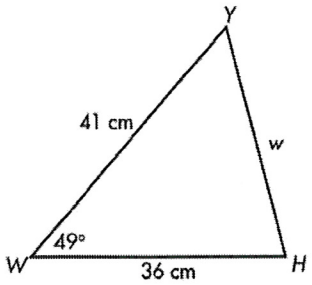
Name Answers Date

8.9 – The Law of Cosines

Find the length of each indicated side to the nearest tenth.

1) w = -?-



$w^2 = 41^2 + 36^2 - 2(41)(36)\cos 49$

$w^2 = 1681 + 1296 - 2952\cos 49$

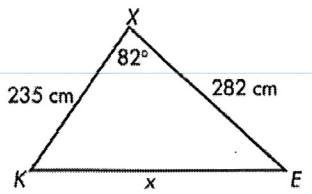
$w^2 = 2977 - 2952\cos 49$

$w^2 = 2977 - 1936.7$

$w^2 = 1040.3$

$w \approx 32.3$ cm

2) x = -?-



$x^2 = 235^2 + 282^2 - 2(235)(282)\cos 82°$

$x^2 = 55225 + 79524 - 132540\cos 82°$

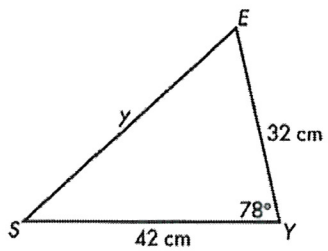
$x^2 = 134749 - 132540\cos 82$

$x^2 = 134749 - 18446$

$x^2 = 116303$

$x \approx 341.0$ cm

3) y = -?-



$y^2 = 42^2 + 32^2 - 2(42)(32)\cos 78$

$y^2 = 1764 + 1024 - 2688\cos 78$

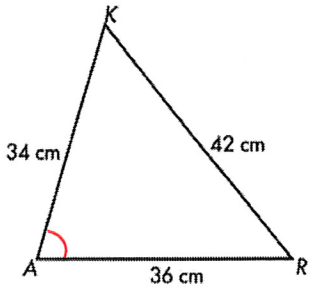
$y^2 = 2788 - 558.89$

$y^2 = 2229.1$

$y \approx 47.2$ cm

Find the measure of each indicated angle in each acute triangle to the nearest degree.

4) * $m\angle A$ = -?-



$42^2 = 34^2 + 36^2 - 2(34)(36)\cos A$

$1764 = 1156 + 1296 - 2448\cos A$

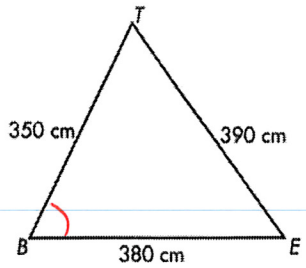
$1764 = 2452 - 2448\cos A$

$-688 = -2448\cos A$

$.2810 = \cos A$

$m\angle A \approx 74°$

5) $m\angle B$ = -?-



$390^2 = 350^2 + 380^2 - 2(350)(380)\cos B$

$152100 = 122500 + 144400 - 266000\cos B$

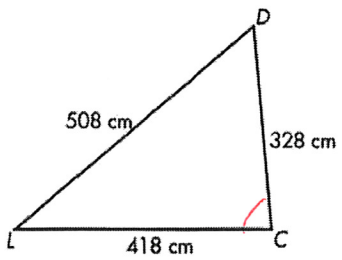
$152100 = 266900 - 266000\cos B$

$-114800 = -266000\cos B$

$.4316 = \cos B$

$m\angle B \approx 64°$

6) $m\angle C$ = -?-



$508^2 = 418^2 + 328^2 - 2(418)(328)\cos C$

$258064 = 174724 + 107584 - 274208\cos C$

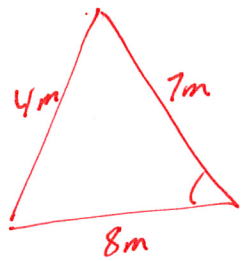
$258064 = 282308 - 274208\cos C$

$-24244 = -274208\cos C$

$.0884 = \cos C$

$m\angle C \approx 85°$

7) To the nearest degree, find the measure of the smallest angle in a triangle whose side lengths are 4 m, 7 m, and 8 m.



$4^2 = 7^2 + 8^2 - 2(7)(8)\cos C$

$16 = 49 + 64 - 112\cos C$

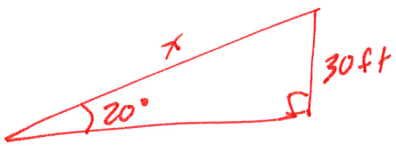
$16 = 113 - 112\cos C$

$-97 = -112\cos C$

$.8660 \approx \cos C$

$m\angle C \approx 30°$

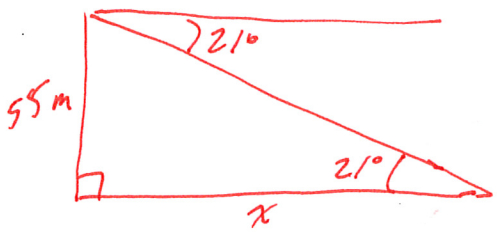
8) A cargo company needs to load truck trailers into ship cargo containers. The trucks must drive up a ramp to a loading platform 30 ft off the ground, but they have difficulty driving up a ramp at an angle steeper than 20°. How long does the ramp need to be?



$\sin 20° = \frac{30}{x}$

$x \approx 87.7$ ft

9) A lighthouse 55 meters above sea level spots a distress signal from a sailboat. The angle of depression to the sailboat measures 21°. To the nearest meter, how far away is the sailboat from the base of the lighthouse?



$\tan 21° = \frac{55}{x}$

$x \approx 143.3$ m