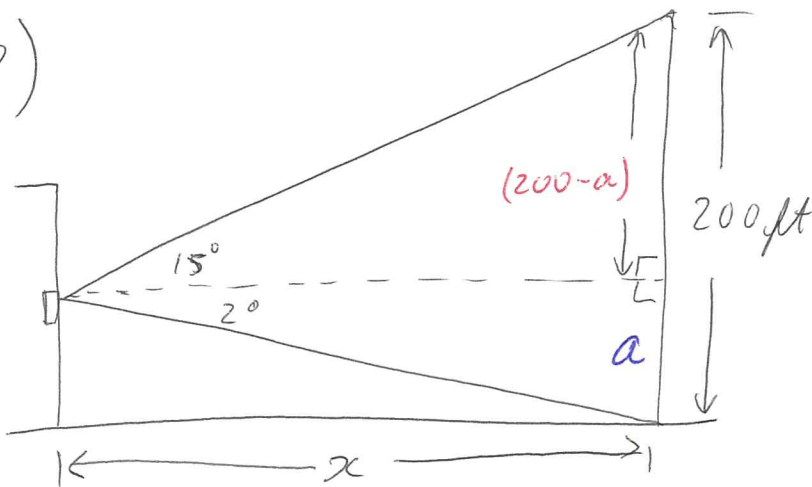
$$\frac{b}{400} = \tan(23^\circ)$$

$$a = 400 \tan(36^\circ)$$

$$b = 400 \tan(23^\circ)$$

$$h = a + b = \underline{\underline{(400 \tan(36^\circ)) + (400 \tan(23^\circ)) \text{ ft}}}$$

48)



$$\frac{a}{x} = \tan(2^\circ)$$

$$a = x \tan(2^\circ)$$

$$\frac{(200 - a)}{x} = \tan(15^\circ)$$

$$(200 - a) = x \tan(15^\circ)$$

$$200 - (x \tan(2^\circ)) = x \tan(15^\circ)$$

$$200 = x \tan(15^\circ) + x \tan(2^\circ)$$

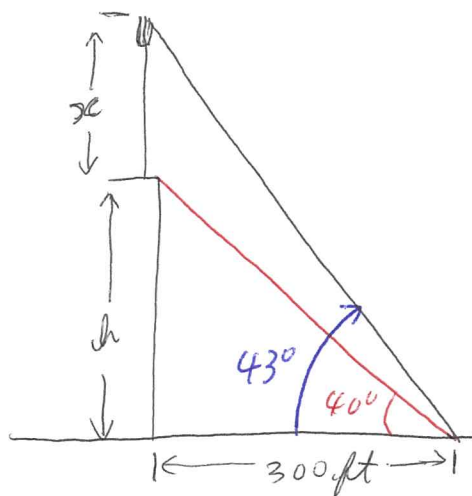
$$200 = x (\tan(15^\circ) + \tan(2^\circ))$$

$$\frac{200}{\tan(15^\circ) + \tan(2^\circ)} = x$$

$$x = \underline{\underline{\frac{200}{\tan(15^\circ) + \tan(2^\circ)} \text{ ft}}}$$

50)

7.2 | 8



$$\frac{h}{300} = \tan(40^\circ)$$

$$\frac{x+h}{300} = \tan(43^\circ)$$

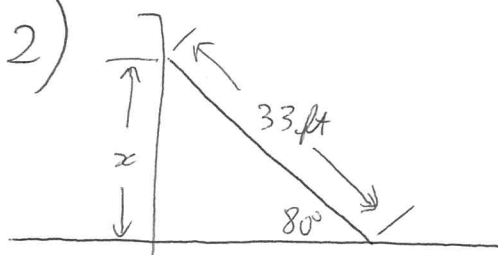
$$h = 300 \tan(40^\circ)$$

$$x+h = 300 \tan(43^\circ)$$

$$x + (300 \tan(40^\circ)) = 300 \tan(43^\circ)$$

$$\underline{\underline{x = 300 \tan(43^\circ) - 300 \tan(40^\circ) \text{ ft}}}$$

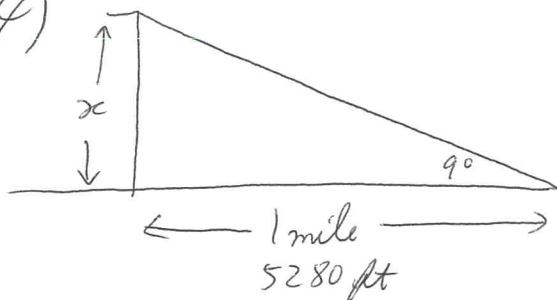
52)



$$\frac{x}{33} = \sin(80^\circ)$$

$$\underline{\underline{x = 33 \sin(80^\circ) \text{ ft}}}$$

54)



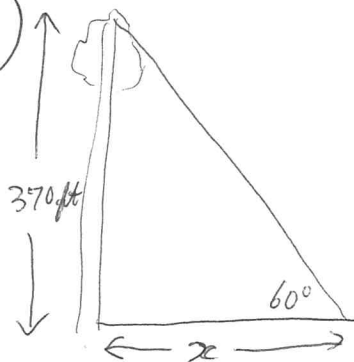
$$\frac{x}{1} = \tan(9^\circ)$$

$$\underline{\underline{x = \tan(9^\circ) \text{ miles}}}$$

$$\frac{x}{5280} = \tan(9^\circ)$$

$$\underline{\underline{x = 5280 \tan(9^\circ) \text{ ft}}}$$

56)



$$\frac{370}{x} = \tan(60^\circ)$$

$$\frac{370}{x} = (\sqrt{3})$$

$$\frac{370}{\sqrt{3}} = x$$

$$\underline{\underline{x = \frac{370}{\sqrt{3}} \text{ ft}}}$$