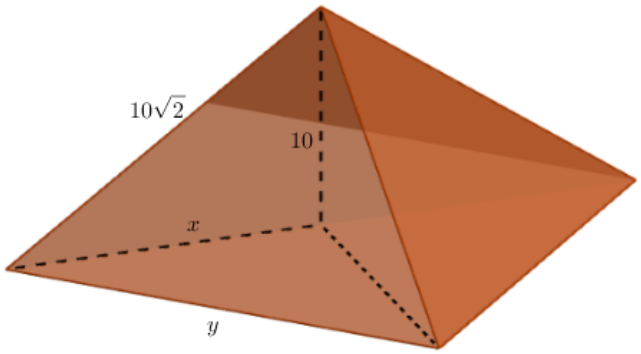
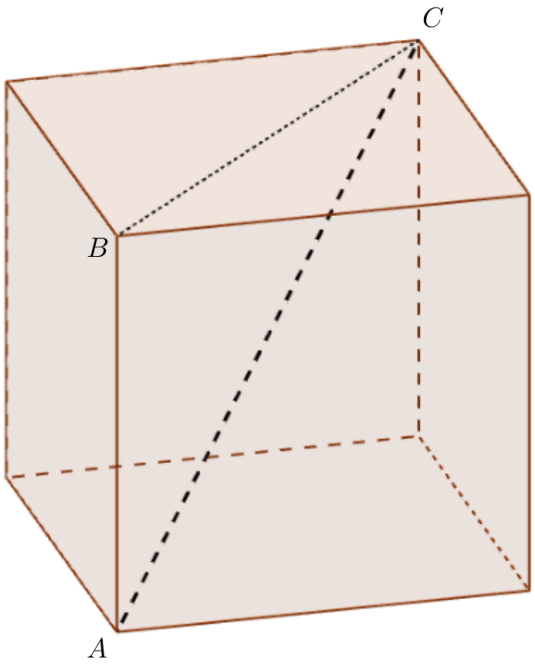
3D Trigonometry

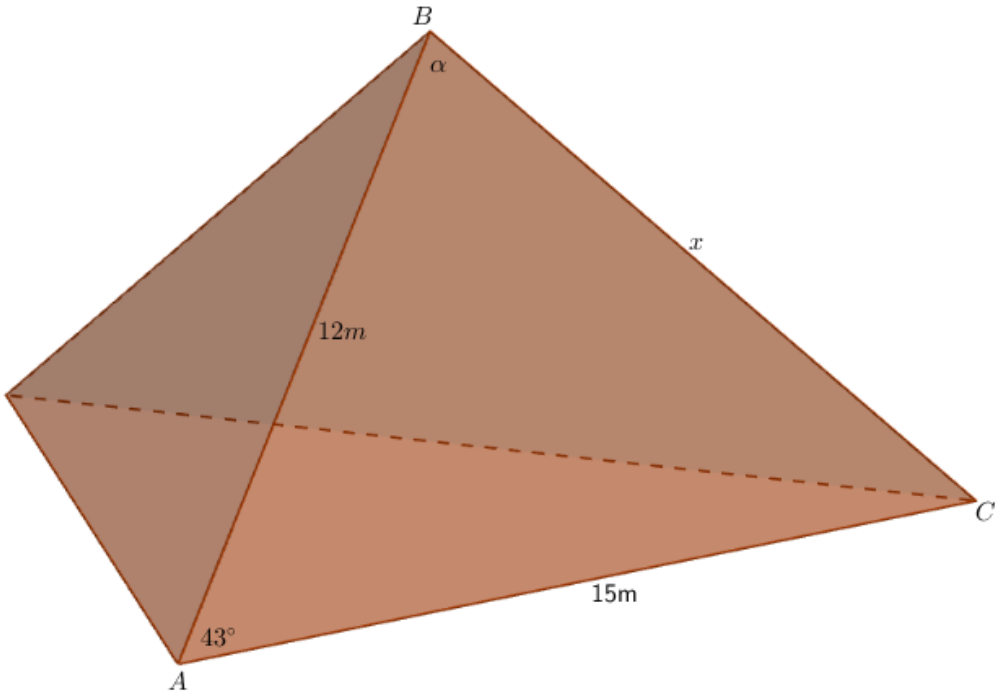
1. The following is a pyramid of vertical height 10m and slant height $10\sqrt{2}$m. Using the relevant trigonometric formulae, calculate the unknown lengths x and y. (As with all pyramids, you can assume all base widths are the same and the shape is symmetrical.)



2. The following is a cube with sides of width 1m. By first calculating the length of the diagonal on the top face of the cube, $|BC|$, calculate the length of the diagonal through the cube $|AC|$.



3. The following shape is an irregular tetrahedron. On the face $\triangle ABC$, the base length is 15m and one of the slant heights is 12m. Given the angle in between to be 43°, calculate
   (i) The length of the unknown side x.
   (ii) The angle α at the apex of the tetrahedron.



4. From two points on the ground, A and D, a bird in the sky can be seen at the point B. If the bird is flying 100m above the ground, and the angles of elevation measured are given in the diagram, calculate
   (i) The distance $|AB|$.
   (ii) The distance $|DB|$.
   (iii) The distance $|AD|$.