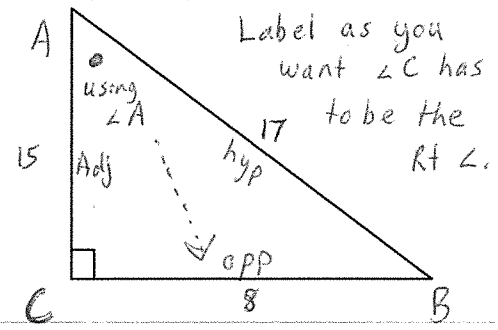
Unit 5: Right Triangles and Trigonometry

PRE-TEST

Evaluate the six trigonometric functions for the regular right triangle for ∠ A.

1. a = 8, b = 15, and c = 17.



SOH - CAH - TOA

$\sin A = \frac{opp}{hyp} = \frac{8}{17}$	$\csc A = \frac{17}{8}$
$\cos A = \frac{adj}{hyp} = \frac{15}{17}$	$\sec A = \frac{17}{15}$
$\tan A = \frac{opp}{adj} = \frac{8}{15}$	$\cot A = \frac{15}{8}$

Flip 1st Column.

For the following problem there will be 3 parts:

A. Draw the angle in standard form.

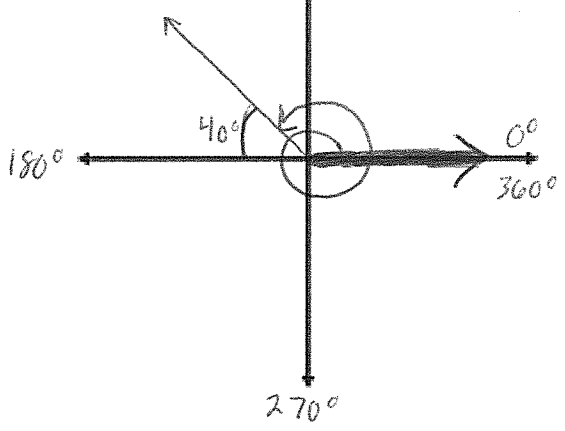
B. Find one (1) positive and one (1) negative coterminal angle of the given angle.

C. Find the reference angle of the given angle.

2A. 500°

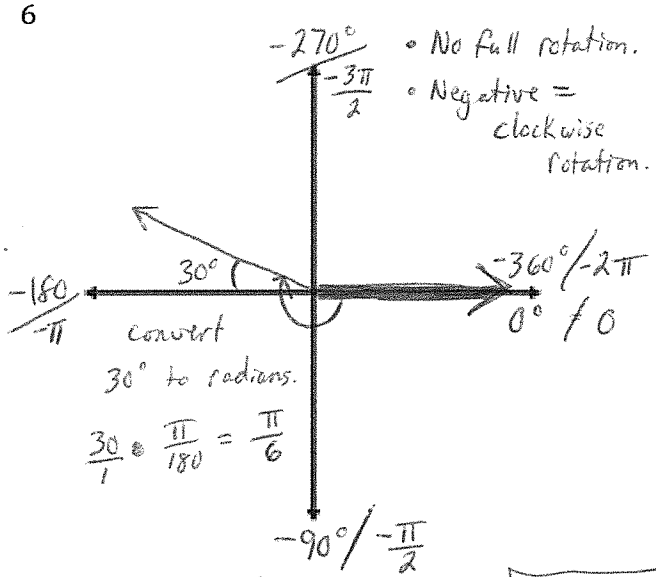
$\frac{-360}{140°}$ 1 rotation, Extra

• Positive = Counter-Clockwise rotation.



3A. $-\frac{7\pi}{6}$

• Convert to Degrees $-\frac{7\pi}{6} \cdot \frac{180}{\pi} = -210°$



2B.

500 − 360 = 140° or 500 + 360 = 860°

Positive Coterminals

500 − 360 = 140; 140 − 360 = −220°

Negative Coterminal.

3B.

$-\frac{7\pi}{6} + \frac{2\pi \cdot 6}{1 \cdot 6} = -\frac{7\pi}{6} + \frac{12\pi}{6} = \frac{5\pi}{6}$ Pos. Coterm.

$-\frac{7\pi}{6} - \frac{2\pi \cdot 6}{1 \cdot 6} = -\frac{7\pi}{6} - \frac{12\pi}{6} = \frac{-19\pi}{6}$ Neg. Coterm.

2C.

Reference ∠ must connect to the x-axis.

180° ∈ x-axis

−140° ∈ Extra°

140°

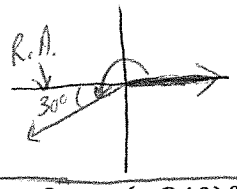
3C.

Reference Angle here I'll take in degrees or Radians.

30° or $\frac{\pi}{6}$

Using the hand trick discussed in class, give the exact value of each of the following trig functions: All Students Take Calculus.

