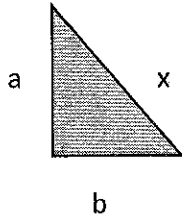


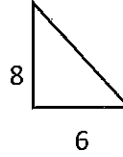
Trigonometry:

If you want a **side and have 2 sides** = use the Pythagorean Theorem

$a^2 + b^2 = c^2$ == if you have the two legs(shorter sides) and



ex.



$$8^2 + 6^2 = c^2$$

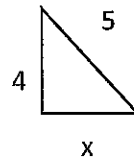
$$64 + 36 = c^2$$

$$\sqrt{100} = \sqrt{c^2}$$

$$10 = c$$

$c^2 - b^2 = a^2$ if you have the hypotenuse (c)

ex.

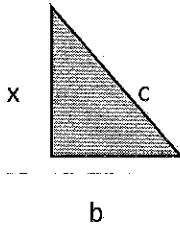


$$5^2 - 4^2 = b^2$$

$$25 - 16 = b^2$$

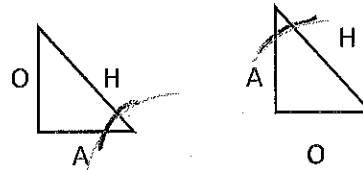
$$\sqrt{9} = \sqrt{b^2}$$

$$3 = b$$



If you have a **side and an angle** or **two sides and want an angle** you need to use SOH CAH TOA

- 1) Label the sides (H, O and A)
- 2) Circle what you have and what you want
- 3) Choose the formula from SOH CAH TOA
- 4) Write the formula
- 5) Plug in what you know
- 6) Rearrange the formula to solve using the rules below



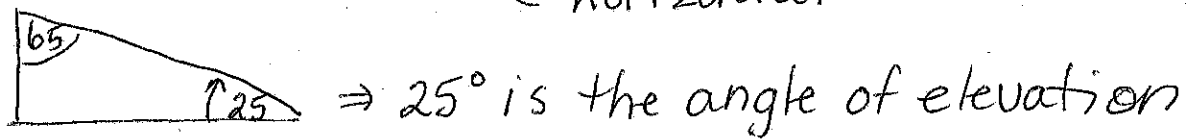
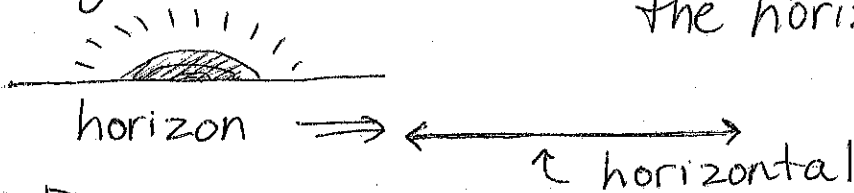
***O and A change depending on the angle used

To find the numerator (top)	To find the denominator (bottom)	To find the angle
ex. $\text{Cos } 43 = \frac{x}{7}$	ex. $\text{Tan } 30 = \frac{4}{x}$	ex. $\text{Sin } x = \frac{2}{5}$
<u>Multiply</u> both sides by the bottom	<u>Switch</u> Tan 30 and x	<u>Divide</u> 2 by 5
$7 \times \text{Cos } 43 = x$	$x = \frac{4}{\text{Tan } 30}$	Press <u>shift</u> and sin
Calculate == $7 \times \text{Cos } 43$	Calculate -- $4 \div \text{Tan } 30$	** on some calculators you need to press shift SIN(2÷5)

Math 10AW - Chapter 9 notes (see review notes of Trig cheat sheet)

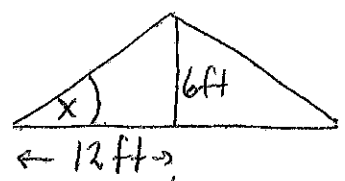
9.1 Angles of Elevation

Angle of Elevation - always up from the horizontal line

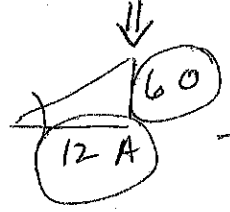


$\sin \theta = \frac{O}{H}$
 $\cos \theta = \frac{A}{H}$
 $\tan \theta = \frac{O}{A}$

ex 1



- ① label
- ② circle what you have + what you want
- ③ choose trig formula



$\tan \theta = \frac{O}{A}$
 $\tan \theta = \frac{6}{12} \Rightarrow (6 \div 12) \text{ shift Tan}$

