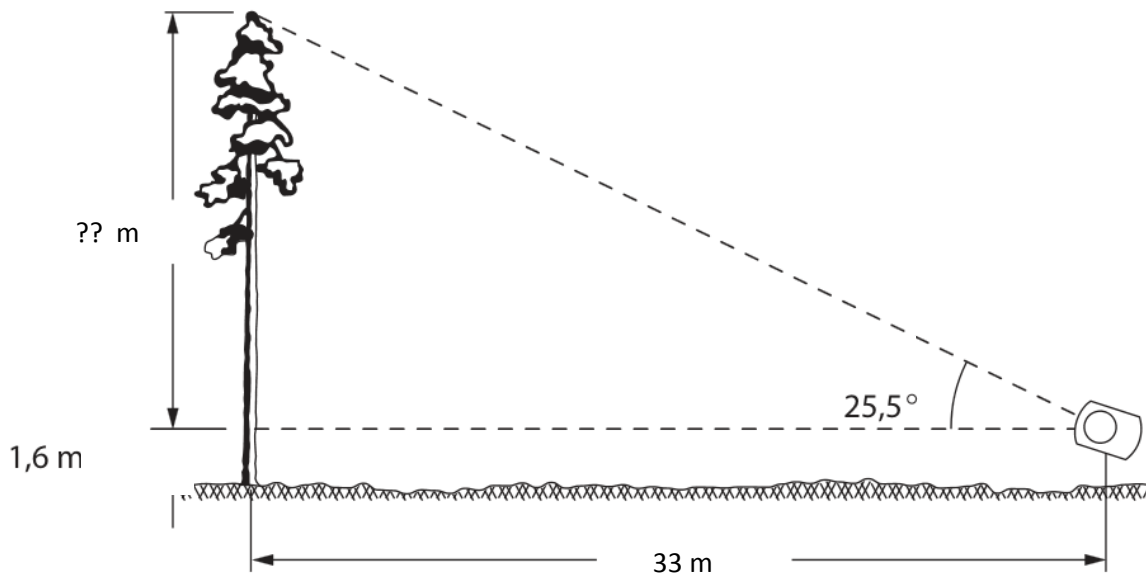
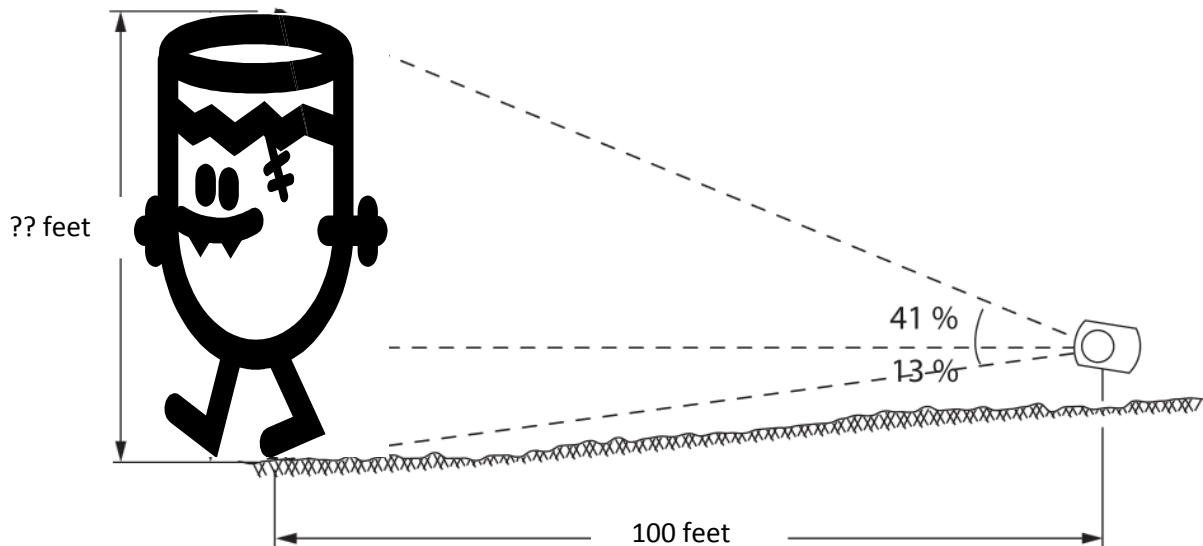


IDEAL CONDITIONS: Negligible slope difference between target and observer, i.e. only the top angle of elevation is measured.



