

Mass

- Amount of "stuff" (matter) in an object
- A measure of INERTIA (resistance to accelerate) an object has

World

U.S.A., Myanmar, Liberia

Units

Kg

slug

$$1 \text{ kg} = 0.06852 \text{ slugs}$$

Weight

- The force with which the Earth^{*} pulls on a mass near its surface

World

U.S.A., Myanmar, Liberia

Units

N

lb (pound)

$$1 \text{ N} = 0.2248 \text{ lb}$$

Relationship $F_g = m a_g$ or $\boxed{F_g = m g}$

* No vector hats means we only care about "magnitude" of force (use \oplus numbers)

~~U.S.A., Myanmar, Liberia~~
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Practice How much does Ms. Chin weigh in Newtons?

$$130 \text{ lbs} \times \frac{1 \text{ N}}{0.2248 \text{ lb}} = 578.3 \text{ N}$$

How much mass does Ms. Chin have?
in Kg:

$$F_g = mg$$

$$\frac{578.3 \text{ N}}{9.8 \frac{\text{m}}{\text{s}^2}} = m \left(\frac{9.8 \frac{\text{m}}{\text{s}^2}}{9.8 \frac{\text{m}}{\text{s}^2}} \right)$$

$$\frac{578.3 \text{ kg} \cdot \frac{\text{m}}{\text{s}^2}}{9.8 \frac{\text{m}}{\text{s}^2}} = m$$

$$m = 59 \text{ kg}$$

in slugs:

$$m = 59 \text{ kg} \cdot \frac{0.06852 \text{ slugs}}{\text{kg}} = 4.04 \text{ slugs}$$

* Would you lose weight if you went to the moon? would you lose mass?

Newton: Objects maintain their state of motion* (constant velocity, straight line) or their state of rest unless acted on by unbalanced forces

↖ Newton's 1st law / law of Inertia

Inertia: an object's resistance to acceleration (massive objects resist more / have more inertia)