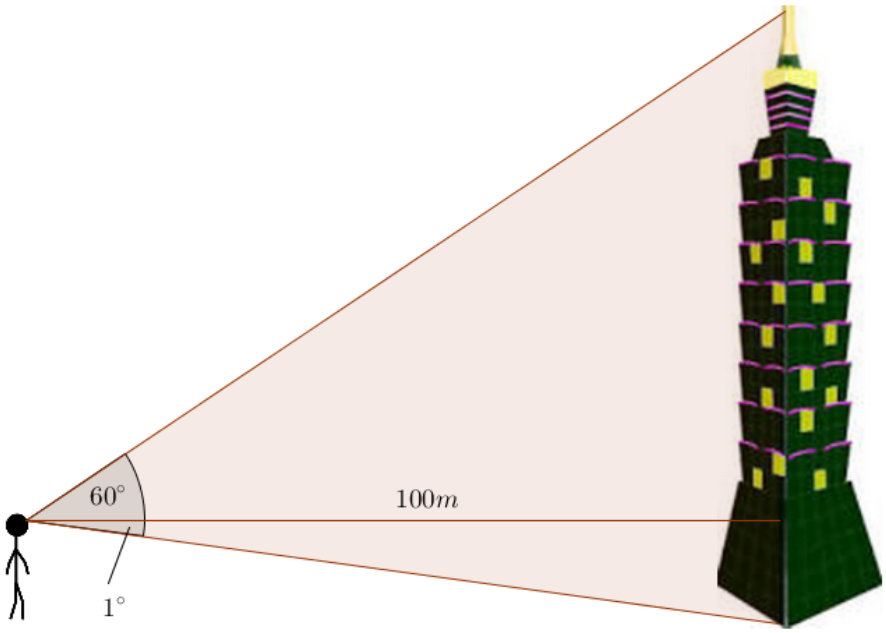
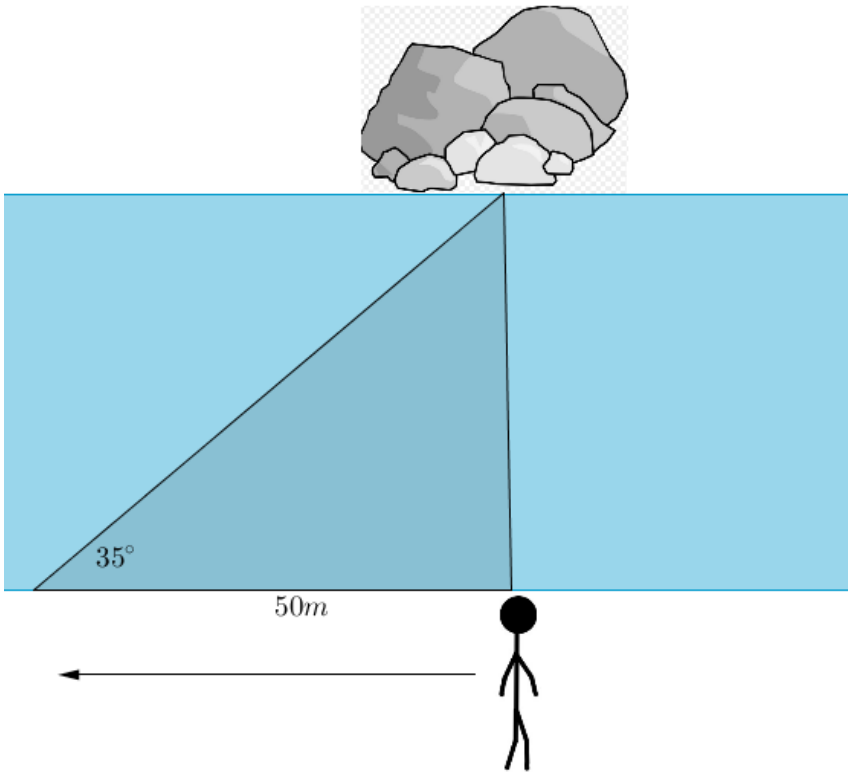
Sine, Cosine and Tangent (d)

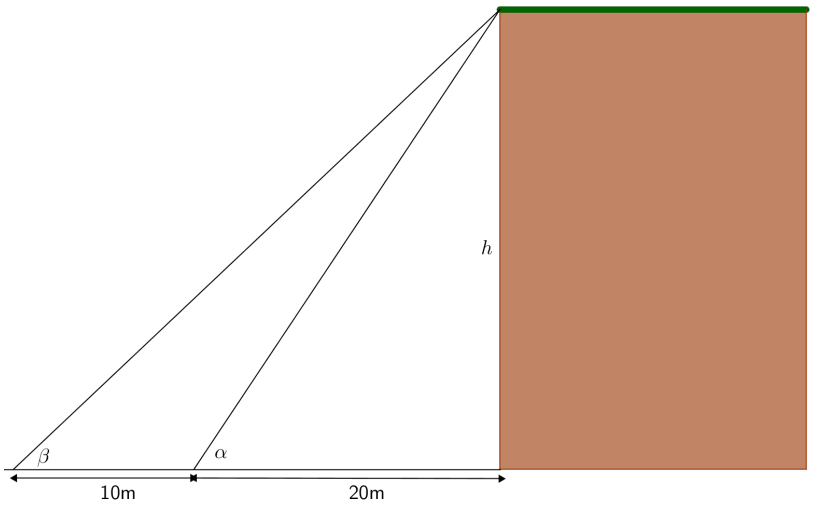
1. A stickman is standing 100m away from a skyscraper. The angle of inclination associated with the top of the building is measured to be 60° and the angle of depression with the base is 1°,
   (i) Calculate the height of the stickman.
   (ii) Calculate the height of the skyscraper.
   (iii) Using the answer from (ii), what would the angle of inclination be measured from the stickman's feet?



