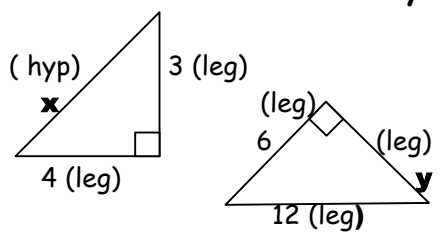
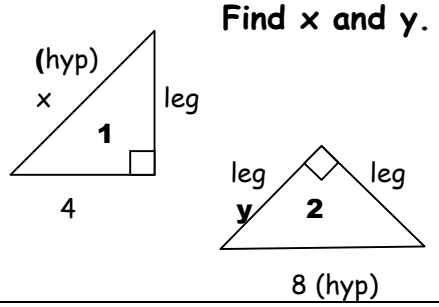
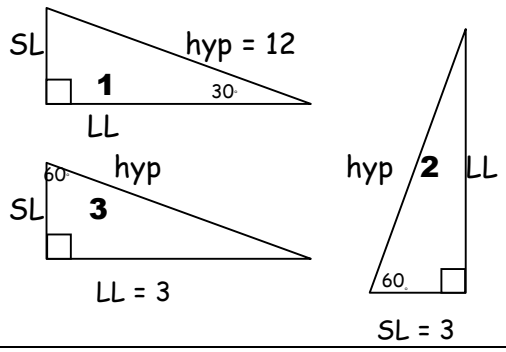
Name _____ **Block** _____

Geometry Journal: _Right Triangle Theorems_

Post, Thm, or Defn	Example/Drawing	Conclusion
1. Pythagorean Theorem: For all rt. Δ: $(hyp)^2 = (leg)^2 + (leg)^2$ $c^2 = a^2 + b^2$ [Used to find a side if given other two.]	**Find x and y.**  	1] $x^2 = 3^2 + 4^2$ $x^2 = 9 + 16$ $x^2 = 25$ $x = 5$ [3,4,5, Pythagorean triple] 2] $12^2 = 6^2 + y^2$ $144 = 36 + y^2$ $108 = y^2$ $y \approx 10.4$ $\sqrt{108} = y$ $y = \sqrt{36 \cdot 3} = 6\sqrt{3}$ **EXACTLY**
2. Converse of Pythagorean Theorem: **If** $(\text{largest side})^2 = (\text{side})^2 + (\text{side})^2$ then Δ is a rt.Δ. if $(\text{largest side})^2 < (\text{side})^2 + (\text{side})^2$ then **Δ is acute** if $(\text{largest side})^2 > (\text{side})^2 + (\text{side})^2$ then **Δ is obtuse**	**Given** these side measures, **classify** each triangle: 1) 5,13,12 2) 10,8,7 3) 2,3,4	1) $13^2 \square 12^2 + 5^2$ $169 \square 144 + 25$ $169 = 169$ [5,12,13 triple] 2) $10^2 \square 8^2 + 7^2$ $100 \square 64 + 49$ $100 < 113$ [Acute] 3) $4^2 \square 3^2 + 2^2$ $16 \square 9 + 4$ $16 > 13$ [Obtuse]
3. Special Rt. Δ: 45 - 45 - 90 hyp = $\sqrt{2}$(leg) $\sqrt{2}^2 = 1^2 + 1^2$	**Find x and y.**  	1) hyp = $\sqrt{2}$(leg) $x = \sqrt{2}(4)$ $x = 4\sqrt{2}$ 2) $\frac{\text{hyp}}{\sqrt{2}} = \frac{\sqrt{2}(\text{leg})}{\sqrt{2}}$ $\frac{8}{\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2}$
4. Special Rt. Δ: 30 - 60 - 90 $\frac{longleg}{\sqrt{3}} = \frac{shortleg}{1} = \frac{hyp}{2}$	**Find SL , LL , hyp**  	**1)** SL = $\frac{12}{2}$ $\frac{LL}{\sqrt{3}} = \frac{12}{2}$ **SL**=6 **LL** = $6\sqrt{3}$ **2)** $\frac{3}{1} = \frac{hyp}{2}$ $\frac{3}{1} = \frac{LL}{\sqrt{3}}$ **hyp**=6 **LL** = $3\sqrt{3}$ **3)** $\frac{3}{\sqrt{3}} = \frac{SL}{1}$ $\frac{3}{\sqrt{3}} = \frac{hyp}{2}$ **SL** = $\sqrt{3}$ **hyp** = $2\sqrt{3}$

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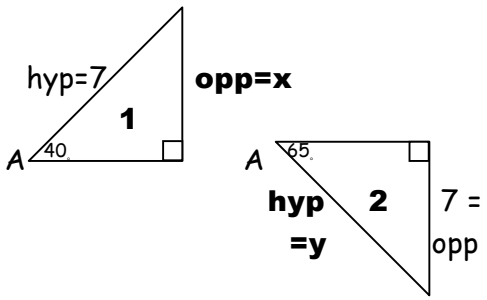
5. **Sine ∠ A** = $\frac{opposite}{hyp}$

