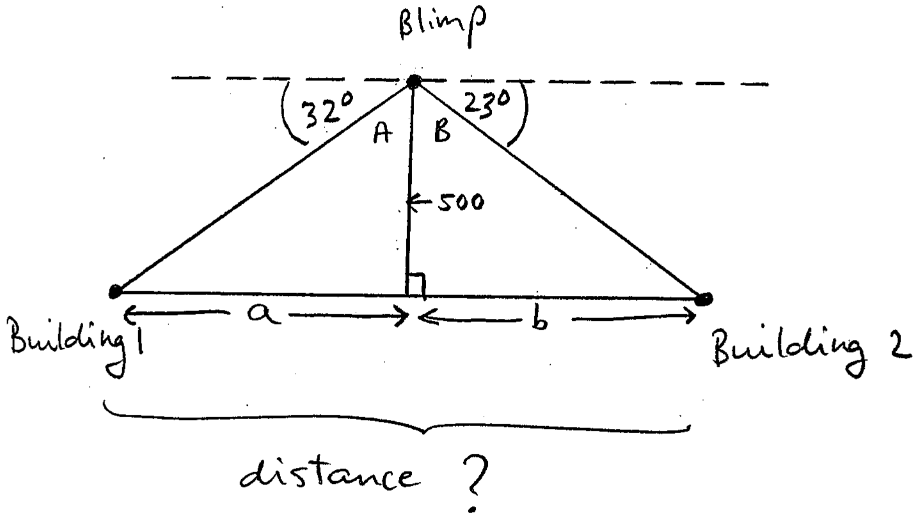
Math 152 S09N01 - Quiz 6 Name: SOLUTIONS
Mar 18 2009 Stu#:

(1) [**7 points**] A blimp is 500 ft in the air directly above a straight road joining two buildings. An observer in the blimp measures the angle of depression to the first building to be 32° and that to the second building to be 23°. How far apart are the buildings?



$A = 90^\circ - 32^\circ = 58^\circ$

$\tan(A) = \frac{a}{500}$

$\therefore\ a = 500\tan(A)$
$= 500\tan(58^\circ)$

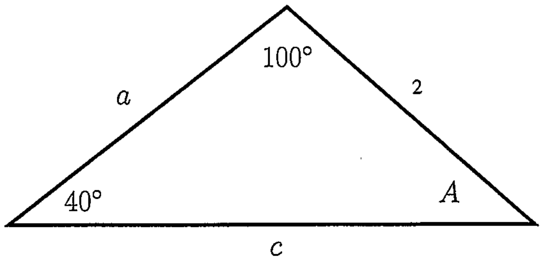
$B = 90 - 23^\circ = 67^\circ$

$\tan(B) = \frac{b}{500}$

$\therefore\ b = 500\tan(B)$
$= 500\tan(67^\circ)$

$$\therefore \text{distance} = a + b$$
$$= 500\tan(58^\circ) + 500\tan(67^\circ)$$
$$\approx \boxed{1978 \text{ ft.}}$$

(2) [**4 points**] Solve the following triangle (round final answers to two decimal places.)



$A = 180° - 100° - 40° = 40°$

$\frac{\sin A}{a} = \frac{\sin(40°)}{2}$

$\therefore\ a = \frac{2\sin A}{\sin(40°)} = \frac{2\sin(40)}{\sin(40)} = 2$

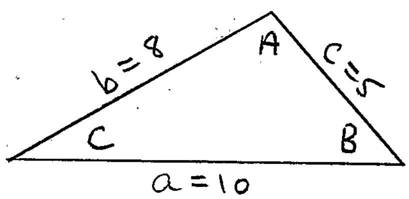
$\therefore$ $a = 2$ (of course, since triangle is isosceles.)

$\frac{\sin(100°)}{c} = \frac{\sin(40°)}{2}$

$\therefore\ c = \frac{2\sin(100°)}{\sin(40°)} \approx 3.06$

$$\boxed{\begin{aligned} \therefore\ A &= 40° \\ a &= 2 \\ c &\approx 3.06 \end{aligned}}$$

(3) [**4 points**] Solve the triangle with side measures $a = 10$, $b = 8$ and $c = 5$ (round final answers to two decimal places.)



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

$\therefore\ A = \cos^{-1}\left[\frac{b^2+c^2-a^2}{2bc}\right] = \cos^{-1}\left[\frac{8^2+5^2-10^2}{(2)(8)(5)}\right] \approx 97.9032°$

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

$\therefore\ B = \cos^{-1}\left[\frac{a^2+c^2-b^2}{2ac}\right] = \cos^{-1}\left[\frac{10^2+5^2-8^2}{(2)(10)(5)}\right] \approx 52.4105°$

$\therefore\ C = 180 - 97.9032 - 52.4105 \approx 29.6863$

$$\boxed{\begin{aligned} \therefore\ A &\approx 97.90° \\ B &\approx 52.41° \\ C &\approx 29.69° \end{aligned}}$$