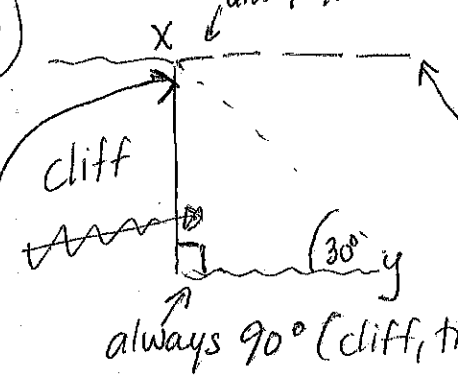
or if that doesn't work
Shift Tan (6 ÷ 12)

* remember to make sure DEG is on your screen
 ↑ use this button to change to DEG

9.2 Angles of Depression

Angle of depression - always down from the horizontal

* remember all angles in a $\Delta = 180^\circ$

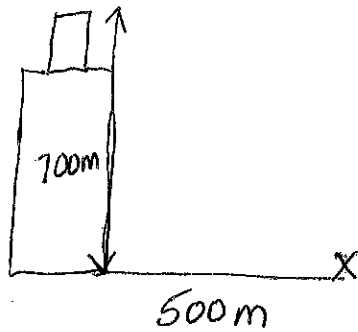


what is the angle of depression?
 * draw a horizontal line at the top.
 Bill is at y - looks up at x on the cliff - angle of elevation = 30°
 What is the angle of depression?
 Top $\theta = 60^\circ$ so angle of depression = 30°

180°
 $- 90^\circ$
 $- 30^\circ$
 60°

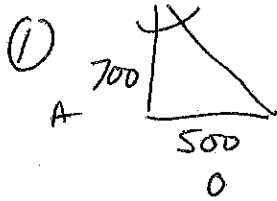
always 90° (cliff, tree, pole)

ex 2

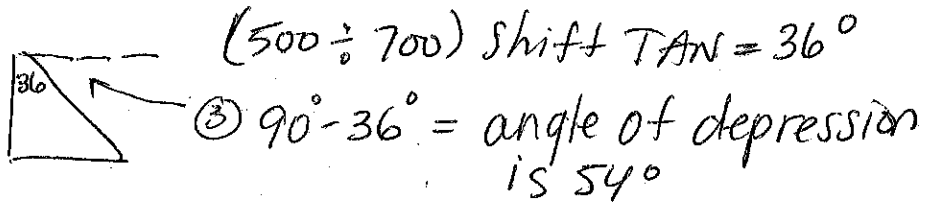


What is the angle of depression from the top of the tower?

- ① draw the Δ
- ② find top \angle
- ③ subtract from 90° to get angle of depression



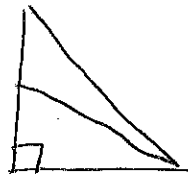
② $TAN \angle = \frac{o}{A} \Rightarrow TAN \angle = \frac{500}{700}$



(500 ÷ 700) Shift TAN = 36°

③ $90^\circ - 36^\circ =$ angle of depression is 54°

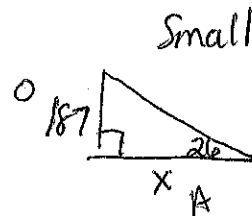
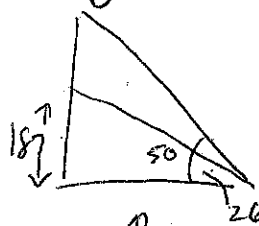
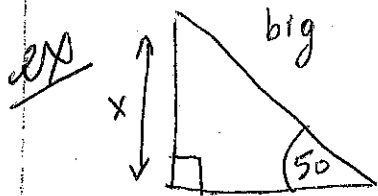
9.4 Two triangle problems



Think of a triangle like this - broken into 2 parts \Rightarrow



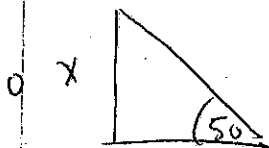
Then use information you know & subtract to find what you want.



