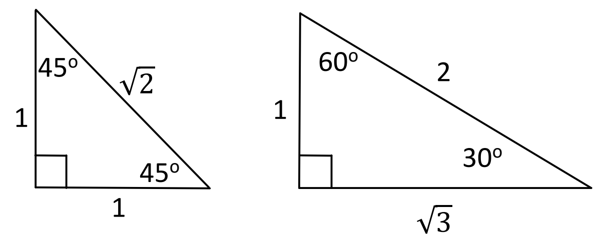
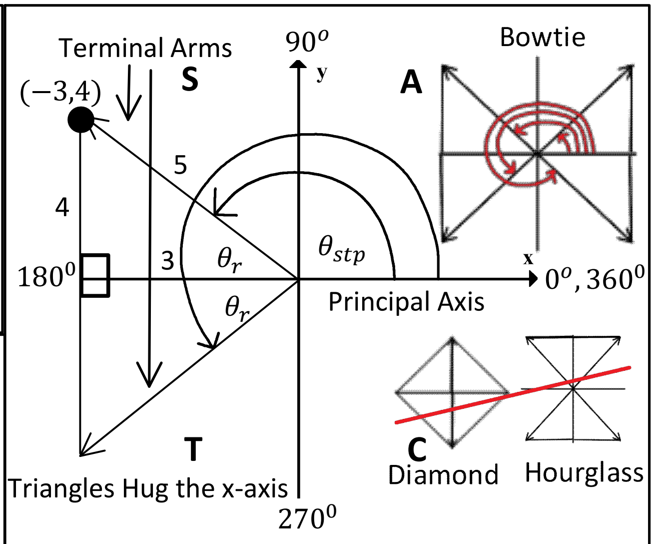
# C11 - 2.0 - Trigonometry Review

**Special Triangles.** $180^o$ in a $\Delta$ $\quad a^2+b^2=c^2$



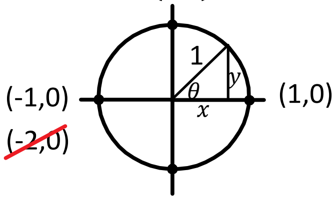



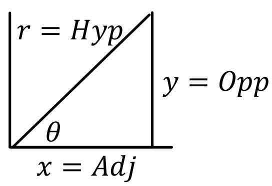

**SOH - CAH - TOA**

$sin\theta=\frac{O}{H}\quad cos\theta=\frac{A}{H}\quad tan\theta=\frac{O}{A}\quad \boxed{tan\theta=\frac{sin\theta}{cos\theta}}$

$\boxed{\theta_r=\sin^{-1}(+\frac{O}{H})}$ Only inverse positives $=\theta_r$

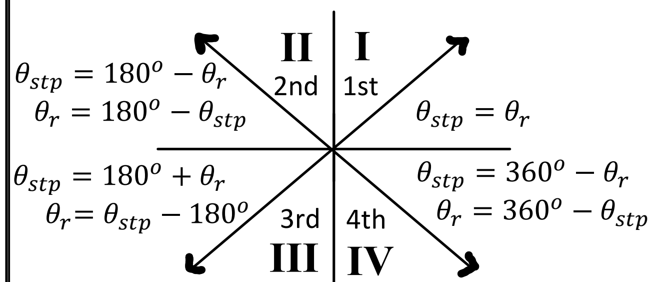
**Unit Circle** $(0,1)$




$\boxed{sin\theta=y}\quad \boxed{cos\theta=x}\quad \boxed{tan\theta=\frac{y}{x}}$

**Quadrants**



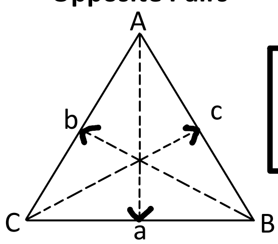

Rationalize

$$\frac{\sqrt{2}}{2}\times\frac{\sqrt{2}}{\sqrt{2}}=\frac{2}{2\sqrt{2}}=\frac{1}{\sqrt{2}}$$

**Sine Law:** $\frac{a}{sinA}=\frac{b}{sinB}=\frac{c}{sinC}$ (to find side) **OR** $\frac{sinA}{a}=\frac{sinB}{b}=\frac{sinC}{c}$ (to find angle)

Put what you are looking for on top.

