Air pressure pushes down on the top of your head with a force of roughly 2000 Newtons, equal to the weight of almost 500 pounds. Why don't your legs collapse?

1) As you grow up, you slowly get accustomed to holding up this weight.
2) Air pressure doesn't cause real forces that point in any particular direction.
3) Air pressure pushes up on other parts of your body causing a net upward force that compensates for the downward force on your head.
4) The normal force of the ground on your feet balances this downward force.
5) You push upwards on the atmosphere with an equal and opposite force so the net force is zero.

Considering only your head, air pressure pushes down on the top with a force of roughly 2000 Newtons, and also pushes upward and inward with similar total forces. Why doesn't your head implode?

1) Evolution has resulted in very strong skull bones.
2) An Intelligent Designer gave us very strong skull bones.
3) The pressure inside my brain cells produces a compensating outward force.
4) Air pressure doesn't cause real forces that point in any particular direction.
5) Since the net force is close to zero, this really has no effect on my head.
6) Air leaks in through my ears so there is air pressure inside my head pushing out.
7) MIT makes my head want to explode, more than compensating for any inward pressure.

Two pieces of wood are floating in water. Both have the same mass and volume and a density equal to half that of the water. One is flat and thin (imagine a sheet of plywood) while the other is more compact (imagine a cube). The buoyancy equations say that both will be half submerged which means that the bottom of the cube is much deeper than the bottom of the thin sheet. Why?

1) The displaced water pushes with a larger force on the cube so it is held up despite its smaller area.
2) The displaced water pushes with a larger force on the sheet so it is held up even though it doesn't have the same depth.
3) The water pressure on the bottom of the sheet is larger in order to compensate for the larger force due to air pressure on the top.
4) The water pressure on the bottom of the cube is larger because the force of gravity on the cube is applied over a smaller area.
5) The cube needs to sink to a point where the water pressure is high enough to compensate for the smaller area, producing the same net upward force.

Predict what you think will happen (and why) as I rotate the blower hose so that the air flow hitting the ping-pong ball is no longer close to vertical.

1) Initially the flow from the bottom balances gravity. With angled air flow, the vertical component of its force will be smaller and will no longer balance gravity so the ball will drop out of the air stream almost right away.
2) Initially the flow from the bottom balances gravity. With angled air flow, the vertical component of its force will be smaller and will no longer balance gravity so the ball will slowly fall towards the air outlet and eventually drop out of the air stream when the angle gets big enough.
3) The stability of the ping-pong ball depends on symmetry. Tilting the air flow will break the symmetry and the ball will fall out immediately.
4) Initially, the ball is held up by air flow from the bottom and held in by pressure differences. As the hose is tilted, the ball will move towards the air outlet to get bigger lifting force but won't fall out.
5) The ball is held up and held in the stream by pressure differences so it will stay about the same distance from the outlet and not fall out.