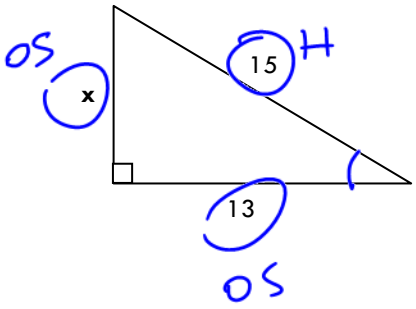
Trigonometry Review

other sides
$a^2 + b^2 = c^2$ → hyp

1. Find the value of side x, rounded to the nearest tenth



OS H

$15^2 = x^2 + 13^2$

$225 = x^2 + 169$

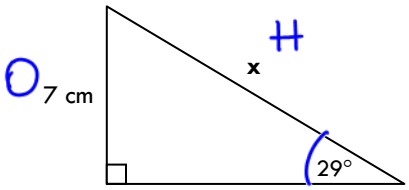
$225 - 169 = x^2$

$\sqrt{56} = \sqrt{x^2}$

$x \doteq 7.5$

OS

2. Find the value of angle θ and side x, rounded to the nearest tenth



O H

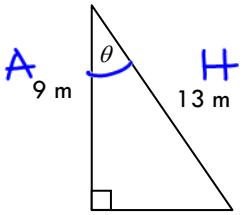
SOH

$\sin 29 = \frac{7}{x}$

$x = \frac{7}{\sin 29}$

$x = 14.4 \text{ cm}$

3. Find the value of angle θ rounded to the nearest degree .



A H

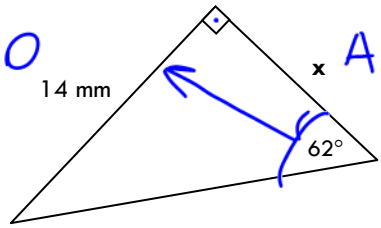
CAH

$\cos\theta = \frac{9}{13}$

$\cos^{-1}\left(\frac{9}{13}\right) = \theta$

$\theta = 46°$

4. Find the value of side x, rounded to the nearest tenth



O A

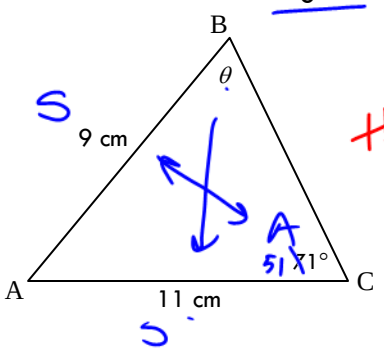
TOA

$\tan 62 = \frac{14}{x}$

$x = \frac{14}{\tan 62}$

$x = 7.4$

5. Find the value of angle θ rounded to the nearest degree



inverse

Sine law

$\frac{\sin\theta}{11} = \frac{\sin 71}{9} \cdot 11$

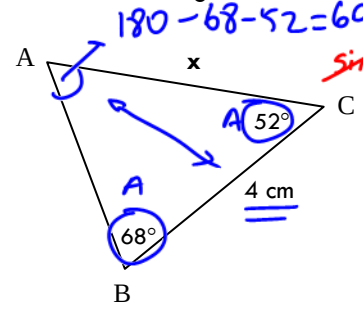
$\sin\theta = \left(\frac{\sin 51}{9} \cdot 11\right)$