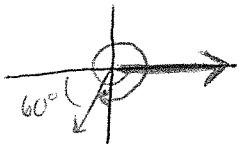
4. $\sin(210)^o$



$\frac{\sqrt{\text{below}}}{2} = \frac{\sqrt{1}}{2} = \frac{1}{2}$

since sin in QIII is neg $\boxed{-\frac{1}{2}}$

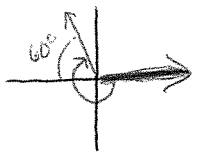
5. $\csc\left(-\frac{8\pi}{3}\right)$ $\quad \frac{-8\pi}{3}\left(\frac{180}{\pi}\right) = -480°$



$\frac{2}{\sqrt{\text{below}}} = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

since sin. in QIII is neg $\boxed{-\frac{2\sqrt{3}}{3}}$

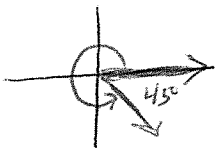
6. $\cos(-240)^o$



$\frac{\sqrt{\text{above}}}{2} = \frac{\sqrt{1}}{2} = \frac{1}{2}$

since cos in QII is neg $\boxed{-\frac{1}{2}}$

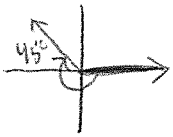
7. $\sec\left(\frac{7\pi}{4}\right)$ $\quad \frac{7\pi}{4}\left(\frac{180}{\pi}\right) = 315°$



$\frac{2}{\sqrt{\text{above}}} = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \sqrt{2}$

since cos in QIV is positive $\boxed{\sqrt{2}}$

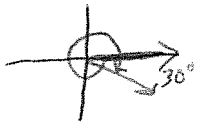
8. $\tan(-225)^o$



$\frac{\sqrt{\text{below}}}{\sqrt{\text{above}}} = \frac{\sqrt{2}}{\sqrt{2}} = 1$

since tan in QII is neg $\boxed{-1}$

9. $\cot\left(-\frac{13\pi}{6}\right)$ $\quad \frac{-13\pi}{6}\left(\frac{180}{\pi}\right) = -390°$



$\frac{\sqrt{\text{above}}}{\sqrt{\text{below}}} = \frac{\sqrt{3}}{\sqrt{1}} = \frac{\sqrt{3}}{1} = \sqrt{3}$

since tan in QIV is neg $\boxed{-\sqrt{3}}$

Solve the following triangle given the information provided:

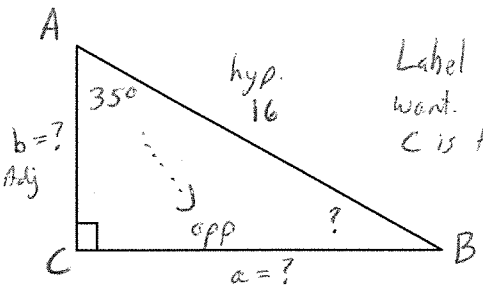
10. $\angle A = 35°$ and $c = 16$

① $\angle B = 180° - 90° - 35°$ $\quad \boxed{\angle B = 55°}$

② Set up SOH-CAH-TOA using $\angle A$

③ $16 \cdot \sin 35 = \frac{a}{16} \cdot 16$ $\quad a = 16\sin 35$ $\quad \boxed{a \approx 9.2}$

④ $\cos 35 = \frac{b}{16} \cdot 16$ $\quad b = 16\cos 35$ $\quad \boxed{b \approx 13.1}$



Label as you want. C is the Rt. ∠.

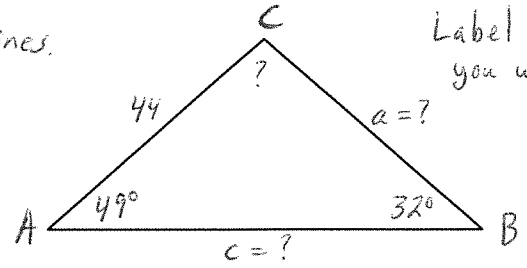
11. $\angle A = 49°$, $\angle B = 32°$, and $b = 44$

① Find $\angle C$: $\quad \angle C = 180 - 49 - 32$ $\quad \boxed{\angle C = 99°}$

② Not a Rt. Δ, so use Law of Sines. $\quad \frac{\sin 49}{a} = \frac{\sin 32}{44} = \frac{\sin 99}{c}$

③ Find a: $\quad \frac{a \sin 32}{\sin 32} = \frac{44 \sin 49}{\sin 32}$ $\quad \boxed{a \approx 62.7}$

④ Find c: $\quad \frac{c \sin 32}{\sin 32} = \frac{44 \sin 99}{\sin 32}$ $\quad \boxed{c \approx 82}$



Label as you want.

12. $a = 11$, $c = 14$, and $\angle B = 34°$

① Given a corner use Law of Cosines: $\quad b^2 = a^2 + c^2 - 2ac\cdot\cos B$

$b^2 = 11^2 + 14^2 - 2(11)(14)\cos 34$

$b^2 = 121 + 196 - 308\cos 34$

$\sqrt{b^2} = \sqrt{317 - 308\cos 34}$ $\quad \boxed{b \approx 7.9}$

② Law of Sines $\quad \frac{\sin A}{11} = \frac{\sin 34}{7.9} = \frac{\sin C}{14}$

③ $\frac{7.9 \sin A}{7.9} = \frac{11 \sin 34}{7.9}$

$\angle A \approx \sin^{-1}\left(\frac{11 \sin 34}{7.9}\right)$ $\quad \boxed{\angle A \approx 51.1°}$

④ $\angle C = 180 - 34 - 51.1$ $\quad \boxed{\angle C = 94.9}$