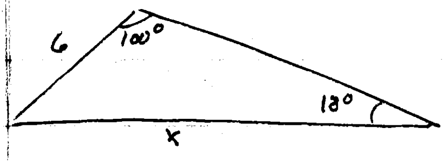
p. 305-306 #1, 4, 7, 16, 24, 25, 27

#30, 35, 36, 38, 44, 48

7.6 Part 1

1.)

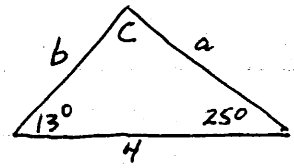


$\frac{\sin 18^\circ}{6} = \frac{\sin 100^\circ}{x}$

$\frac{x \sin 18^\circ}{\sin 18^\circ} = \frac{6 \sin 100^\circ}{\sin 18^\circ}$

$\boxed{x = 19.121}$

16.)



$C = 180 - (13 + 25)$

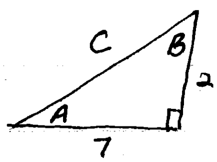
$\boxed{C = 142^\circ}$

$\frac{\sin 142^\circ}{4} = \frac{\sin 13^\circ}{a}$ $\qquad$ $\frac{\sin 142}{4} = \frac{\sin 25}{b}$

$\frac{a \sin 142^\circ}{\sin 142^\circ} = \frac{4 \sin 13^\circ}{\sin 142^\circ}$ $\qquad$ $\frac{b \sin 142^\circ}{\sin 142^\circ} = \frac{4 \sin 25^\circ}{\sin 142^\circ}$

$\boxed{a = 1.462}$ $\qquad$ $\boxed{b = 2.746}$

4.)



$2^2 + 7^2 = c^2$

$4 + 49 = c^2$

$53 = c^2$

$\boxed{7.280 = C}$

$\tan A = \frac{2}{7}$

$A = \tan^{-1}\left(\frac{2}{7}\right)$

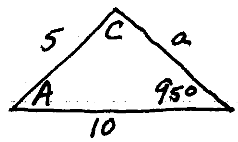
$\boxed{A = 15.945^\circ}$

$\tan B = \frac{7}{2}$

$B = \tan^{-1}\left(\frac{7}{2}\right)$

$\boxed{B = 74.055^\circ}$

24.)



$\frac{\sin 95^\circ}{5} = \frac{\sin C}{10}$

$\frac{5 \sin C}{5} = \frac{10 \sin 95^\circ}{5}$

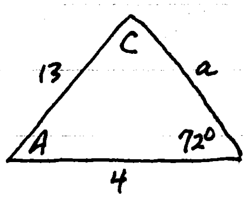
$C = \sin^{-1}\left(\frac{10 \sin 95^\circ}{5}\right)$

$C = \sin^{-1} 1.992$

NOT A TRIANGLE

($-1 \le \sin\theta \le 1$ and a shorter side is opposite the largest angle)

25.)



$\frac{\sin 72^\circ}{13} = \frac{\sin C}{4}$

$13 \sin C = 4 \sin 72^\circ$

$C = \sin^{-1}\left(\frac{4 \sin 72^\circ}{13}\right)$

$\boxed{C = 17.016^\circ}$

*Must be smaller than B since side opposite B is larger than C. No second △

$A = 180 - (72 + 17.016)$

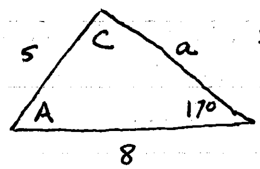
$\boxed{A = 90.984^\circ}$

$\frac{\sin 72^\circ}{13} = \frac{\sin 90.984^\circ}{a}$

$\frac{a \sin 72^\circ}{\sin 72^\circ} = \frac{13 \sin 90.984}{\sin 72^\circ}$

$\boxed{a = 13.667}$

27.)



$\frac{\sin 17^\circ}{5} = \frac{\sin C}{8}$

$\frac{5 \sin C}{5} = 8 \sin 17^\circ$

$C = \sin^{-1}\left(\frac{8 \sin 17^\circ}{5}\right)$

$\boxed{C_1 = 27.891^\circ}$ ①

$C_2 = 180 - 27.891^\circ$

$\boxed{C_2 = 152.109^\circ}$ ②

$A_1 = 180^\circ - (17^\circ + 27.891^\circ)$

$\boxed{A_1 = 135.109^\circ}$ ③

$A_2 = 180 - (17^\circ + 152.109^\circ)$

$\boxed{A_2 = 10.891^\circ}$ ④

$\frac{\sin 17^\circ}{5} = \frac{\sin 135.109}{a_1}$

$\frac{a_1 \sin 17^\circ}{\sin 17^\circ} = \frac{5 \sin 135.109}{\sin 17^\circ}$

$\boxed{a_1 = 12.070}$ ⑤

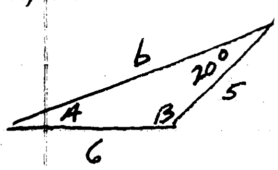
$\frac{\sin 17^\circ}{5} = \frac{\sin 10.891^\circ}{a_2}$

$\frac{a_2 \sin 17^\circ}{\sin 17^\circ} = \frac{5 \sin 10.891^\circ}{\sin 17^\circ}$

$\boxed{a_2 = 3.231}$

2 TRIANGLES ARE POSSIBLE BECAUSE THERE IS ROOM FOR THE OBTUSE ANGLE: $152.109 + 17^\circ < 180$

7.)



