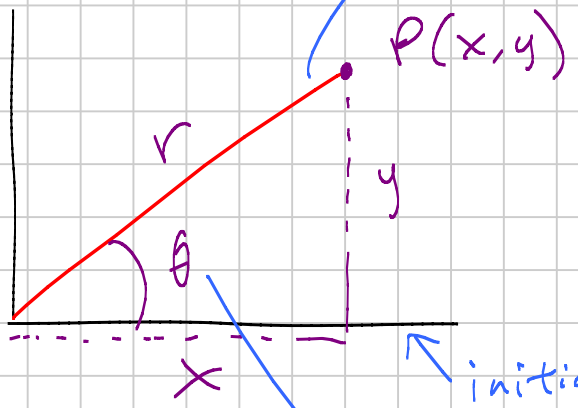
PreCalc 11 - Chp 6 Review/Ref Sheet

Note Title 2015-09-24



mnemonics

primary trig angles

Syr : $\sin\theta = \frac{y}{r}$

cxr : $\cos\theta = \frac{x}{r}$

tyx : $\tan\theta = \frac{y}{x}$

sir kix'r ticks

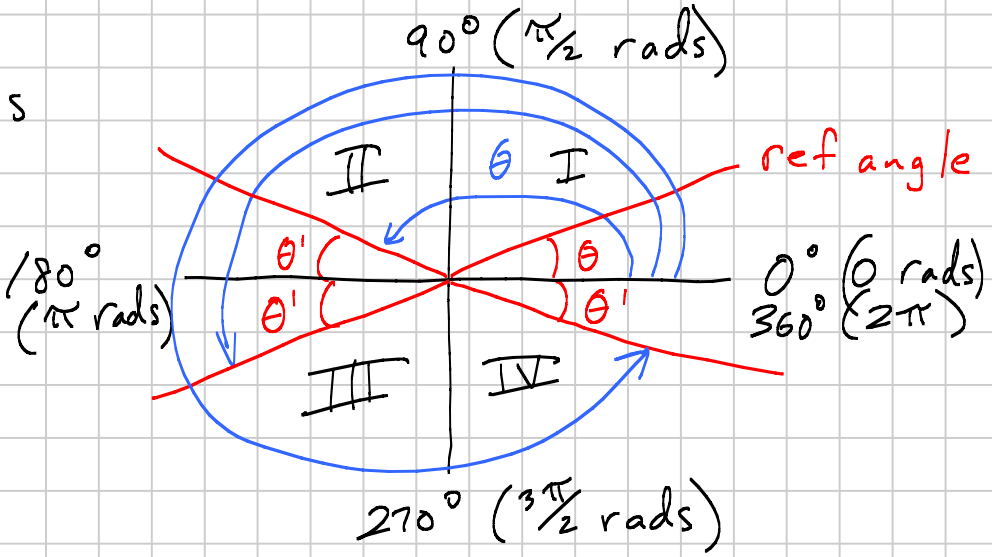
Reference Angles (converting to)

I : $\theta' = \theta$ θ

II : $\theta' = 180° - \theta$ $\pi - \theta$

III : $\theta' = \theta - 180°$ $\theta - \pi$

IV : $\theta' = 360° - \theta$ $2\pi - \theta$



Standard Angles (Converting to)

I : $\theta = \theta'$ θ'

II : $\theta = 180° - \theta'$ $\pi - \theta'$

III : $\theta = 180° + \theta'$ $\pi + \theta'$

IV : $\theta = 360° - \theta'$ $2\pi - \theta'$

$r = \sqrt{x^2 + y^2}$

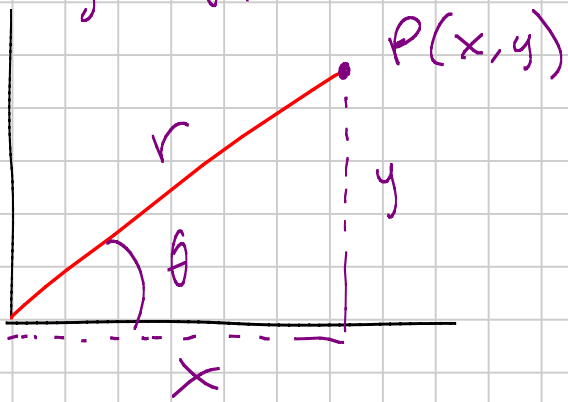
$x = \pm\sqrt{r^2 - y^2}$

$y^2 = \pm\sqrt{r^2 - x^2}$

$r \sin\theta = y$

$r \cos\theta = x$

tan θ means slope.



