Trigonometry

Monday, June 17, 2024 9:54 AM

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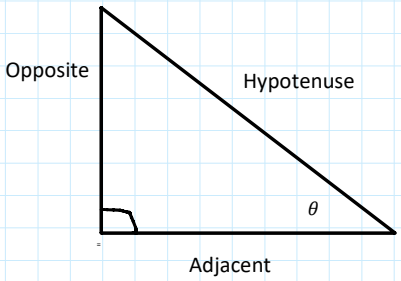
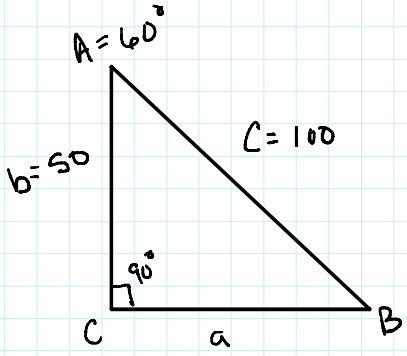


S = Sine
O = opposite
H = Hypotenuse
C = Cosine
A = Adjacent
H = Hypotenuse
T = Tangent
O = Opposite
A = Adjacent

$$\sin\theta = \frac{opp}{hyp}$$

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

$$\tan\theta = \frac{opp}{adj}$$



$B = 180 - 90 - 60$

$B = 30°$

$\sin(60°) = \frac{a}{100}$

$0.8660 = \frac{a}{100}$

$a = 86.60$

$\tan(60°) = \frac{a}{50}$

$1.7321 = \frac{a}{50}$

$a = 86.60$

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

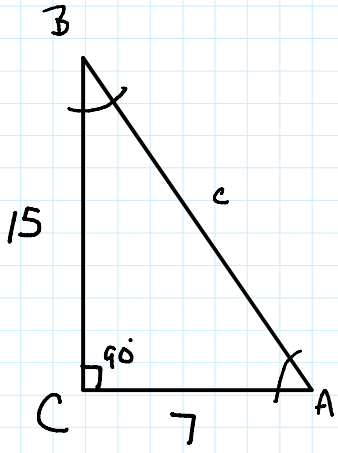
$c^2 - b^2 = a^2$

$\sqrt{c^2 - b^2} = a$

$\sqrt{(100)^2 - (50)^2} = a$

$\sqrt{10000 - 2500} =$

$\sqrt{7500} = 86.60 ft$



$\tan\theta = \frac{opp}{adj}$

$\tan B = \frac{7}{15}$

$\tan B = 0.4666$

$\tan^{-1}(0.4666) = B$

$A\tan(0.4666) = B$

$B = 25.02°$

$A = 180 - 90 - B$

$A = 180 - 90 - 25.02$

$A = 64.98°$

$\tan^{-1}\left(\frac{15}{7}\right) =$

$\tan^{-1}(2.143) = 64.98°$

$C = \sqrt{a^2 + b^2}$

$C = \sqrt{(15)^2 + (7)^2}$

$C = \sqrt{225 + 49}$

$C = \sqrt{274}$

$C = 16.55$

$\sin B = \frac{b}{c}$

$\sin(25.02) = \frac{7}{c}$

$0.4229 = \frac{7}{c}$

$(c)(0.4229) = 7$

$c = \frac{7}{0.4229}$

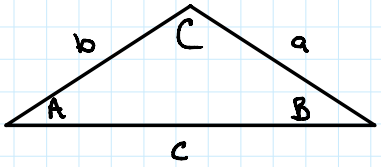
$c = 16.55$

1. Is it a right triangle?
2. Is there an opposite pair?

Yes - use lawofsines

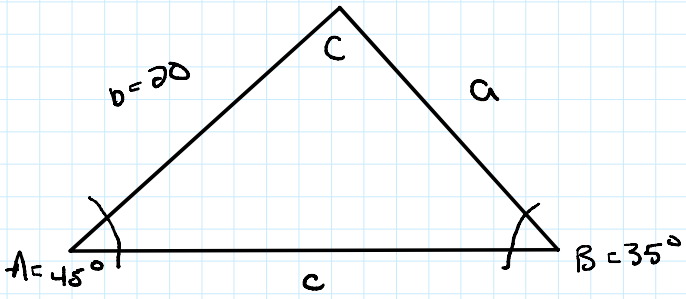
No - Go to step 3

2. Law of Sines