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

$\sin^{-1}\left(\frac{\sin 51}{9} \cdot 11\right) = \theta$

$\theta = 72°$

6. Find the length of side x rounded to the nearest tenth



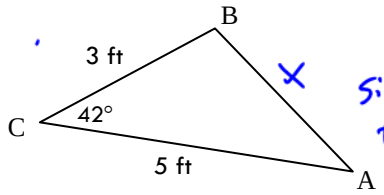
$180 - 68 - 52 = 60$

$\frac{x}{\sin 68} = \frac{4}{\sin 60}$ → $\sin 68$

$x = \frac{4}{\sin 60} \cdot \sin 68$

$x = 4.3$

7. Find the length of side x rounded to the nearest tenth



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

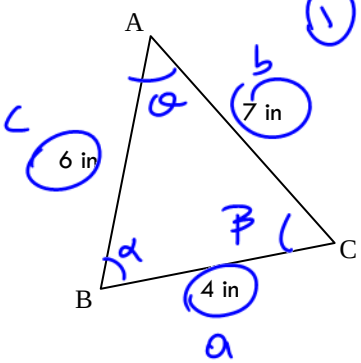
side to find; other sides; opposite ∠

$x^2 = 3^2 + 5^2 - 2 \cdot 3 \cdot 5 \cdot \cos 42$

$\sqrt{x^2} = \sqrt{11.7057}$

$x = 3.4$

8. SOLVE the triangle $\triangle ABC$



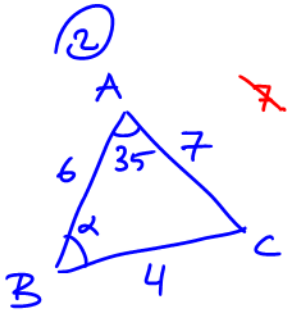
① $\cos\theta = \frac{b^2 + c^2 - a^2}{2bc}$

$\cos\theta = \frac{7^2 + 6^2 - 4^2}{2 \cdot 7 \cdot 6}$

$\cos\theta = \frac{69}{84}$

$\cos^{-1}\left(\frac{69}{84}\right) = \theta$

$\theta = 34.8$



$\frac{\sin\alpha}{7} = \frac{\sin 34.8}{4} \cdot 7$

$\sin\alpha = \left(\frac{\sin 34.8}{4} \cdot 7\right)$

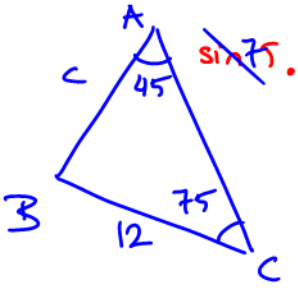
$\sin^{-1}\left(\frac{\sin 34.8}{4} \cdot 7\right) = \alpha$

$\alpha = 87.1$

③ $\beta = 180 - 34.8 - 87.1$

$\beta = 58.1$

9. Find the length of side c in $\triangle ABC$, where $\angle A=45°$, $\angle C=75°$, and a = 12 cm.

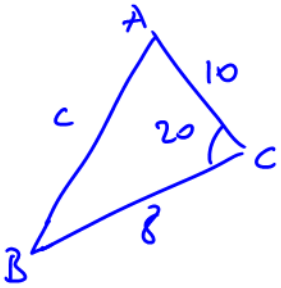


$\frac{c}{\sin 75} = \frac{12}{\sin 45} \cdot \sin 75$

$c = \frac{12}{\sin 45} \cdot \sin 75$

$c = 16.4 \text{ cm}$

10. Find the length of side c in $\triangle ABC$, where a=8cm, b=10cm, and $\angle C = 20°$.

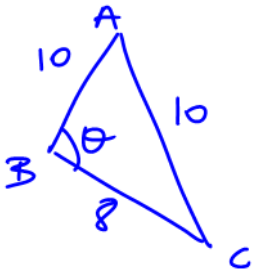


$c^2 = 8^2 + 10^2 - 2 \cdot 8 \cdot 10 \cdot \cos 20$

$c^2 = 13.6492$

$c = 3.7 \text{ cm}$

11. Find the measure of $\angle B$ in $\triangle ABC$, where a=8 cm, b =10 cm and c = 10cm.



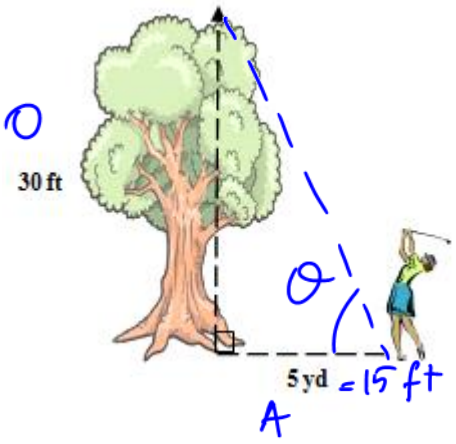
$\cos\theta = \frac{10^2 + 8^2 - 10^2}{2 \cdot 10 \cdot 8}$