**Opposite Pairs**




Draw an arrow to the Opposite side

Sine Law: Opposite pair and one other piece of information

Ambiguous Case: ASS 5 acute cases, 2 obtuse cases.

**Cosine Law:** Find smallest Angle First. $180^o-\theta^*$

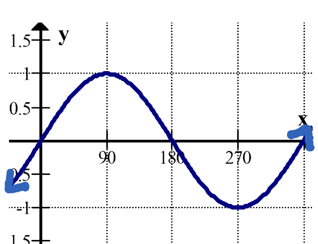
SAS (easy) SSS (hard) $\quad c^2=a^2+b^2-2abcosC\quad$ Only Cos $\angle$'s

Rainbow Pattern should occur. $(ab=ba)$

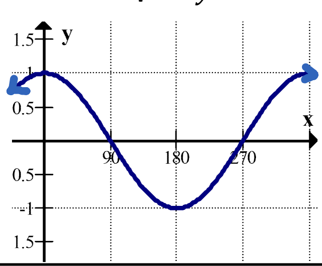
$\theta_{cot}=\theta_{stp}\pm 360$

*General Solution:* $\theta_{gen}=\theta_{stp}+p^*n, n\in I$ $\quad$ *Period* $\quad p=\frac{360^0}{|b|}\ (sin, cos)\quad p=\frac{180^o}{|b|}\ (tan)$

