

Floating

Consider a piece of wood floating in the water. The stable floating orientations depend on the shape. For example, all orientations of a perfect sphere are stable, while a long, thin cylinder is not stable when vertical.

Given that hydrostatic pressure is proportional to depth and exerts a normal force on any surface, try to determine the stable orientations of various objects. For simplicity's sake, start with two-dimensional water and consider uniform-density rectangles and ellipses.

Now try varying the mass distribution and moving into three-dimensions.