**Kilograms, kilogram mass, slugs, and pounds**

Students who learn physics using the SI system are often confused when they encounter kilograms as weight or what the Marks Standard Handbook for Mechanical Engineers calls **kilogram force**. This term comes as a surprise to students who have been taught that mass in the metric system was kilograms and force was **newtons**. They are further bewildered when presented with a spring scale calibrated in kilograms (a force/weight), use a Rockwell hardness tester with loads(force/weight) measured in kilograms or find the term kilogram force in a bearing catalog. They are then more totally confused when they take a dynamics course and they are told to divide the weight of an object in pounds by g=32 ft/sec2 to obtain its mass in **slugs** but that the weight in kilograms is not divided by the metric g=9.8 m/sec2 to get kilogram mass.

The Kilogram is the base unit of mass in the SI and MKS versions of the metric system. The kilogram is defined as the mass of the standard kilogram, a platinum-iridium bar in the custody of the International Bureau of Weights and Measures (BIPM) near Paris, France. Copies of this bar are kept by the standards agencies of all the major industrial nations, including the U.S. National Institute of Standards and Technology (NIST). It is unique because it is the only physical object used to define an international standard.

The weight of one kilogram of mass near the surface of the earth is called a Kilogram Force, and is about 2.204,622 pounds. This is NOT the same as a Newton, in fact it is about 9.8 Newtons. A **Newton** is the amount of force(weight) created by a mass of 1 Kg under an acceleration of 1 meter/sec2. A Kgf (kilogram force) is the force/weight created by a mass of 1 Kg under the acceleration of gravity on the earth, about 9.8 meters/sec2.

So what the heck is a slug? Well in the British and US system of weights in which a **pound** is the unit of weight/force under the acceleration of gravity, which in English Units is 32 feet/sec2, the unit of mass is the **slug**. The word slug seems to have been created around the beginning of the 20th century by A. M. Worthington [from the OED]"1902, A. M. WORTHINGTON Dynamics of Rotation (ed.4) p. viii, I have ventured to give the name of a ‘slug’ to the British Engineer's Unit of Mass, i.e., to the mass in which an acceleration of one foot-per-sec.-per-sec. is produced by a force of one pound." The OED also gives clues to why the term is so little known to students; "1936, F. W. LANCHESTER Theory of Dimensions & its Application for Engineers v. 37 Even amongst the advocates of Perry's system.., the slug has never taken shape except on paper; it has, and has had no real material existence." And if it ever did live, it may have been short lived, [OED]"1973, Nature 20 July 184/3 The statement that the unit of mass in the British system is the slug is several years out of date."

The [origin of the word pound](http://www.pballew.net/arithme4.html#pound) is explained on its own page. The word Kilogram combines the Latin kilo, for one thousand, and *gramme* from the earlier Greek term *gramma* which meant a small weight.

**Pound** The unit of weight now common in the US came from a long string of language ideas that at first seem poorly related. The original Indo-European *spen* related to spinning or twisting, and gives us our current word for spin. Hanging things sometimes spin, and so the Romans attached the word to things that were hung up and begat modern words like pendant, penthouse, and suspend. The act of hanging things on a balance rod to measure weights led to the use as an object of weight, and gave us peso, pound, and pendulum. The Romans first used divisions of twelve ounces in their weight system and had a large unit called the As. Eventually the As became a coin and the word for the unit of weight became the *Libre*. This is the origin of the **LB** abbreviation for pounds.