SOH - CAH - TOA

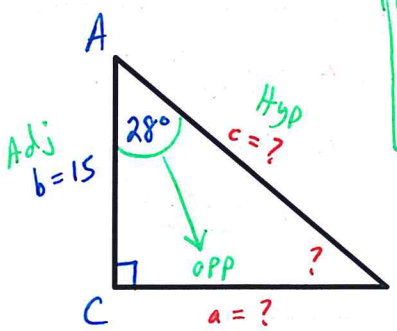
$\sin = \frac{opp}{hyp}$ $\cos = \frac{adj}{hyp}$ $\tan = \frac{opp}{adj}$

Trigonometry

Emphasis on Solving Right Triangles

Solve the following triangles given the provided information. Round all angles to the nearest tenth of a degree and sides to the nearest tenth if using inverse trig functions:

1. $\angle A = 28^\circ$ & $b = 15$



① $\angle B = 180^\circ - 28^\circ - 90^\circ$

$\boxed{\angle B = 62^\circ}$

$\cancel{\sin 28 = \frac{a}{c}}$

Two Variables. Can't solve.

$c \cdot \cos 28 = \frac{15}{\cancel{c}} \cdot \cancel{c}$

$\frac{c \cdot \cos 28}{\cos 28} = \frac{15}{\cos 28}$

$c = \frac{15}{\cos 28} \approx 16.98855076$

$\boxed{c \approx 17}$

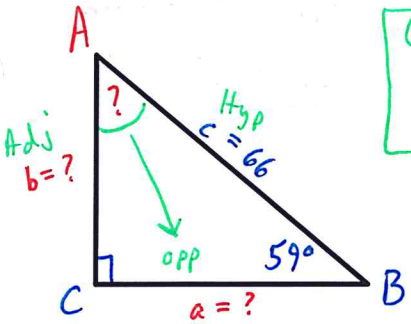
$15 \cdot \tan 28 = \frac{a}{\cancel{15}} \cdot \cancel{15}$

$15 \tan 28 = a$

$7.975641475 \approx a$

$\boxed{8 \approx a}$

2. $\angle B = 59^\circ$ & $c = 66$



① $\angle A = 180 - 90 - 59^\circ$

$\boxed{\angle A = 31^\circ}$

$66 \cdot \sin 31 = \frac{a}{\cancel{66}} \cdot \cancel{66}$

$66 \sin 31 = a$

$33.99251294 \approx a$

$\boxed{34 \approx a}$

$66 \cdot \cos 31 = \frac{b}{\cancel{66}} \cdot \cancel{66}$

$66 \cos 31 = b$

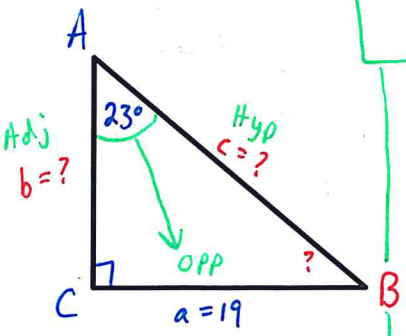
$56.57304185 \approx b$

$\boxed{56.6 \approx b}$

$\cancel{\tan 31 = \frac{a}{b}}$

Two Variables Can't solve.

3. $\angle A = 23^\circ$ & $a = 19$



① $\angle B = 180 - 90 - 23$

$\boxed{\angle B = 67^\circ}$

$c \cdot \sin 23 = \frac{19}{\cancel{c}} \cdot \cancel{c}$

$\frac{c \sin 23}{\sin 23} = \frac{19}{\sin 23}$

$c = \frac{19}{\sin 23}$

$c \approx 48.62678864$

$\boxed{c \approx 48.6}$

$\cos 23 = \frac{b}{c}$

Two Variables. Can't solve.