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



$C = 180 - 45 - 35$

$C = 180 - 80$

$C = 100°$

$$\frac{a}{\sin(45°)} = \frac{20}{\sin(35°)}$$

$$a = \left[\sin(45)\left(\frac{20}{\sin(35)}\right)\right]$$

$a = (0.7071)\left(\frac{20}{0.5736}\right)$

$a = (0.7671)(34.87)$

$a = 24.66$

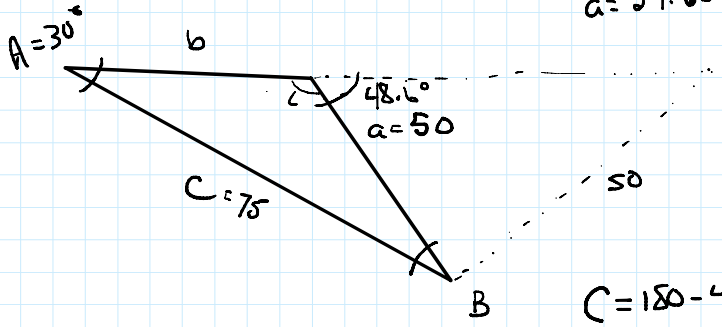
$$\frac{C}{\sin(100°)} = \frac{20}{\sin(35)}$$

$$C = \left[\sin(100)\left(\frac{20}{\sin(35)}\right)\right]$$

$C = (0.9848)\left(\frac{20}{0.5736}\right)$

$C = (0.9848)(34.87)$

$C = 34.34$



$C = 180 - 48.6$

$C = 131.4°$

$B = 180 - 131.4 - 30$

$B = 18.6°$

$$\frac{b}{\sin(18.6)} = \frac{50}{\sin(30)}$$

$b = (0.3190)\left(\frac{50}{0.5}\right)$

$b = 31.9$

$$\frac{\sin C}{75} = \frac{\sin(30)}{50}$$

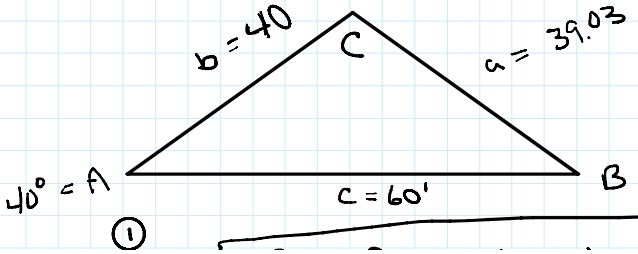
$\sin C = (75)\left[\frac{\sin(30)}{50}\right]$

$C = \sin^{-1}\left[(75)\left[\frac{\sin(30)}{50}\right]\right]$

$C = \sin^{-1}(0.75)$

$C = 48.6°$

3. LAW. OF COSINES

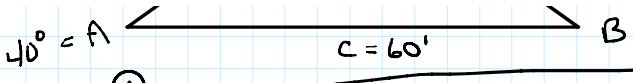


$$a = \sqrt{b^2 + c^2 - 2bc(\cos A)}$$

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

$$c = \sqrt{a^2 + b^2 - 2ab(\cos C)}$$

① ② $\sin B$ $\sin 40$



$c = \sqrt{a^2 + b^2 - 2ab(\cos C)}$

① $a = \sqrt{40^2 + 60^2 - 2(40)(60)(\cos 46^\circ)}$

$a = \sqrt{1600 + 3600 - (4800)(0.7660)}$

$a = \sqrt{5200 - 3676.8}$

$a = \sqrt{1523.2}$

$a = 39.03$

② $\frac{\sin B}{40} = \frac{\sin 40}{39.03}$

$\sin B = (40)\left(\frac{\sin 40}{39.03}\right)$

$\sin B = 0.6588$

$B = \sin^{-1}(0.6588)$

$B = 41.21^\circ$

③ $C = 180 - 40 - 41.21$

$C = 98.79^\circ$