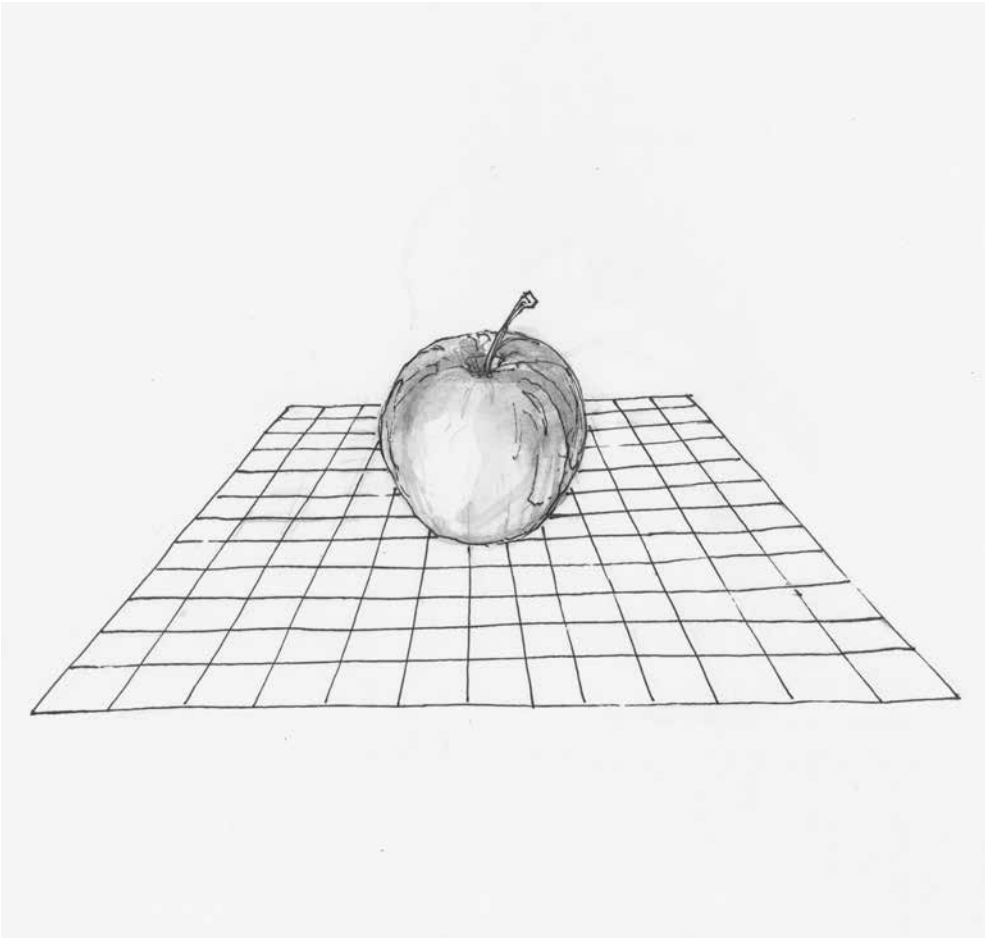
Gravity

Our Universe is governed by forces
carried through particles.
One force is gravity.
Every particle of the Universe, including
the composite of particulate matter that our body is,
feels the force of gravity.

Two scientists who have contributed to our understanding of gravity are Isaac Newton and Albert Einstein.

Gravity, as understood by Newton, is a force between two objects, the larger of the two exerting an attractive force, pulling the smaller object towards itself. For example, when an apple falls off a tree, Earth, the largest of many objects around the apple, exerts the strongest force on it. This force of Earth pulls the apple towards its surface – the ground. The space through which the apple has fallen, according to Newton, is a passive unchanging fabric. Any phenomenon, such as the apple being pulled by the Earth, would have no impact on the fabric. At the same time, the fabric would have no impact on the interaction between the Earth and the apple.

Roughly two and a half centuries later, Einstein, using his ground-breaking theory of relativity, evolved Newton's concept of space. He said space was not passive, but dynamic. In Einstein's theory of relativity, the three dimensions of space were combined with the one dimension of time to form four-dimensional space-time.



The four dimensions of space-time may seem bizarre at first. This is partly due to the fact that through our application of classical mechanics, we have been conditioned to treat time separately from space. However, if we ponder a little with regard to our everyday encounters, it starts to make a bit of sense. For example, when we make plans to meet someone, we define the place (space) and the time of the upcoming meeting. If either of the two is not defined, the meeting cannot happen. In appreciating this, we start to warm up to Einstein's four-dimensional space-time.

Space-time, like Newton's space, is a fabric. However, unlike Newton's space, space-time becomes distorted in the presence of matter. Matter grips the fabric, warping and stretching it. Concurrently, the fabric grips matter, telling it how to move. Thus, in overlaying Einstein's work on relativity onto Newton's understanding of gravity, the apple does not fall to the ground because the Earth exerts a mysterious force on the apple. It falls to the ground because it follows curves and grooves that have been carved into the fabric of space-time by innumerable masses of matter. It is these curves and grooves that we feel as gravity.