$\cos\theta = \frac{64}{160}$

$\cos^{-1}\left(\frac{64}{160}\right) = \theta$

$\theta = 66.4°$

12. A golfer hit her tee shot so that it landed 5 yd behind a 30 ft tall tree. She decided to take her second shot and hoped the ball would make it over the top of the tree. She used her lob wedge and hit the ball, sending it upward at an angle of 60°. **Was she able to clear the top of the tree?** ***Hint: there are 3 ft in 1 yd***



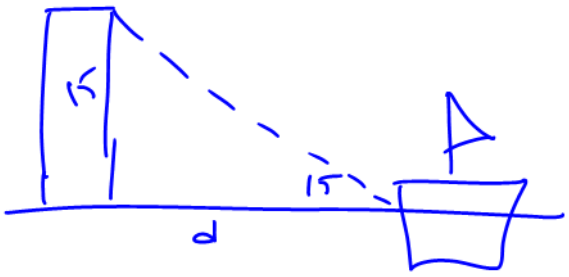
$\tan\theta = \frac{30}{15}$

$\tan^{-1}\left(\frac{30}{15}\right) = \theta$

$\theta = 63.4$

∴ She won't clear the top of the tree because the min angle must be 63.4. She sends the ball with 60°.

13. A lighthouse is 15 m tall. A sailor, in his sailboat, looks up to the top of the lighthouse at angle of elevation of 15°. **How far is the sailor from the base of the light house?**



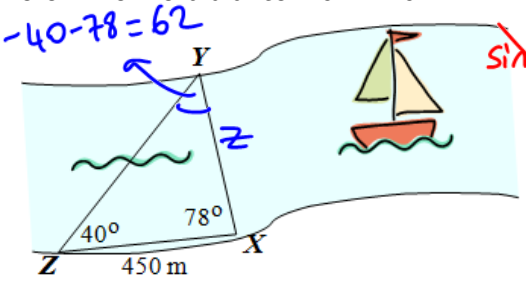
$\tan 15 = \frac{15}{d}$

$d = \frac{15}{\tan 15}$

$d \doteq 56\text{m}$

∴ The sailor is 56 m from the base of the light house.

14. To measure the distance across a river, a surveyor took measurements and drew the diagram shown. Determine the distance from *X* to *Y*.



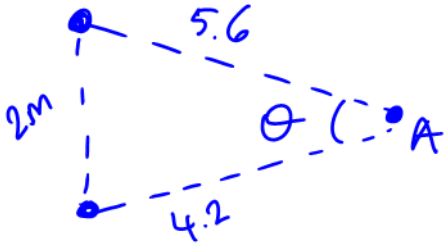
$180 - 40 - 78 = 62$

$\sin 40° \cdot \frac{z}{\sin 40°} = \frac{450}{\sin 62} \cdot \sin 40$

$z = 327.60\text{m}$

∴ The distance between x and y is 327.60m

15. The posts of a hockey goal are 2.0 m apart. Adam is 4.2 m from one post and 5.6 m from the other post. Within what angle must he shoot the puck to score the goal?



$\cos\theta = \frac{(4.2)^2 + (5.6)^2 - 2^2}{2 \cdot (4.2) \cdot (5.6)}$

$\cos\theta = \frac{45}{47.04}$

$\cos\left(\frac{45}{47.04}\right) = \theta$

$\theta = 16.9°$

$\theta \doteq 17°$

∴ He must shoot within 17° to score.