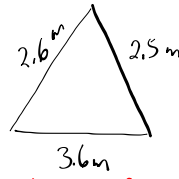
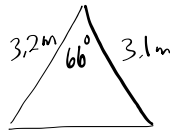
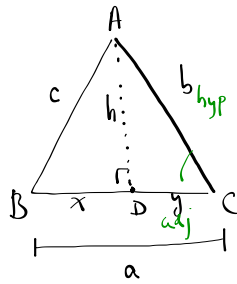


§3-3 Proving + Applying the Law of Cosines



Cannot use Law of Sines in either of these situations.



In $\triangle ABD$:

$$c^2 = h^2 + x^2$$

$$h^2 = c^2 - x^2$$

In $\triangle ACD$:

$$b^2 = h^2 + y^2$$

$$h^2 = b^2 - y^2$$

$x + y = a$

so $x = a - y$

$$c^2 = x^2 = b^2 - y^2$$

$$c^2 = x^2 + b^2 - y^2$$

$$c^2 = (a - y)^2 + b^2 - y^2$$

$$c^2 = a^2 - 2ay + y^2 + b^2 - y^2$$

$(a - y)(a - y)$
 $a^2 - ay - ay + y^2$

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

$$c^2 = a^2 + b^2 - 2ab \cos C$$

Law of Cosines

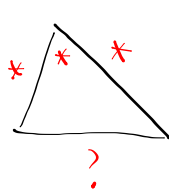
$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\cos C = \frac{y}{b}$

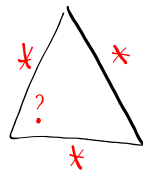
$y = b \cos C$

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

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

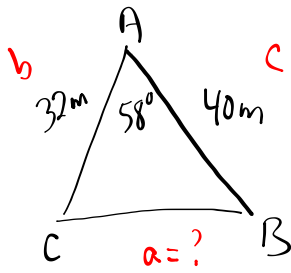


SAS \rightarrow find the 3rd Side



SSS \rightarrow find an angle.

Example 1 (p132)



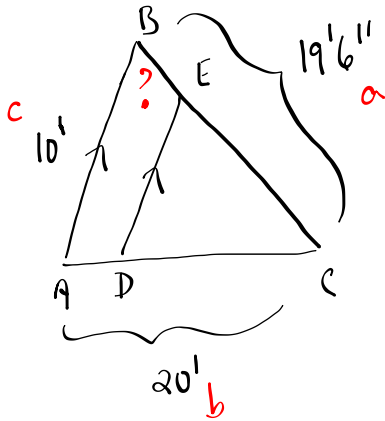
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = 32^2 + 40^2 - (2(32)(40)\cos 58^\circ)$$

$$a^2 = 1267$$

$$a = 36 \text{ m}$$

Example 2 (p133)



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

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

$$\cos B = \frac{b^2 - a^2 - c^2}{-2ac}$$

$$\cos B = \frac{(20^2 - (19.5)^2 - 10^2)}{(-2(19.5)(10))}$$

$$19'6'' = 19.5'$$

$$19 \frac{6}{12}$$

$$\cos B = 0.206 \dots$$

$$B = 78^\circ$$

Since the angle is within 70° to 80° , the roof meets the building code.

TO DO

① CYU (p136-137)

② Groupwork - Law of Sines.