

## Quiz Study Problems

$$F = ma$$

$$a = \frac{F}{m}$$

$$F_{\text{gravity}} = mg$$

$$g \approx 10 \text{ m/s}^2$$

$$F_{\text{net}} = \sum \text{Forces} = F_1 + F_2 + F_3 + \dots \text{etc}$$

When  $F_{\text{net}} = 0$ , then  $\sum \text{Forces} = 0$ .

$$1 \text{ N} = 1 \text{ kg} \cdot 1 \frac{\text{m}}{\text{s}^2}$$

$$\frac{1 \text{ N}}{1 \text{ kg}} \Rightarrow \frac{1 \text{ kg} \cdot \text{m/s}^2}{1 \text{ kg}} \Rightarrow 1 \text{ m/s}^2$$

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1. A particular *force* acts on a  $2 \text{ kg}$  mass and gives it an acceleration of  $3 \text{ m/s}^2$ . What **acceleration** is produced by the same force when acting on a mass of **(a)**  $6 \text{ m/s}^2$  and **(b)**  $1.5 \text{ m/s}^2$ ?
2. A particular *mass* acquires an acceleration of  $3 \text{ m/s}^2$  when acted upon by a force of  $9 \text{ N}$  ( $9 \text{ kg} \cdot \frac{\text{m}}{\text{s}^2}$ ). What **force** will give the same mass an acceleration of **(a)**  $1 \text{ m/s}^2$  and **(b)**  $15 \text{ m/s}^2$ ?
3. Acceleration due to gravity is about  $10 \text{ m/s}^2$ . What is the **gravitational weight** (force due to gravity) of an object whose mass is **(a)**  $2 \text{ kg}$  and **(b)**  $25 \text{ g}$ ?  
Reminder,  $1 \text{ kg} = 1000 \text{ g}$  and the standard unit for a force is  $\text{N}$  (Newton) where  $1 \text{ N} = 1 \text{ kg} \cdot \text{m/s}^2$ . Make sure mass is in kilograms before solving for force, or else you will have to report the answer in a unit other than newtons (which is fine, as long as it is correct).
4. A block hangs at rest from a cord. Find the **mass** of the block if the tension in the cord is  $5 \text{ N}$ . Gravitational acceleration is  $10 \text{ m/s}^2$ .
5. Taking the force of gravity into account, what **upward force** must be exerted on a  $2 \text{ kg}$  mass to cause it to rise with an acceleration of  $1.6 \text{ m/s}^2$ ?