

Sec. 8.1: Geometric Means + RT Δ 's w/ Altitudes

• **Arithmetic Mean:** The average

★ • **Geometric Mean:** When the means or extremes of a proportion are the same.

- Ex: $\frac{a}{12} = \frac{6}{a}$ } a is the GM of 6 and $\frac{1}{2}$

$\frac{a}{3} = \frac{3}{6}$ } 3 is the GM of a and 6

- Ex) Find the GM of 8 and 10.

$$\frac{x}{8} = \frac{10}{x}$$

$$\sqrt{x^2} = \sqrt{80}$$

$$x = \sqrt{80} = 2 \cdot 2\sqrt{5} = 4\sqrt{5}$$

$$= \sqrt{8 \cdot 10}$$

$$= \sqrt{4 \cdot 2 \cdot 2 \cdot 5}$$

$$= 2 \cdot 2 \cdot \sqrt{5}$$

$$= 4\sqrt{5}$$

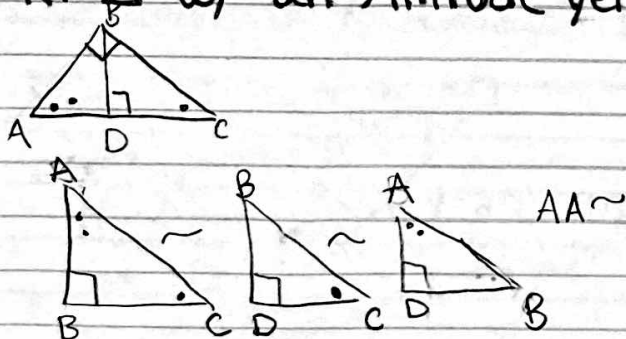
- Ex) 6 is the GM of 10 and what #

$$\frac{6}{10} = \frac{x}{6}$$

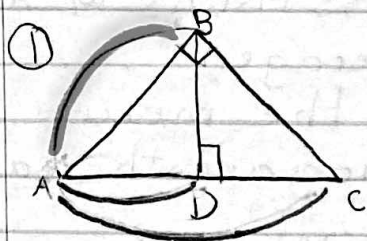
$$10x = 36$$

$$x = \frac{36}{10} = \frac{18}{5}$$

• RT Δ w/ an Altitude yeld 3 similar Δ 's.

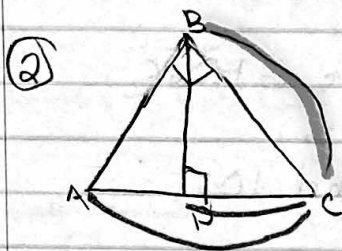


RT Δ 's w/ Altitude Th^m:



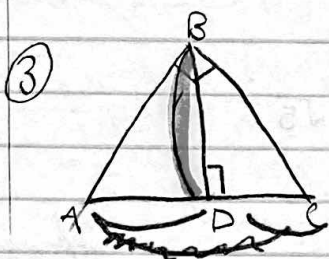
AD is the GM of AD and AC

$$\frac{AB}{AD} = \frac{AC}{AB}$$



BC is the GM of DC and AC

$$\frac{BC}{DC} = \frac{AC}{BC}$$



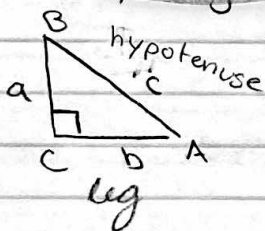
BD is the GM of AD and DC

$$\frac{BD}{DC} = \frac{AD}{BD}$$

2 side greater than 3rd side
For Δ

FINAL
EXAM
Q

8.2 Pythagorean Th^ms

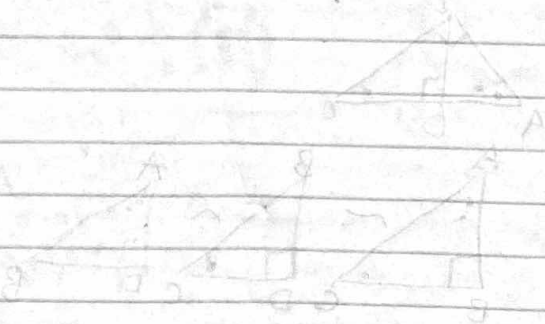


If $a^2 + b^2 = c^2 \Rightarrow$ RT Δ

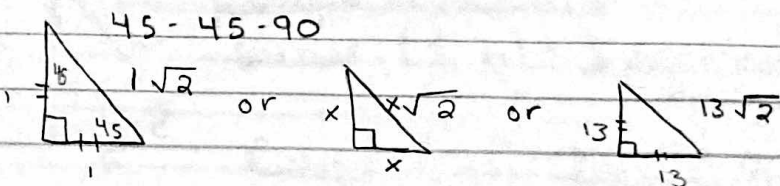
If $a^2 + b^2 > c^2 \Rightarrow$ Acute Δ

