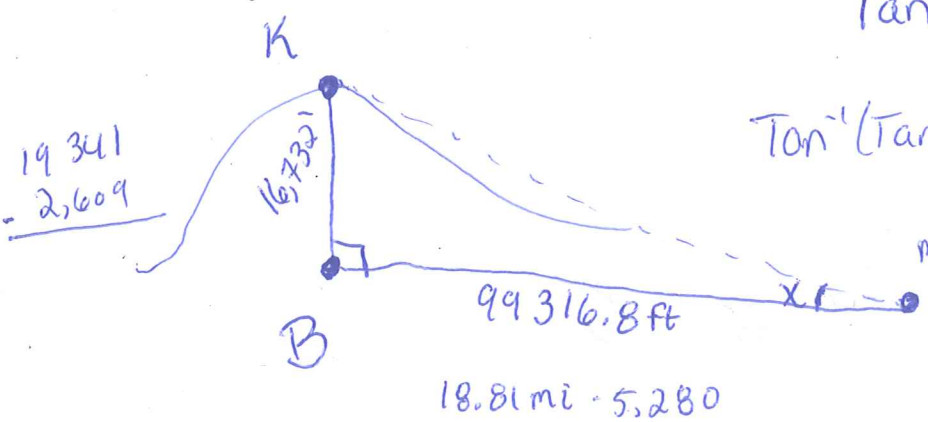
Geometry - 7.5 - Angles of Elevation and Depression

- An angle of elevation is the angle between the line of sight and the horizontal when an observer looks upward.

Ex 1 - Mount Kilamanjaro (elevation 19,341') is located in Tanzania, Africa. The elevation of its base at the town of Moshi is approximately 2,609' above sea level. If the horizontal distance from Moshi to the summit of Kilamanjaro 18.81 miles, find the angle of elevation from Moshi to Mount Kilamanjaro.



$18.81 \text{ mi} \cdot 5{,}280$

$\text{Tan}(x) = \frac{16{,}732'}{99{,}316.8'}$

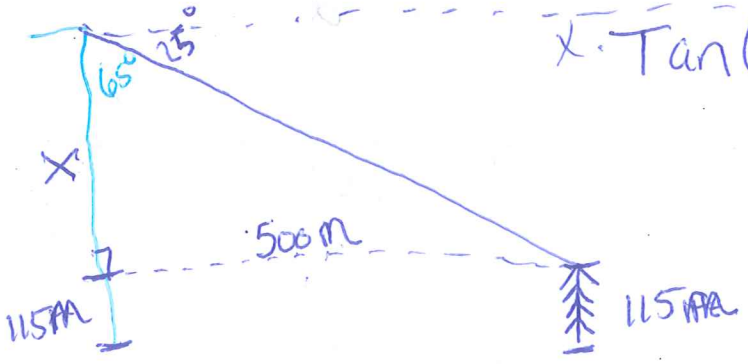
$\text{Tan}^{-1}(\text{Tan}(x)) = \text{Tan}^{-1}\left(\frac{16{,}732'}{99{,}316.8'}\right)$

$m\angle M = 9.6^\circ$

- An angle of depression is the angle between the line of sight and the horizontal when an observer looks downward.

Ex 2 - The angle of depression from the top of a cliff to the top of a tree 500 meters horizontally from the base of the cliff is 25°. If the tree is 115 meters tall and the ground is level from the base of the cliff to the tree, find the height of the cliff.

$90^\circ - 25^\circ$



$x \cdot \text{Tan}(65^\circ) = \frac{500\text{m} \cdot x}{x}$

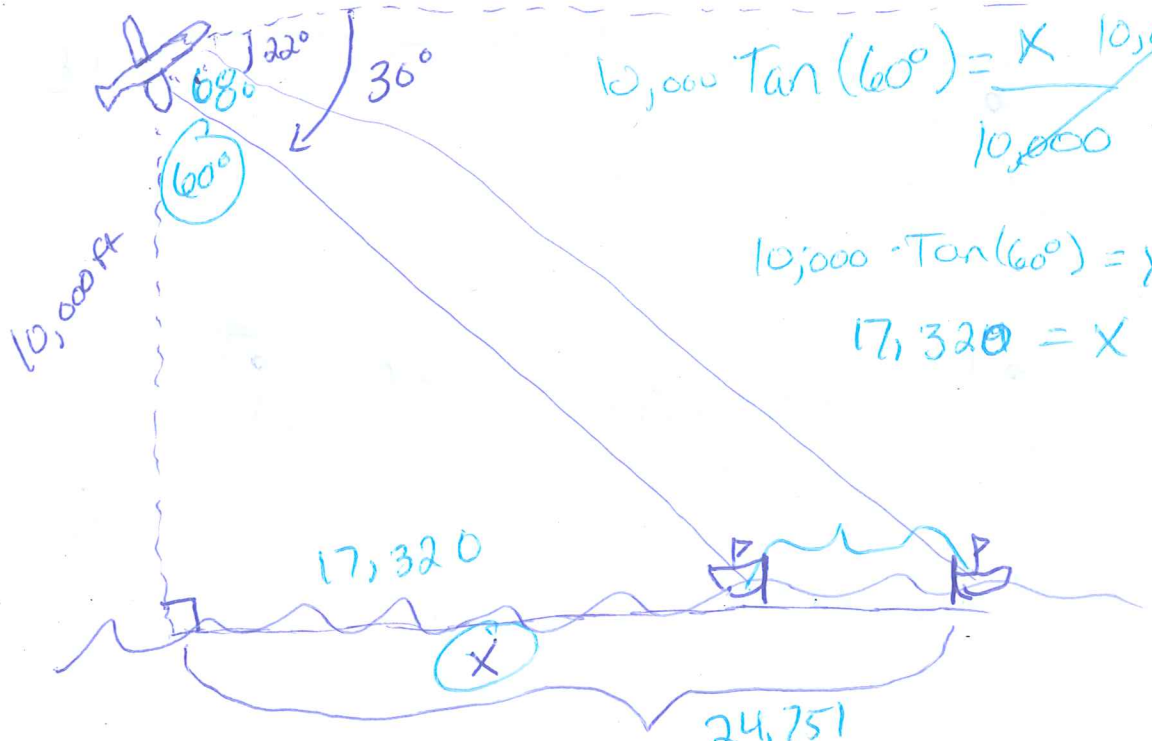
$\frac{x\,\text{Tan}(65^\circ)}{\text{Tan}(65^\circ)} = \frac{500\text{m}}{\text{Tan}(65^\circ)}$

$x = \frac{500\text{m}}{\text{Tan}(65^\circ)}$

$x \approx 233.15 + 115$

$x \approx 348.15$

Ex 3 - A pilot is flying on a straight course over the Atlantic Ocean at an elevation of 10,000'. She spots two naval vessels directly on her flight path off in the distance. If the angles of depression to the two vessels from the pilot's vantage point are 22° and 30°, find the distance between the two boats to the nearest foot.



$10{,}000 \tan(60°) = \frac{X}{10{,}000}\ 10{,}000$

$10{,}000 \cdot \tan(60°) = X$

$17{,}320 = X$

y $10{,}000 \tan(68°) = \frac{Y}{10{,}000}\ 10{,}000$

$10{,}000 \cdot \tan(68°) = y$

$24{,}751$

$24{,}751$
$-\ 17{,}320$

$7{,}431$ ft