202: Principles of electrical science  
**Handout 14: Basic mechanics – mass and weight**

**Learning outcome**

The learner will:

1. Understand basic mechanics and the relationship between force, work, energy and power.

**Assessment criteria**

The learner can:

3.1 specify what is meant by mass and weight

**Basic mechanics – mass and weight**

Some may think incorrectly that when we talk about ‘*mechanics*’ we are talking about working on cars and lorries. Traditionally, and for the benefit of this lesson, mechanics is an area of science concerned with the behaviour of physical bodies when subjected to forces or displacements, and the subsequent effects of the bodies on their environment. It can be defined as a branch of science which deals with the motion of and forces on objects.

In electrical installation, we install equipment that moves other items by imparting a force on them, for example, an electric motor powering a machine. When selecting an electric motor, we need to select the correct size, that is, power rating. Too powerful and its wasteful, not enough power then the equipment driven may not work as expected.

We need to understand how to calculate these forces and how they relate to the selection of the most appropriate pieces of equipment.

**Mass versus weight**

Many people confuse mass with weight and frequently interchange each term but they are two distinct and different entities and we must be able to differentiate between them.

**What is mass?**

This is a measure of how much matter is in an object. This doesn’t change regardless of where the object is – on Earth, the Moon, Jupiter or floating around in space, the object’s mass will always be the same.

Points to not about mass:

* Mass is indestructible. Wherever you are the mass will never change
* Mass can never be zero otherwise it would not exist.
* Mass is not related to gravity, centrifugal force, etc and these forces have no effect whatsoever on mass
* The SI unit of mass is the kilogram (kg).

**What is weight?**

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| Unfortunately, the mass of an object is often referred to as its weight, though these are in fact different concepts and quantities. In scientific contexts, mass refers to the amount of ‘matter’ in an object, whereas weight refers to the force exerted on an object by gravity. In other words, an object with a mass of 1.0 kilogram will weigh approximately 9.81 newtons on the surface of the Earth (its mass multiplied by the gravitational field strength), since the newton is a unit of force, while the kilogram is a unit of mass. |  |