If $a^2 + b^2 < c^2 \Rightarrow$ Obtuse Δ

RT Δ on altitude & similar Δ

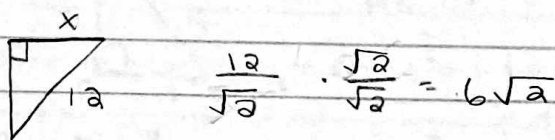


Sec. 8.3 - Special RT Δ 's

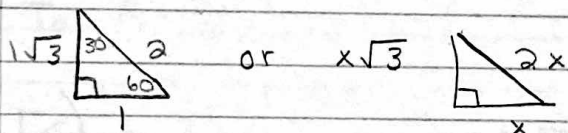


Hypotenuse = $\sqrt{2}$ (leg)

Leg = $\frac{\text{Hypotenuse}}{\sqrt{2}}$



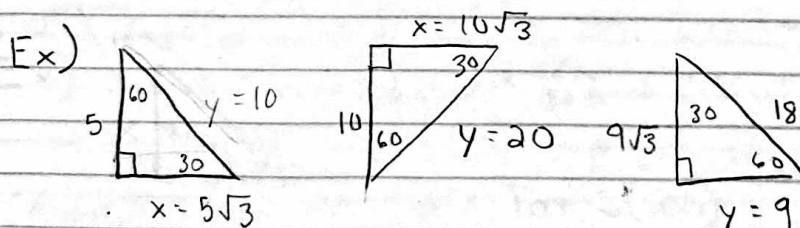
30-60-90



Hypotenuse = 2 (short) $H = 2(s)$

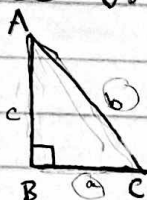
Long Leg = $\sqrt{3}$ (Short) $L = \sqrt{3}(s)$

Short Leg = $\frac{1}{2}$ (hypotenuse) $s = \frac{1}{2}(H)$



SOH-CAH-TOA

Sec 8.4 - RT Δ Trig.



Trig functions:

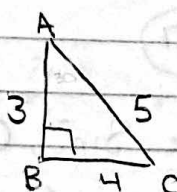
Sine (Sin) - $\frac{\text{Side opposite}}{\text{hypotenuse}}$

Cosine (Cos) - $\frac{\text{Side adjacent}}{\text{hypotenuse}}$

Tangent (Tan) - $\frac{\text{Side opposite}}{\text{Side adjacent}}$

At least
4 decimals
on calc -
no rounding

Ex)



Can never work from
RT Δ

$$\sin A = \frac{4}{5}$$

$$\sin B = \frac{3}{5} \quad \sin 30 =$$

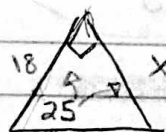
$$\cos A = \frac{3}{5}$$

$$\cos C = \frac{4}{5}$$

$$\tan A = \frac{4}{3}$$

$$\tan C = \frac{3}{4}$$

Ex)



$$\frac{\text{Opp}}{\text{Adj.}} = \text{Tangent}$$

2 WAYS
TO WRITE!

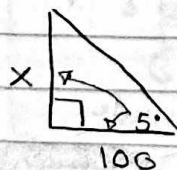
$$\tan 25 = \frac{x}{18}$$

Every Time!

$$x = \tan 25(18)$$

$$x = 8.3935$$

Ex)



$$\tan 5 = \frac{x}{100}$$

$$x = \tan 5(100)$$

$$x = 8.7489$$

Ex)



Adj/hyp

$$\cos 70 = \frac{15}{x}$$

$$\cos 70 (x) = 15$$

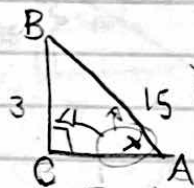
$$\cos 70 \quad \cos 70$$

$$x = \frac{15}{\cos 70}$$

$$x = 43.857$$

To find missing angles use $\sin^{-1}$, $\cos^{-1}$, or $\tan^{-1}$

Ex)