$b \cdot \tan 23 = \frac{19}{\cancel{b}} \cdot \cancel{b}$

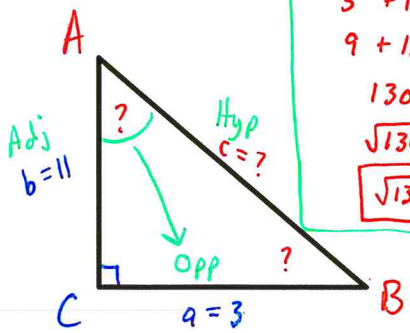
$\frac{b \tan 23}{\tan 23} = \frac{19}{\tan 23}$

$b = \frac{19}{\tan 23}$

$b \approx 44.76119495$

$\boxed{b \approx 44.8}$

4. a = 3 & b = 11



① $a^2+b^2=c^2$

$3^2+11^2=c^2$

$9+121=c^2$

$130=c^2$

$\sqrt{130}=\sqrt{c^2}$

$\boxed{\sqrt{130}=c}$

$\sin A=\frac{3}{\sqrt{130}}$ $\cos A=\frac{11}{\sqrt{130}}$ $\tan A=\frac{3}{11}$

Choose the one without any Square Roots

② $\tan^{-1}(\tan A)=\tan^{-1}\left(\frac{3}{11}\right)$

$\angle A=\tan^{-1}\left(\frac{3}{11}\right)$

$\angle A\approx 15.2551187$

$\boxed{\angle A\approx 15.3^\circ}$

③ $\angle B=180-90-15.3$

$\boxed{\angle B\approx 74.7^\circ}$

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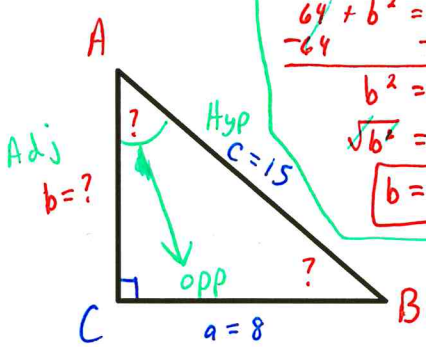
5. a = 8 & c = 15



① $a^2+b^2=c^2$

$8^2+b^2=15^2$

$64+b^2=225$

$-64 \qquad -64$

$b^2=161$

$\sqrt{b^2}=\sqrt{161}$

$\boxed{b=\sqrt{161}}$

$\sin A=\frac{8}{15}$ $\cos A=\frac{\sqrt{161}}{15}$ $\tan A=\frac{8}{\sqrt{161}}$

② $\sin^{-1}(\sin A)=\sin^{-1}\left(\frac{8}{15}\right)$

$\angle A=\sin^{-1}\left(\frac{8}{15}\right)$

$\angle A\approx 32.23095264$

$\boxed{\angle A\approx 32.2^\circ}$

③ $\angle B=180-90-32.2$

$\boxed{\angle B\approx 57.8^\circ}$

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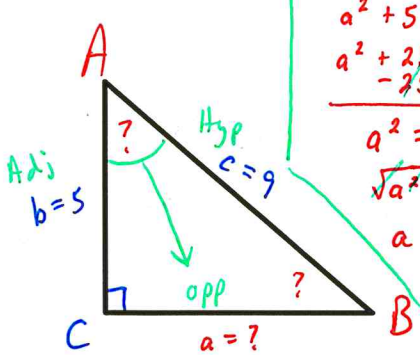
6. b = 5 & c = 9



① $a^2+b^2=c^2$

$a^2+5^2=9^2$

$a^2+25=81$

$-25 \qquad -25$

$a^2=56$

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

$a=\sqrt{4\cdot 14}=\sqrt{4}\cdot\sqrt{14}$

$\boxed{a=2\sqrt{14}}$

$\sin A=\frac{2\sqrt{14}}{9}$ $\cos A=\frac{5}{9}$ $\tan A=\frac{2\sqrt{14}}{5}$

② $\cos^{-1}(\cos A)=\cos^{-1}\left(\frac{5}{9}\right)$

$\angle A=\cos^{-1}\left(\frac{5}{9}\right)$

$\angle A\approx 56.2510114$

$\boxed{\angle A\approx 56.3^\circ}$

③ $\angle B=180-90-56.3$

$\boxed{\angle B\approx 33.7^\circ}$