Mode = Radian to degree



1] Sine 40 = $\frac{opposite}{hyp}$

$\frac{0.6428}{1} = \frac{x}{7}$ **x = 4.5**

2] sin 65 = $\frac{opposite}{hyp}$

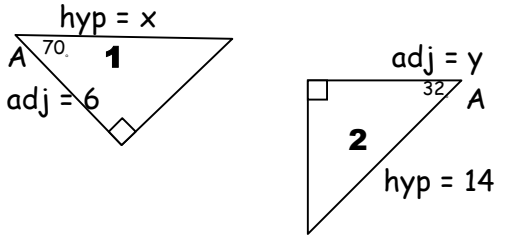
$\frac{0.9063}{1} = \frac{7}{y}$

7 = (0.9063)y

y = 7.7

6. **Cosine ∠ A** = $\frac{adjacent}{hyp}$

Mode = Radian to degree



1] cos 70 = $\frac{adjacent}{hyp}$

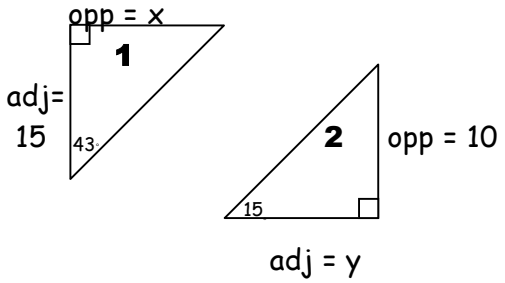
$\frac{0.3420}{1} = \frac{6}{x}$ x = 17.5

2] cos 32 = $\frac{adjacent}{hyp}$

$\frac{0.8480}{1} = \frac{y}{14}$ y = 11.9

7. **Tangent ∠ A** = $\frac{opposite}{adjacent}$

Mode = Radian to degree



1] tan 43 = $\frac{opp}{adj}$

$\frac{0.9325}{1} = \frac{x}{15}$ x = 14.1

2] tan 15 = $\frac{opp}{adj}$

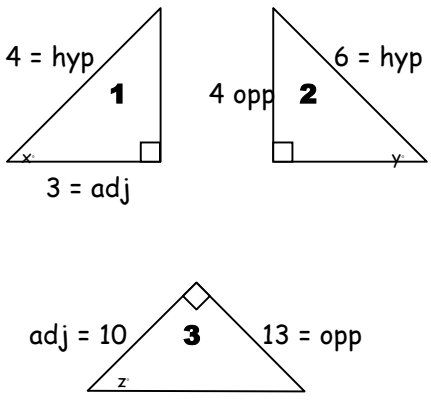
$\frac{0.2679}{1} = \frac{10}{y}$ y = 37.3

8. **Finding angle measures using Inverse Trig. Functions**

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

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

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



1.]$\cos^{-1}\left(\frac{3}{4}\right)$ = $\cos^{-1}$(075) =41.4°

2] $\sin^{-1}\left(\frac{4}{6}\right)$ = $\sin^{-1}(.\overline{66})$= 41.8°

3] $\tan^{-1}\left(\frac{13}{10}\right)$= 52.4°

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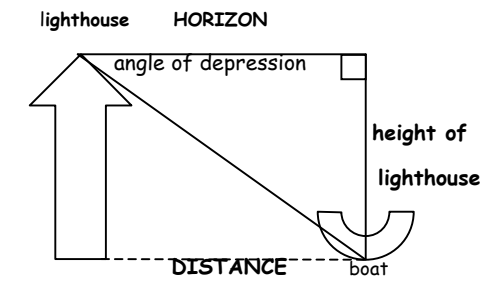
9. **Angle of Elevation:**
angle which rises with the horizon

height - always vertical
Horizon - always horizontal



$S\frac{o}{h}$ $C\frac{a}{h}$ $T\frac{o}{a}$

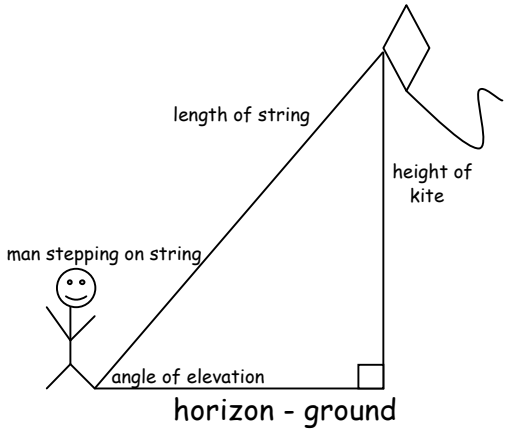
Given: light house is 240 ft high. Angle of depression with boat is 27°. How far away is the boat?

$\tan 27° = \frac{240}{x}$

x = 471°

10. **Angle of Depression:**
angle which falls with the horizon

height - always vertical
Horizon - always horizontal



Given: Man standing on string of kite. Kite is 140ft high. How much string is needed if the angle of elevation is 57° from the ground?

$\sin 57° = \frac{140}{string}$

String = $\frac{140}{0.8387}$ = 166.9 ft