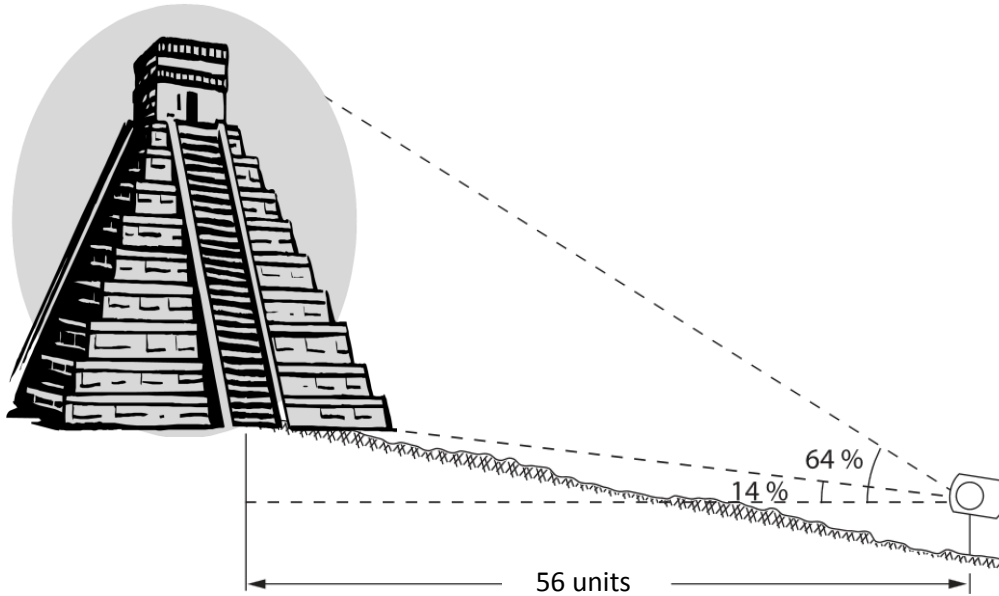
Calculate the height of the tree using the Degree method

TYPICAL CONDITIONS: Slight slope. Observer is uphill from target, i.e. base and top angles of elevation are both negative and positive.



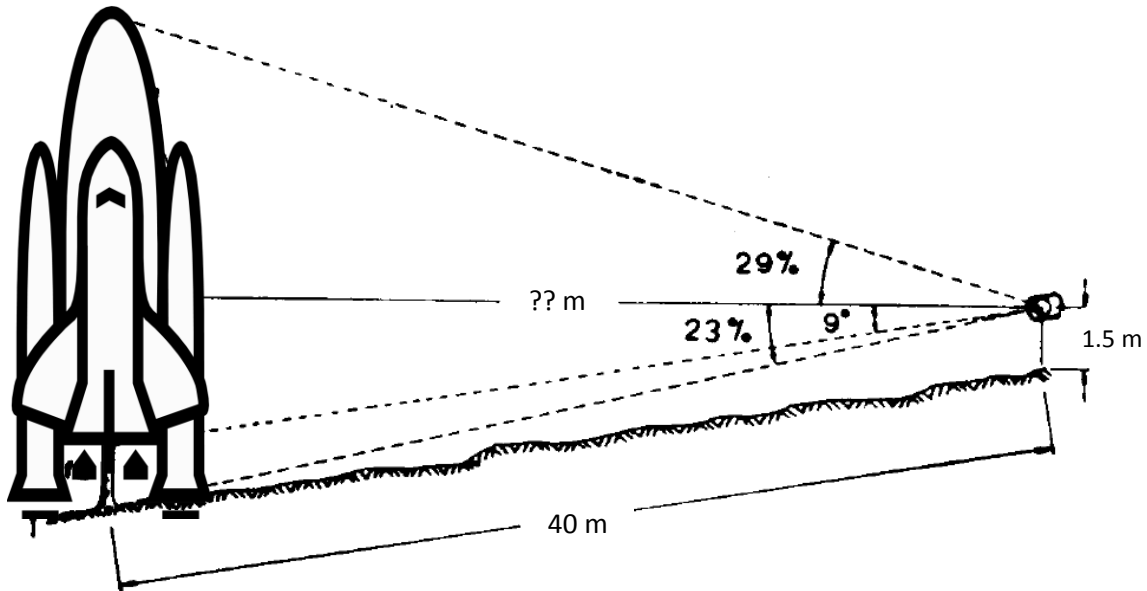
Calculate the height of the terrible monster using the percentages method.

