Weight vs. Weightlessness

The concepts of *weight* and *weightlessness* are concepts that are often misunderstood.

Weight is the force due to gravity gravity that pulls a person down towards the center of the earth. When you stand on a scale, the weight it reads is the force the scale pushes back on you to hold you up.

Therefore, when you stand still on any surface there are at least two forces. (1) The force you push down on the surface which we call **weight** or **gravitational force** – which we calculate by multiplying mass by gravity (mg). (2) The force the surface pushes back on you which we call the _____ force. If you are not sinking through the surface then this is equal and opposite to the force of gravity.

If you jump upwards when you are on an analog scale the reading on the scale will decrease. This is because of changes in _____ force. However, _____ force remains constant. This tells us that when weighing ourselves the scale reflects the value of the _____ force (the support force).

Suppose the floor beneath the scale falls through while you are standing on top of the scale. You would no longer press against the scale. Likewise there would be no support force and the normal force would be _____. The scale would read _____. The force of gravity, however, would still act on you as you fall through the floor.

If no support force acts on you then you have no weight – you are _____.