Opp/Adj

$$\sin x = \frac{3}{15} (\sin^{-1})$$

$$x = \sin^{-1} (3/15)$$

$$x = 11.53695$$

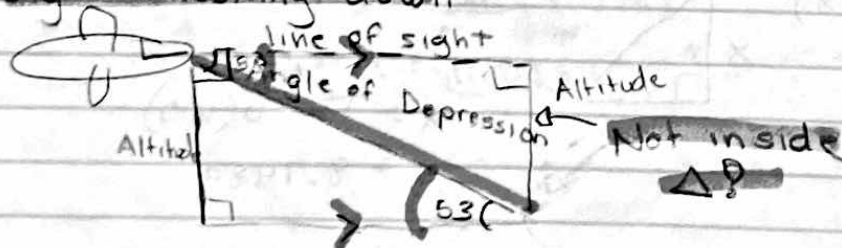
Find $\angle A$

8.5 - Angle of Elevation/Depression

$\angle$ of Elevation: $\angle$ formed by your line of sight looking up.

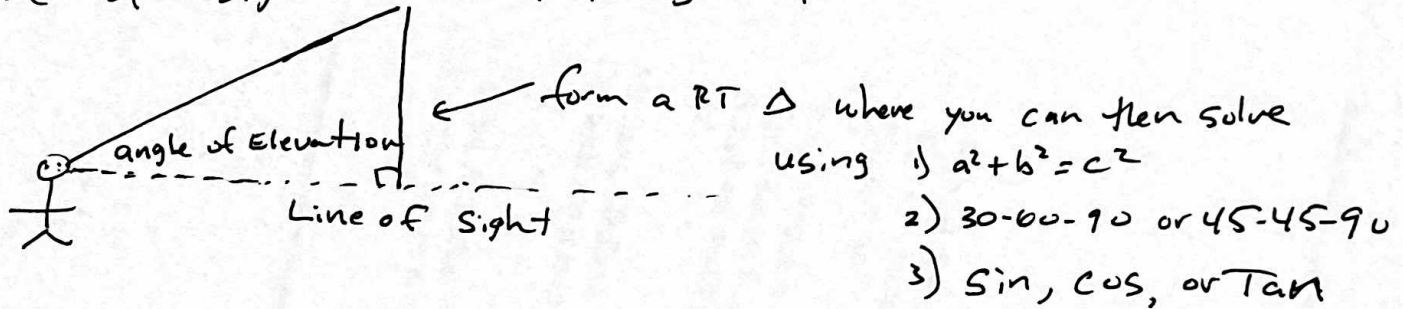


$\angle$ of Depression: $\angle$ formed by your line of sight looking down.

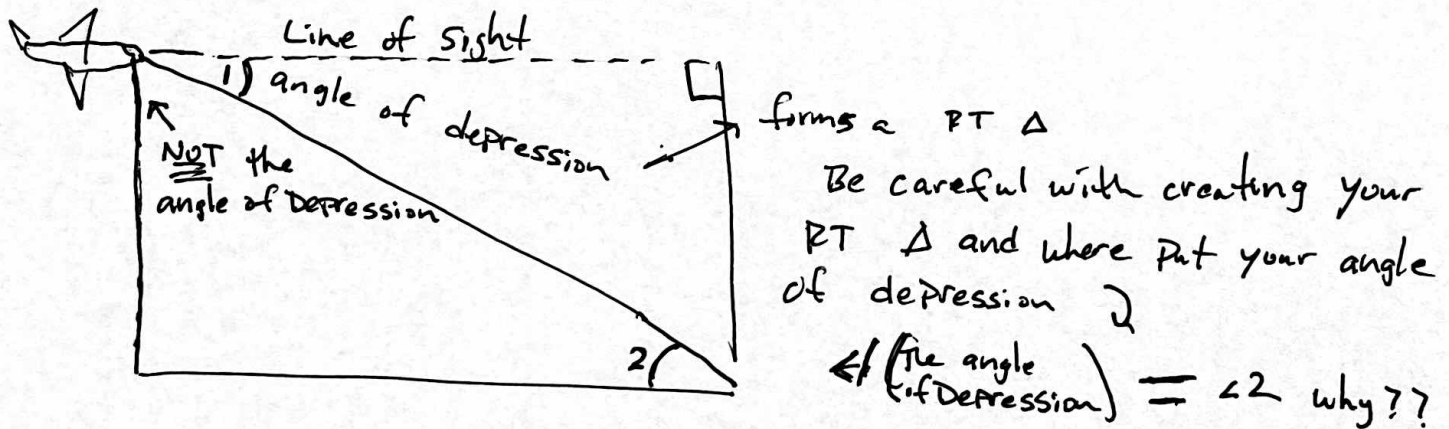


Sec 8.5

angle of Elevation: angle formed by your line of sight and looking up.



angle of Depression: angle formed by your line of sight and looking down



Hint: Parallel lines and Transversal,

* Solve The Right Δ's using

1) $a^2 + b^2 = c^2$

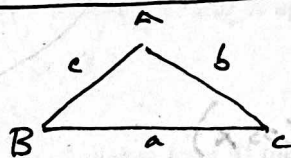
2) 30-60-90 " 45-45-90 Properties

3) Sin, Cos, Tangent.

To Find missing sides / L's for non RT Δ's

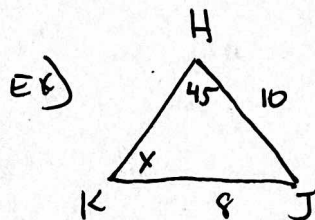
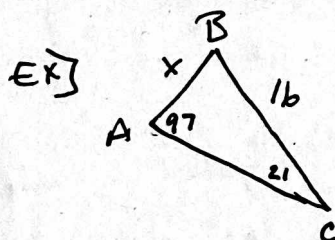
Law of Sines: Use if know 2 L's and any side

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



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21-27 = 10



$$\frac{\sin 21}{x} = \frac{\sin 97}{16}$$

$$\frac{\sin x}{10} = \frac{\sin 45}{8}$$

$$\frac{\sin 97(x)}{\sin 97} = \frac{\sin 21(16)}{\sin 97}$$

$$\sin x(8) = 10(\sin 45)$$

$$\frac{8 \sin x}{8} = \frac{10(\sin 45)}{8}$$

$$\sin x = \frac{10(\sin 45)}{8}$$

$$x = \frac{\sin 21(16)}{\sin 97}$$

$$(\sin^{-1})(\sin x) = \left(\frac{10(\sin 45)}{8} \right) (\sin^{-1})$$

Law of Cosine

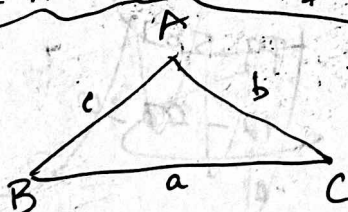
Use if know 2 sides & included L

Sec 8.7

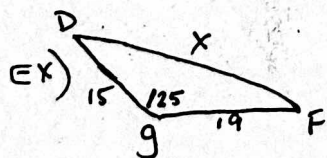
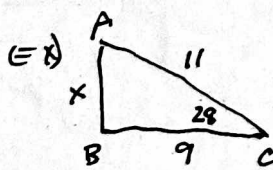
$$a^2 = b^2 + c^2 - 2bc(\cos A)$$

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

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



Separate 3 Pic's



$$x^2 = 15^2 + 19^2 - 2(15)(19)(\cos 125)$$

over

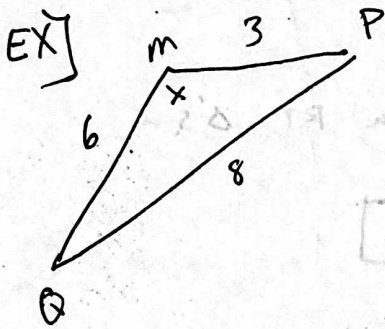
$$c^2 = a^2 + b^2 - 2ab(\cos C)$$

$$x^2 = 9^2 + 11^2 - 2(9)(11)(\cos 28)$$

$$x^2 = 81 + 121 - 198(\cos 28)$$

$$x^2 = 202 - 198(\cos 28)$$

$$x = \sqrt{202 - 198(\cos 28)} = 5.2$$



$$8^2 = 3^2 + 6^2 - 2(6)(3)(\cos x)$$

$$64 = 9 + 36 - 36(\cos x)$$

$$64 = 45 - 36(\cos x)$$

$$\frac{19}{-36} = \frac{-36(\cos x)}{-36}$$

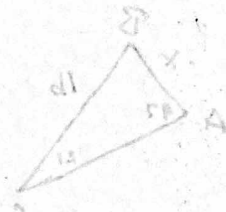
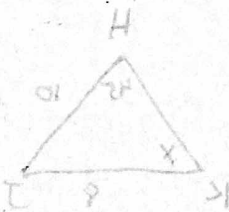
$$\cos^{-1} \frac{-19}{36} = \cos^{-1} x$$

$$\cos^{-1} \left(\frac{-19}{36} \right) = x$$

$$121.85$$

79 627

9-23 odd



$$\frac{\sin x}{10} = \frac{\sin 120^\circ}{8}$$

$$\frac{\sin x}{10} = \frac{\sin 120^\circ}{12}$$

$$\sin x = \frac{10 \sin 120^\circ}{12}$$

$$\sin x = \frac{10 \sin 120^\circ}{12}$$