TYPICAL CONDITIONS: Slight slope. Observer is downhill from target, i.e. base and top angles of elevation are both positive.



Calculate the height of the temple using the Percentages method

CHALLENGING CONDITIONS: Observer and target are on a slope and horizontal distance is unknown, however, slope distance is known.



Calculate the actual height and the horizontal distance to the rocket.

Height Calculations Correcting for Slope Distance: All readings of the percentage scale are based on the horizontal distance. This means that if the distance on sloping terrain is measured along the ground an error is introduced, and this must be corrected for accurate results. The error is insignificant for most purposes at small ground slope angles but increases progressively as the angle increases.

The trigonometrical correlation is $H = h \times \cos \alpha$

| 360° | | | | |
|-----------------------|---------|---------|---------|---------|
| COSINE DESIMALS | | | | |
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| COSINUSDEZIMALZAHLEN | | | | |
| 1-9998 | 10-9848 | 19-9455 | 28-8829 | 37-7986 |
| 2-9994 | 11-9816 | 20-9397 | 29-8746 | 38-7880 |
| 3-9986 | 12-9781 | 21-9336 | 30-8660 | 39-7771 |
| 4-9976 | 13-9744 | 22-9272 | 31-8572 | 40-7660 |
| 5-9962 | 14-9703 | 23-9205 | 32-8480 | 41-7547 |
| 6-9945 | 15-9659 | 24-9135 | 33-8387 | 42-7431 |
| 7-9925 | 16-9613 | 25-9063 | 34-8290 | 43-7314 |
| 8-9903 | 17-9563 | 26-8988 | 35-8192 | 44-7193 |
| 9-9877 | 18-9511 | 27-8910 | 36-8090 | 45-7071 |

Cosine Table taken directly from the back of a Suunto clinometer. Slope angles are listed first, and the 4 digit number that follows it is the decimal multiplier. The preceding decimals are omitted. For example, 10 degree slope angles would be multiplied by 0.9848

Example Calculation Correcting for Slope (use the Challenging Conditions graphic for reference: the numbers are different.)

We measure the slope distance as 100 ft, and the Top and Base percentage as 40 and 15 respectively, and the Slope percentage as 10. The apparent height of the tree = $(40 + 15) * 100 = 55$ feet. To correct for slope we look up the slope percentage and use the Cosine multiplier: $10 = 0.9848$. Multiply this to your apparent height of the object. $55 * 0.9848 = 54.16$.

We can also use this multiplier to figure out the Horizontal distance to the target. We simply multiply this by our slope distance. $100 * 0.9848 = 98.48$ feet.

Astute disciples of geometry and mathematics will note that we could simply use the corrected horizontal distance in our calculations of the height calculations. $98.48 * (.55) = 54.16$

Finally, slope corrections are really only necessary for very steep slope angles or very long slope distances. At 100 feet, the difference between horizontal distance and slope distance was only $\sim\sim 1.5\%$.

Calculations:

Height of Tree:

Height of Terrible Monster:

Height of Temple:

Height of Rocket: