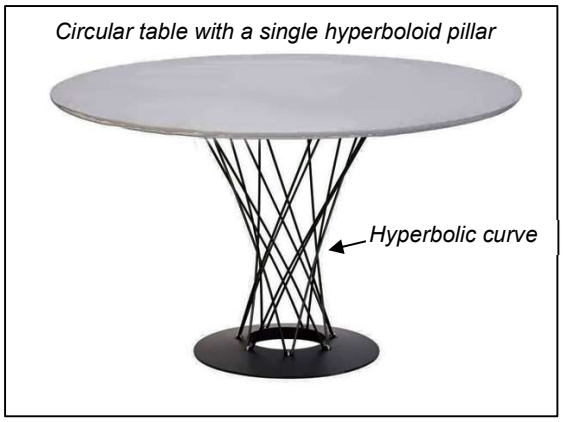
Student instructions sheet

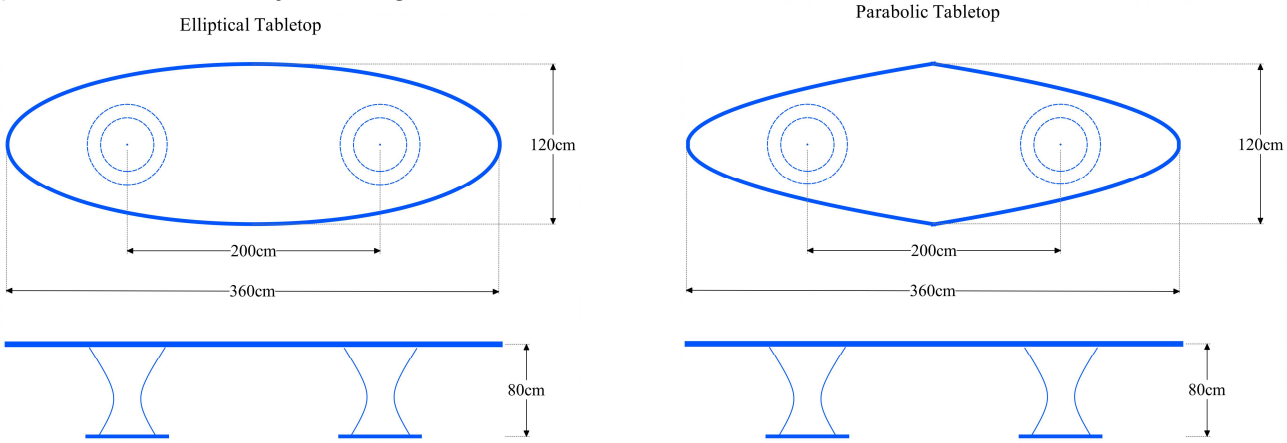
Superior Design is a furniture design company. Their latest line of tables will be constructed using a variety of conical curves. A basic circular table is shown with a hyperboloid pillar supporting the tabletop above the base. Hyperboloid structures are very strong and have a hyperbolic outline.



Superior Design is looking to construct a large dining table supported by **two** hyperboloid pillars.

Each hyperboloid pillar has a circular metal base plate, where the outer diameter of the metal base is the same as the diameter at the top of the hyperboloid pillar.

The tabletop is available in two possible designs – elliptical or parabolic (where two identical parabolic halves are joined together.



The hyperboloid pillars have a diameter of 70cm at the top and 50cm at the base.
The circular metal plate has an outer diameter of 70cm.
The tabletop is 80cm above the floor.

For aesthetic purposes the thinnest part of the hyperboloid pillar is to be 30cm above the base.

Task

- Give suitable formulae to produce the different **conic shapes** that meet the criteria for the table-top, the circular metal base plates and the structural pillars for each of the designs.
- Find the exact values for the hyperbolic equations.

Your solution of this problem should:

- show all relevant calculations
- use correct mathematical statements
- clearly communicate your strategy and method at each stage of the solution.

The quality of your discussion and reasoning and how well you link this to the context will determine the overall grade.