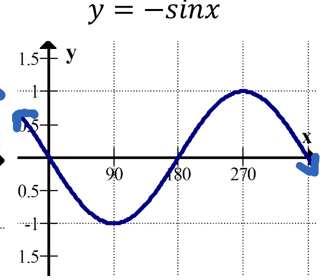
**Sine Graph** $y=sinx$



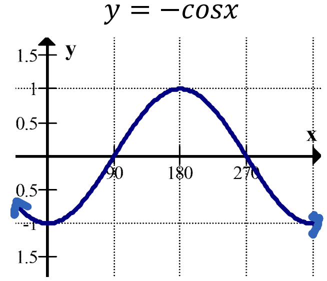

**Cosine Graph** $y=cosx$




$y=-sinx$




$y=-cosx$

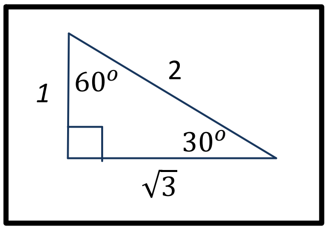


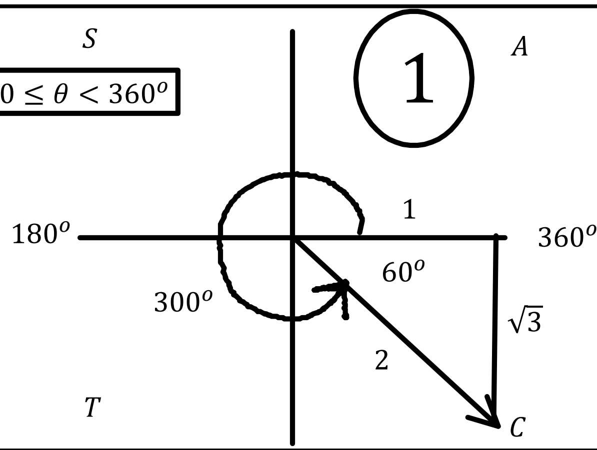
# C11 - 2.0 - Trig Summary

$\sin(300^o) = ?$

$0 \le \theta < 360^o$

$\sin(300^o) = -\frac{\sqrt{3}}{2}$ ✓




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

$360 - 60 = 300$

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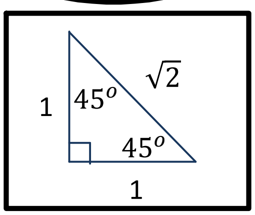
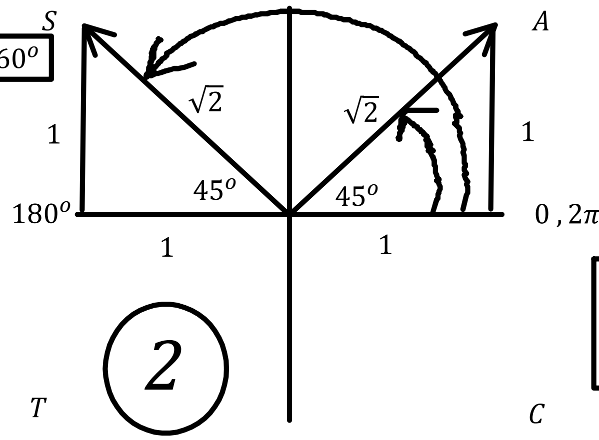
$sin\theta = \frac{\sqrt{2}}{2}$

$0 \le \theta < 360^o$

$sin\theta = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$

$\theta = 45^o, 135^o$ ✓




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

Rationalize

$\frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}}$

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$sin\theta = 0$

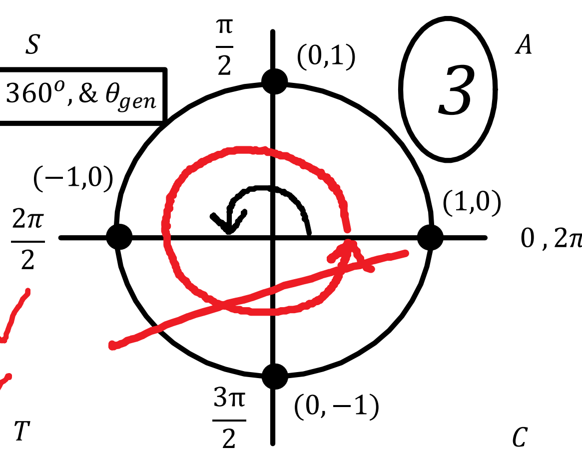
$sin\theta = y$

$y = 0$

$0 \le \theta < 360^o, \& \ \theta_{gen}$

$\theta = 0, 180^o, 360^o$ ✓

$\theta = 180^o n, n \in \mathrm{I}$ ✓




$@@@\theta = 0, \pm 1^*, und$

$x^2 + y^2 = r^2$
$x^2 + y^2 = 1$

$sin\theta = y$

$cos\theta = x$

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

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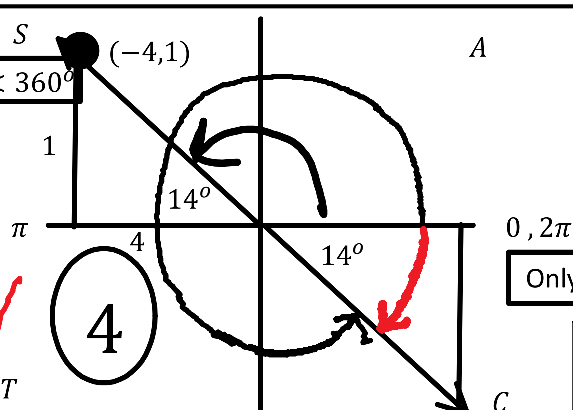
$tan\theta = -\frac{1}{4}$

$-180^o \le \theta < 360^o$

$\theta = \tan^{-1}(+\frac{1}{4})$

$\theta = 14^o$

$\theta = -14^o, 166^o, 356^o$ ✓




$tan\theta = \frac{Opp}{Adj}$

Only inverse positives $= \theta_r$

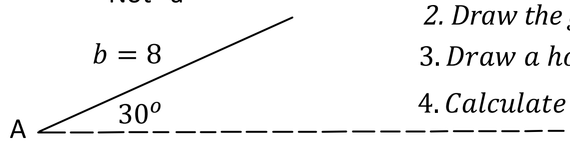
$180 - 14 = 166$
$360 - 14 = 356$

If they give you the triangle it's not ambiguous.

# C11 - 2.0 - Ambiguous Case of Sine (ASS) Review

**Acute Triangle**

Not "a"

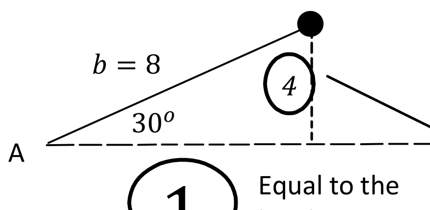


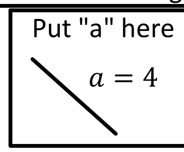

**Steps**

Every Time $\theta_{stp}$!!!

