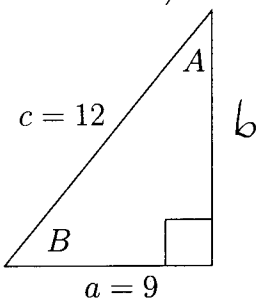
Math 152 Sec S08N01 - Quiz 4 Name: SOLUTIONS
Feb 20 2008 Stu#:

(1)[5 points] Find all remaining sides and angles in the following triangle (round final answers to one decimal):



$b^2 = c^2 - a^2$

$b = \sqrt{12^2 - 9^2}$

$b = 3\sqrt{7}$

$\boxed{b \doteq 7.9}$

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

$B = \cos^{-1}\left(\frac{a}{c}\right)$

$= \cos^{-1}\left(\frac{9}{12}\right)$

$\boxed{B \doteq 41.4^\circ}$

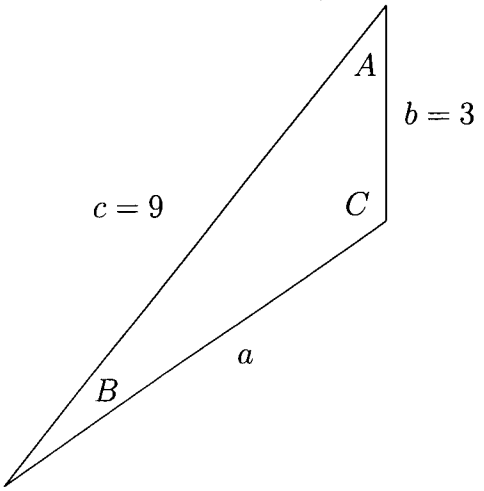
$\sin A = \frac{a}{c}$

$A = \sin^{-1}\left(\frac{a}{c}\right)$

$= \sin^{-1}\left(\frac{9}{12}\right)$

$\boxed{A \doteq 48.6^\circ}$

(2)[5 points] In the following triangle $A = 22°$. Find the remaining sides and angles (round final answers to one decimal):



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

$a = \sqrt{3^2 + 9^2 - 2(3)(9)\cos(22^\circ)}$

$\doteq 6.319$

$\boxed{a \doteq 6.3}$

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

$\therefore B = \cos^{-1}\left[\frac{b^2 - a^2 - c^2}{-2ac}\right]$

$= \cos^{-1}\left[\frac{3^2 - (6.319)^2 - 9^2}{-2(6.319)(9)}\right]$

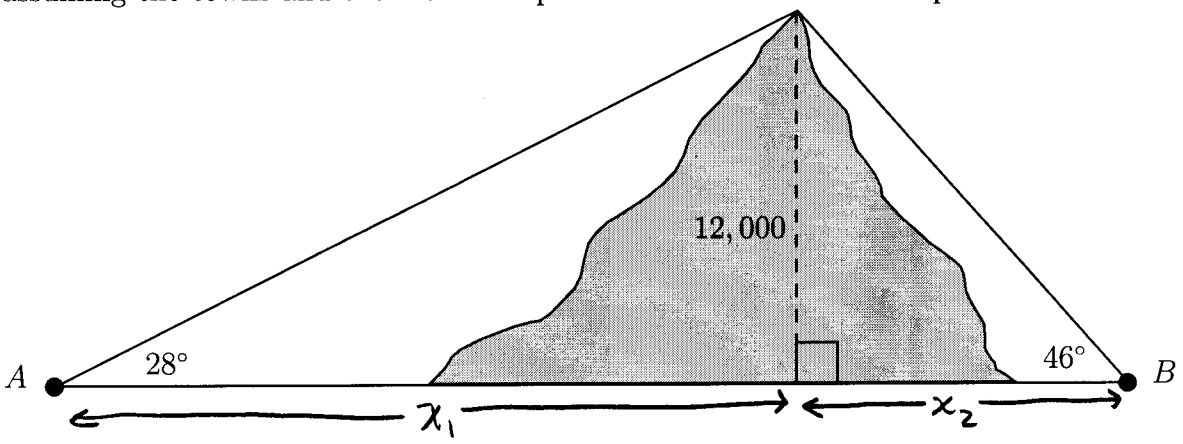
$B \doteq 10.241$

$\boxed{B \doteq 10.2^\circ}$

$C = 180 - A - B \doteq 180 - 22 - 10.241$

$\boxed{C \doteq 147.8}$

(3)[5 points] Observers in towns located at A and B measure the angle of elevation to the peak of a 12,000 foot mountain to be 28° and 46°, respectively. Find the distance between the towns assuming the towns and the mountain peak lie in the same vertical plane.



$$\tan(28°) = \frac{12{,}000}{x_1} \qquad \tan(46°) = \frac{12{,}000}{x_2}$$

$$\therefore \quad x_1 = \frac{12000}{\tan(28)} \qquad x_2 = \frac{12000}{\tan(46°)}$$

$\therefore$ distance between towns is

$$x_1 + x_2 = \frac{12000}{\tan(28)} + \frac{12000}{\tan(46)}$$

$$\doteq \boxed{34{,}157 \text{ ft.}}$$