S II	A I
III T	IV C

All Students Take Calculus.

- All: All trig ratios +'ve
- Students: sin θ is +'ve, cos θ, tan θ
- Take: tan θ is +'ve, sin θ, cos θ
- Calculus: cos θ is +'ve, sin θ, tan θ are -'ve

Best practice is to draw a diagram!

Definition: Principal Angle is the coterminal angle such that $0 \le \theta < 360°$.

$$\theta' = \sin^{-1}\left(\left|\frac{y}{r}\right|\right) \qquad \theta' = \cos^{-1}\left(\left|\frac{x}{r}\right|\right) \qquad \theta' = \tan^{-1}\left(\left|\frac{y}{x}\right|\right)$$

Sine Law: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ or $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

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

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

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

For ALL triangles, use angle property: $A + B + C = 180°$

Isosceles triangles: legs are equal if base angles are equal.

Angle-Side-Angle: use sine law (not ambiguous)

Angle-Side-Side: DRAW DIAGRAM!

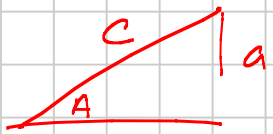
① Check if triangle: $a > c\sin A$

② Check Ambiguous:

i) $A > 90°$, not ambig

ii) $a > c$, not ambig

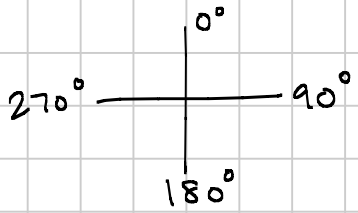
else ambiguous.



Side-Angle-Side: use Cosine Law, then Sine Law.

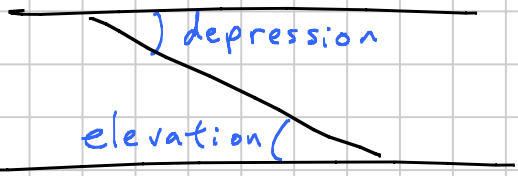
Side-Side-Side: use Cosine Law, then Sine Law.

Definition: Bearing - does not match angles in standard position. North is defined as 0° and incrementing is clockwise, so east is 90°, south is 180°, and west is 270°.



Bearing Directions

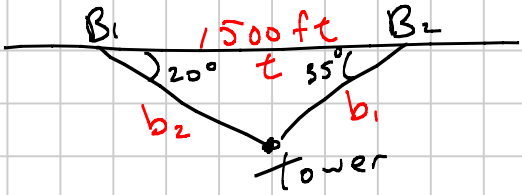
Definition: Angle of Elevation/Depression – This is the angle from horizontal.



Take care with implied bearing questions:

eg) The angles of depression from 2 hot air balloons from a spotting tower are 20° and 35°; all 3 are co-linear. The balloons are 1500 ft apart. How far are each balloon from the tower

Case 1



$\angle T = 180° - 20° - 35° = 125°$

$$\frac{b_1}{\sin B_1} = \frac{t}{\sin T}$$

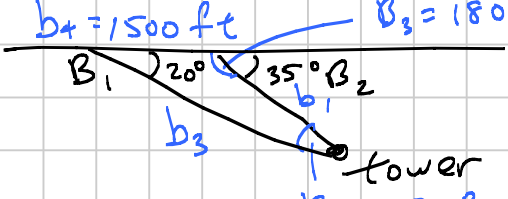
$$b_1 = 1500 \frac{\sin 20°}{\sin 125°}$$

$$\sim 626 \text{ ft}$$

$$b_2 = 1500 \frac{\sin 35°}{\sin 125°}$$

$$\sim 1050 \text{ ft}$$

Case 2



$B_4 = 180° - 20° - 145° = 15°$

$$\frac{b_3}{\sin B_3} = \frac{b_4}{\sin B_4}$$

$$b_3 = 1500 \frac{\sin 145°}{\sin 15°}$$

$$\sim 3324 \text{ ft}$$

$$b_1 = 1500 \frac{\sin 20°}{\sin 15°}$$

$$\sim 1982 \text{ ft}$$