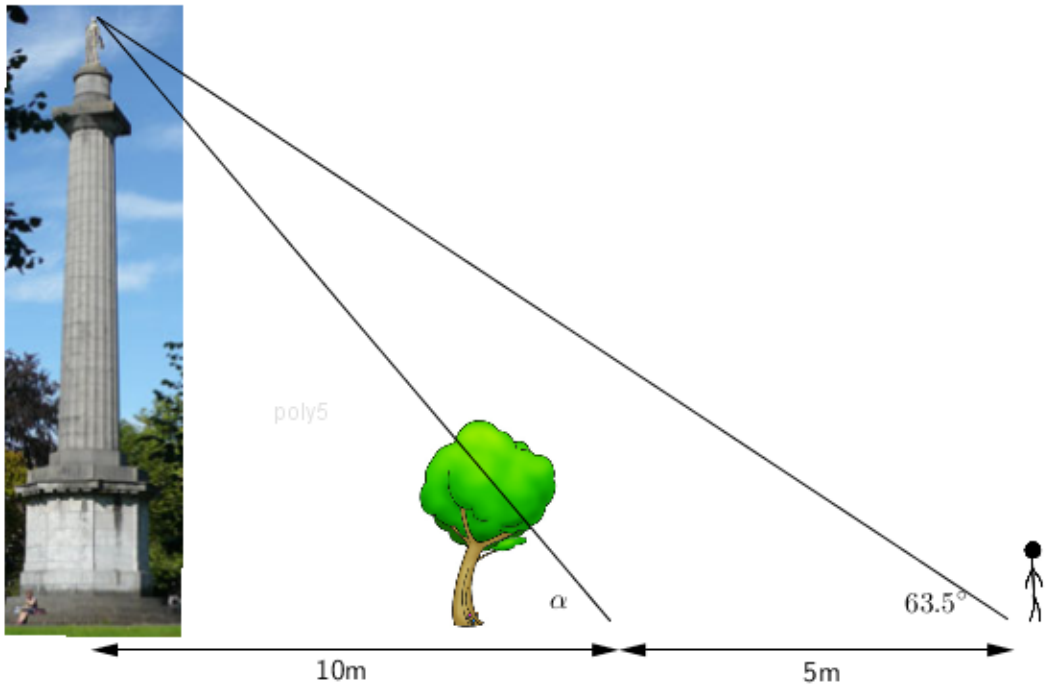
2. The stickman then comes across a river and wants to approximate its width. He begins by standing directly opposite a large group of boulders, then walks 50m downstream and using a clinometer measures the angle 35°.
   (i) What is the width of the river (to the nearest m)?
   (ii) How far is he now standing from the boulders?



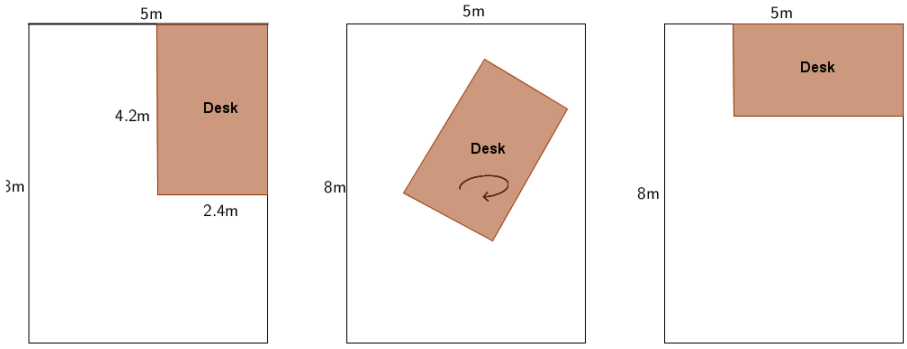
3. Calculate the angles α and β if the height of the cliff is 50m.



4. A student from Leamy Maths Community want's to approximate the height of the Rice's Memorial Column in the nearby People's Park. The student begins by standing directly under the monument, and measuring ten metres out. Unfortunately, from this position there is a tree blocking the view of the top, so the student walks another 5m and measures the angle of inclination 63.5°.
(i) How tall is the column?
(ii) If the tree was chopped down, what would the original attempted angle of inclination have measured (i.e. α).



5. Is it possible to rotate the desk in the room from the figure below? Explain your answer.



6. The stickman is now standing at the edge of a cliff, watching an airplane and boat approach. If the airplane is flying at 500m above sea level, and the cliff is 100m high, using the angles shown in the following diagram, calculate
(i) How far the boat is from the base of the cliff.
(ii) How far the airplane is from passing directly over stickman's head.
(iii) If the boat is travelling at $10km/hr$ and the airplane at $150km/hr$, by converting the speeds to m/s determine which will happen first, the boat crashes into the cliff or the airplane passes over the stickman's head.