$TAN \angle = \frac{o}{A}$
 $TAN 26 = \frac{187}{x}$

$x = \frac{187}{TAN 26}$

$x = 383.4$



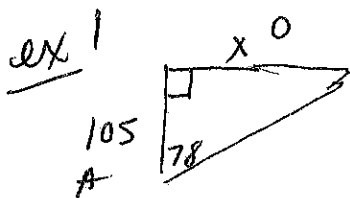
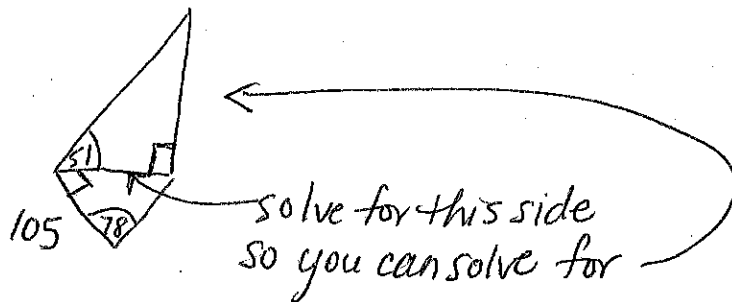
383.4
A

$TAN 50 = \frac{x}{383.4} = 457 \text{m or } 4.6 \text{m}$
 $(TAN 50) \times 383.4 =$

find shared bottom to solve big Δ

9.5 Solving 3-D Δ problems

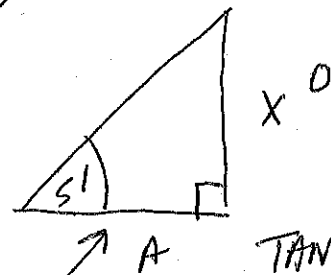
* note \rightarrow always look to see all the separate right triangles... solve for the missing side on the next Δ triangle.



$$\tan \theta = \frac{O}{A}$$

$$\tan 78 = \frac{x}{105}$$

$$105 \times \tan 78 = 493.99$$



$$\tan \theta = \frac{O}{A}$$

$$\tan 51 = \frac{x}{493.99}$$

$$493.99 \times \tan 51 = 616$$

ex 2



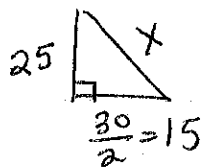
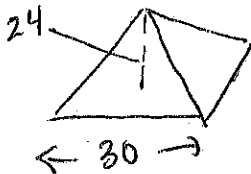
$\frac{1}{2}$ way on front side = length of Δ side length \Rightarrow

height of pyramid \Rightarrow

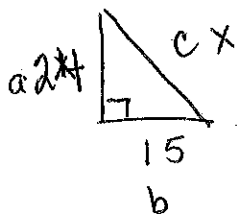
* remember Pythagorean Theorem!

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

$$c^2 - b^2 = a^2$$



\Rightarrow find slant height



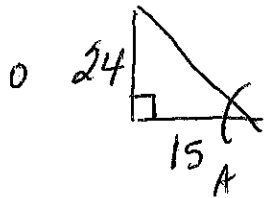
$$a^2 + b^2 = c^2$$

$$24^2 + 15^2 = c^2$$

$$576 + 225 = c^2$$

$$801 = c^2 \Rightarrow c = \sqrt{801} = 28.3$$

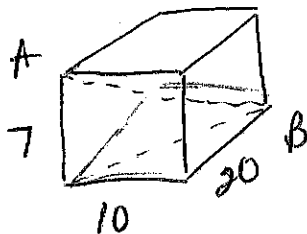
① what is the angle of elevation?



$$\tan A = \frac{O}{A}$$

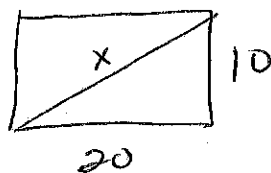
$$\tan A = \frac{24}{15} \Rightarrow (24 \div 15) \text{ shift Tan} = 58^\circ$$

ex 3



FIND length of AB

① Make a \triangle using the diagonal of the box & the height



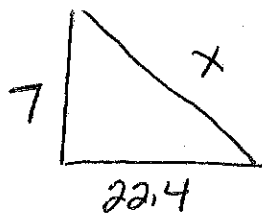
② find the length of the bottom diagonal
 $a^2 + b^2 = c^2$

$$20^2 + 10^2$$

$$400 + 100 = c^2$$

$$500 = c^2 \Rightarrow c = \sqrt{500} = 22.4$$

③ redraw bottom diagonal



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

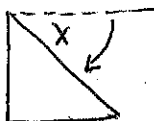
$$7^2 + 22.4^2$$

$$49 + 501.8$$

$$550.76 = c^2 \Rightarrow c = \sqrt{550.76} = 23.5$$

Review

Depression



Elevation