1. *Draw the given angle as seen on left.*
2. *Draw the given side, going up (not opposite the angle).*
3. *Draw a horizontal dotted line*
4. *Calculate the height of the triangle (altitude*)*

Treat the opposite side to the angle like a door on a hinge that can swing accordingly. Draw the side opposite the angle off to the right. Find the height and decide how many triangles.




$$\sin\theta = \frac{\text{Opp}}{\text{Hyp}}$$

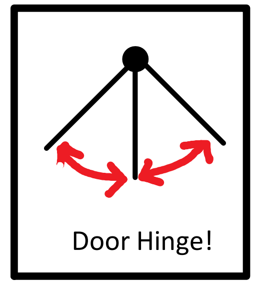
$$sin30^o = \frac{Opp}{8}$$

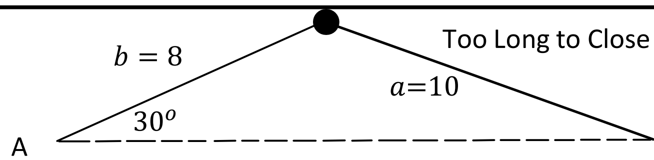
$$8\ sin30^o = Opp$$

$$Opp = 4$$

1 — Equal to the height

| | |
|---|---|
| $a = 4$ | $a = H$ : *Height* |
| *<u>one triangle</u>* | |

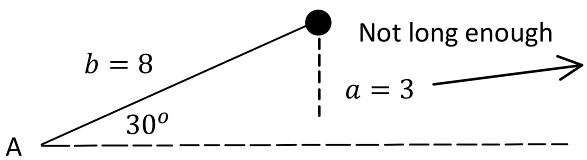



Too Long to Close the door

| | |
|---|---|
| $a \geq 8$ | $a \geq b$ |
| *<u>one triangle</u>* | |

1



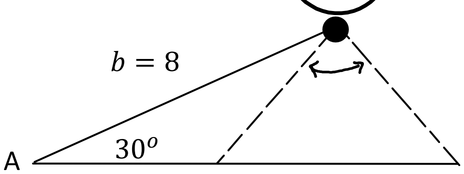

Not long enough

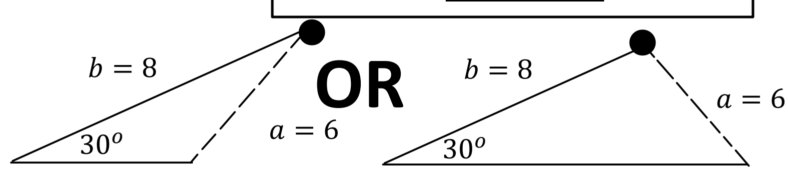
| | |
|---|---|
| $a < 4$ | $a < H$ : (*Height*) |
| *<u>no triangle</u>* | |

0

2 — Just Between!

| | |
|---|---|
| $4 < a < 8$ | $H$: *Height* $< a < b$ |
| *<u>Two triangles</u>* | |



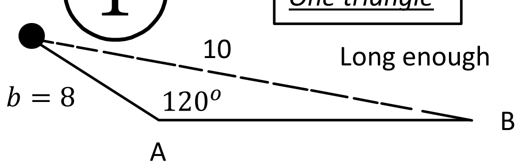

Notice: Both triangles have an angle of $30^o$, a side going up of 8, and a side opposite to $30^o$ of 6.
Notice the isosceles triangle and angles on a line add to 180 degrees.

**Obtuse Triangle**

The door closes or not!

1

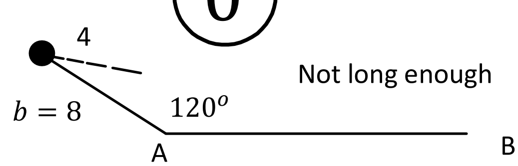
| | |
|---|---|
| $a > b$ | |
| *<u>One triangle</u>* | |




Long enough

0

| | |
|---|---|
| $a \leq b$ | |
| *<u>No triangle</u>* | |




Not long enough