

## **Newton's Third Law of Motion**

**Class Notes 2**

**Homework 3**

## **Newton's Second Law of Motion:**

Net force is the sum of all the forces acting on the object.

Net Force = mass x acceleration

$$\mathbf{F_{net} = m \times a}$$

**Equilibrium :  $a = 0 \text{ m/s}^2$  , then  $F_{net} = 0 \text{ N}$**

**Equilibrium: No change in speed or direction =  $a = 0 \text{ m/s}^2$**

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If  $F_{net} = 0 \text{ N}$ , then  $a = 0 \text{ m/s}^2$

**Acceleration is when there is a change in speed or direction.**

a) The skier is floating motionless in the water. Is there an equilibrium?

Is there a change of speed or direction? No

**Equilibrium: No change in speed or direction =  $a = 0 \text{ m/s}^2$**

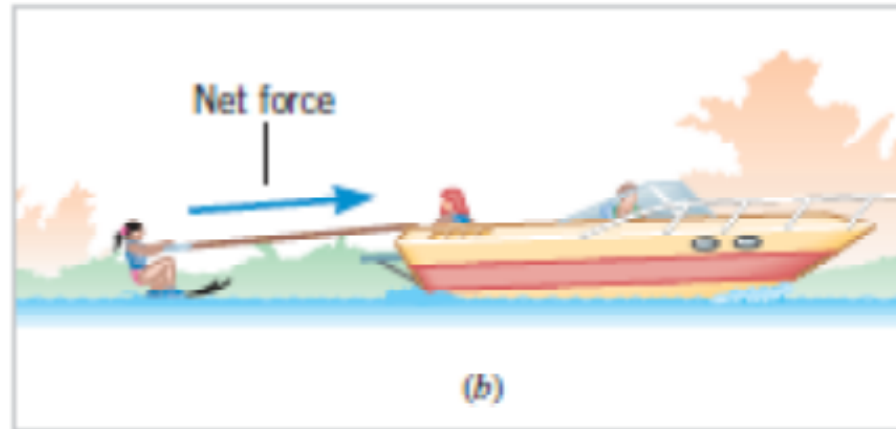


Net Force =  $m \times a = m \times 0 = 0 \text{ N}$  ; Equilibrium

b) The skier is being pulled out of the water and up onto the skis.

Is there a change in speed or direction? Yes

There is an acceleration. No equilibrium. Net force  $\neq 0$  N

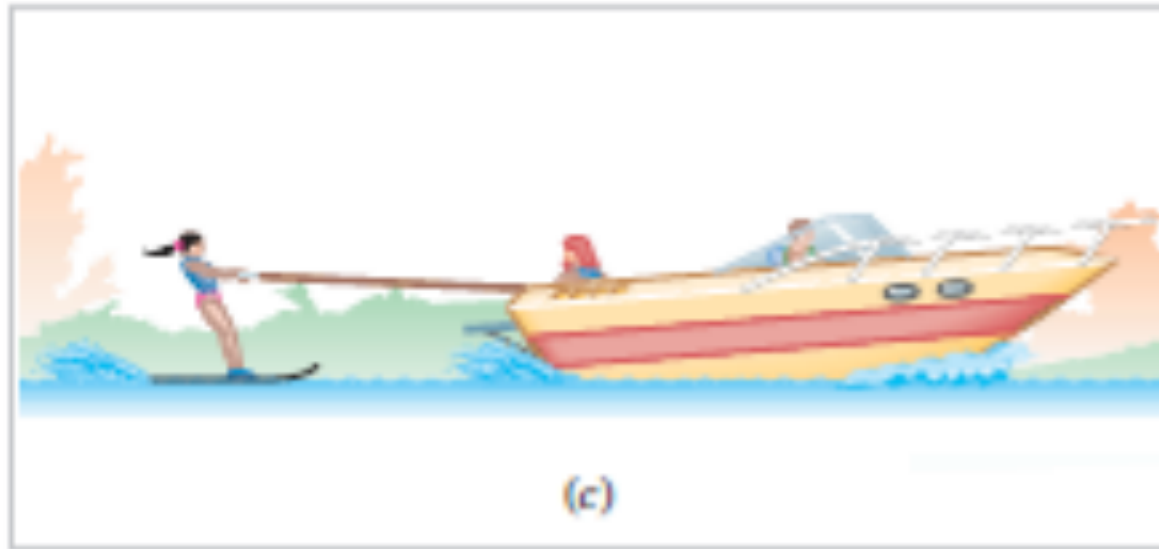


$$\text{Net force} = m \times a \neq 0 \text{ N.}$$

There is an acceleration and net force, so, there is no Equilibrium.

3) The skier is moving at a constant speed along a straight line.

Is there a change of speed or direction? No



**Equilibrium: No change in speed or direction =  $a = 0 \text{ m/s}^2$**

$$\text{Net force} = m \times a = m \times 0 = 0 \text{ N.}$$

There is no acceleration and net force, so, there is an Equilibrium.

d) The skier has let go the tow rope and is slowing down.

Is there a change of speed or direction? Yes, There is an acceleration.



Net force =  $m \times a \neq 0 \text{ N}$ .

There is an acceleration and net force, so, there is no Equilibrium.