$\frac{\sin 20^\circ}{6} = \frac{\sin A}{5}$

$\frac{6 \sin A}{6} = \frac{5 \sin 20^\circ}{6}$

$A = \sin^{-1}\left(\frac{5 \sin 20^\circ}{6}\right)$

$\boxed{A = 16.560^\circ}$ ①

(OBTUSE ANGLE NOT POSSIBLE AS THERE ALREADY IS ONE!)

$B = 180 - (20 + 16.560)$

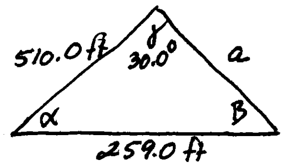
$\boxed{B = 143.440^\circ}$ ②

$\frac{\sin 20^\circ}{6} = \frac{\sin 143.440}{b}$

$\frac{b \sin 20^\circ}{\sin 20^\circ} = \frac{6 \sin 143.440}{\sin 20^\circ}$

$\boxed{b = 10.450}$ ③

30.)



$\frac{\sin 30.0^\circ}{259.0} = \frac{\sin B}{510.0}$

$\frac{259.0 \sin B}{259.0} = \frac{510.0 \sin 30.0^\circ}{259.0}$

$B = \sin^{-1}\left(\frac{510.0 \sin 30.0^\circ}{259.0}\right)$

$\boxed{B_1 = 79.917^\circ}$ ①

*2ND TRIANGLE POSSIBLE: $100.083^\circ + 30.0^\circ < 180^\circ$

$B_2 = 180 - 79.917$

$\boxed{B_2 = 100.083^\circ}$ ②

$\alpha_1 = 180 - (30.0^\circ + 79.917^\circ)$

$\boxed{\alpha_1 = 70.083^\circ}$ ③

$\alpha_2 = 180 - (30.0^\circ + 100.083^\circ)$

$\boxed{\alpha_2 = 49.917^\circ}$ ④

$\frac{\sin 30^\circ}{259.0} = \frac{\sin 70.083^\circ}{a_1}$

$\frac{a_1 \sin 30^\circ}{\sin 30^\circ} = \frac{259.0 \sin 70.083}{\sin 30^\circ}$

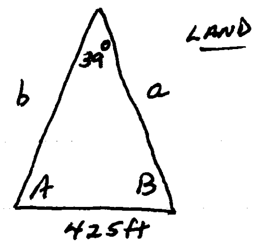
$\boxed{a_1 = 487.016 ft}$

$\frac{\sin 30^\circ}{259.0} = \frac{\sin 49.917}{a_2}$

$\frac{a_2 \sin 30^\circ}{\sin 30^\circ} = \frac{259.0 \sin 49.917^\circ}{\sin 300}$

$\boxed{a_2 = 396.330 ft}$

38.)



$2A + 39 = 180$

$2A = 141$

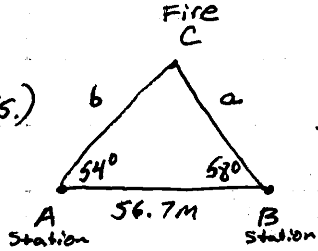
$A = 70.5^\circ = B$

$\frac{\sin 70.5}{a} = \frac{\sin 39^\circ}{425}$

$\frac{a \sin 39^\circ}{\sin 39^\circ} = \frac{425 \sin 70.5}{\sin 39^\circ}$

$\boxed{a = 636.596 ft = b}$

35.)



$C = 180^\circ - 54^\circ - 58^\circ$

① $C = 68^\circ$

$\frac{\sin 68^\circ}{56.7} = \frac{\sin 54^\circ}{a}$

$\frac{a \sin 68^\circ}{\sin 68^\circ} = \frac{56.7 \sin 54^\circ}{\sin 68^\circ}$

② $a = 49.474$ miles

$\frac{\sin 68^\circ}{56.7} = \frac{\sin 58^\circ}{b}$

$\frac{b \sin 68^\circ}{\sin 68^\circ} = \frac{56.7 \sin 58^\circ}{\sin 68^\circ}$

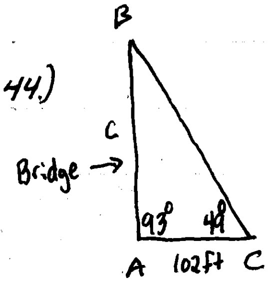
③ $b = 51.861$ miles

$\boxed{\text{Station B is closer}}$

$51.861 - 49.474$

$\boxed{\text{by } 2.387 \text{ miles}}$

44.)



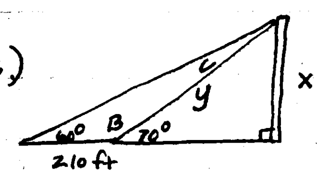
$B = 180 - 93 - 49 = 38^\circ$

$\frac{\sin 38^\circ}{102} = \frac{\sin 49}{c}$

$\frac{c \sin 38^\circ}{\sin 38^\circ} = \frac{102 \sin 49^\circ}{\sin 38^\circ}$

$\boxed{c = 125.037 ft}$

36.)



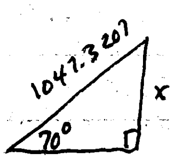
$B = 180 - 70 = 110^\circ$

$C = 180 - 110 - 60 = 10^\circ$

$\frac{\sin 10^\circ}{210} = \frac{\sin 60^\circ}{y}$

$\frac{y \sin 10^\circ}{\sin 10^\circ} = \frac{210^\circ \sin 60^\circ}{\sin 10^\circ}$

$y = 1047.3207$



$\sin 70^\circ = \frac{x}{1047.3207}$

$1047.3207 \sin 70^\circ = x$

$\boxed{984.160 ft = x}$