Answer on Question #42263, Physics, Mechanics | Kinematics | Dynamics

A pupil hangs a load of 45N from a length of copper wire. The wire extends by 2.5 mm and does not exceed the limit of proportionality. The gravitational field strength is 10 N/kg. Calculate the mass of the 45N load.

Solution:

$P = 45$ N,

$g = 10$ N/kg,

$m =$?

The gravitational field strength at a point in a gravitational field is the force acting on a 1kg mass placed at that point. From Newton's second law of motion we can regard "force per unit mass" as being equivalent to acceleration.

Therefore, gravitational field strength is another name for acceleration due to gravity.

$$g = \frac{P}{m}$$

Thus,

$$m = \frac{P}{g} = \frac{45 \text{ N}}{10 \text{ N/kg}} = 4.5 \text{ kg}$$

Answer. $m = 4.5$ kg.