

# 3/5/12 NEWTON'S 2ND LAW

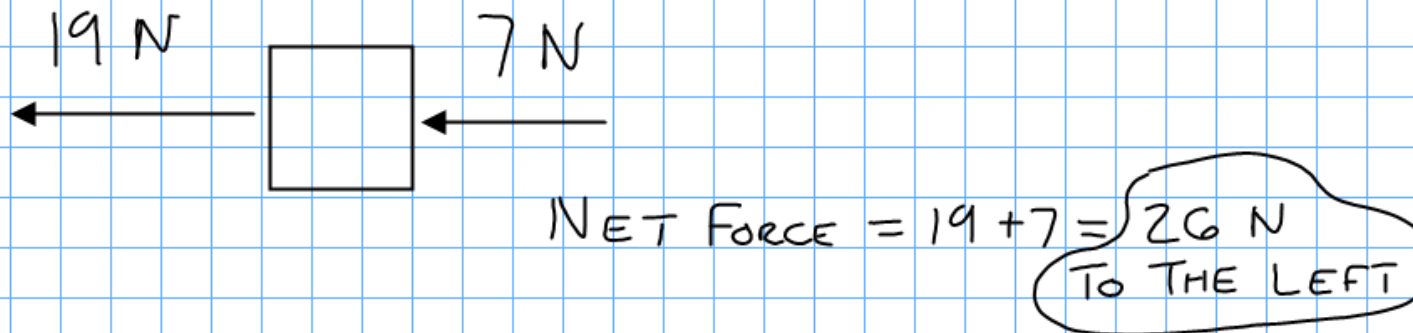
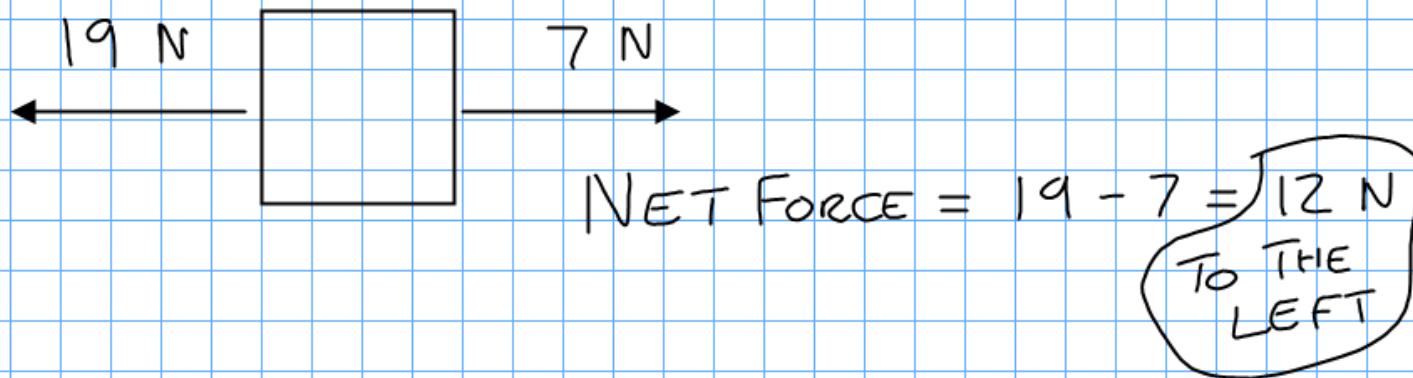
WHAT HAPPENS WHEN FORCES ACTING ON AN OBJECT ARE BALANCED?

- THE MOTION OF THE OBJECT WON'T CHANGE
  - NO VELOCITY
  - CONSTANT VELOCITY

WHAT HAPPENS WHEN THE FORCES ARE UNBALANCED?

- THE MOTION CHANGES
  - SPEEDING UP
  - SLOWING DOWN
  - CHANGING DIRECTION

UNBALANCED FORCE IS SOMETIMES  
CALLED NET FORCE



# NEWTON'S 2ND LAW

NET FORCE = MASS x ACCELERATION

$$F_{\text{NET}} = m \times a$$

$F_{\text{NET}}$   $\rightarrow$  NEWTONS (N) (lb)

$m$   $\rightarrow$  KILOGRAMS (kg) (SLUGS)

$a$   $\rightarrow$   $\text{m/s}^2$

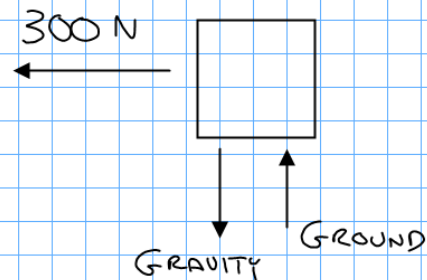
## TO SOLVE 2ND LAW PROBLEMS:

1. DRAW A FREE BODY DIAGRAM

2. USE THE 5 STEPS &  $F_{\text{NET}} = m \times a$

## EXAMPLE:

A 272 kg CAR IS BEING PUSHED BY A GORILLA & A MOUSE. THE NET FORCE BEING APPLIED ON THE CAR IS 300 N IN THE DIRECTION THE MOUSE IS PUSHING. WHAT ACCELERATION DOES THE CAR EXPERIENCE?



(1a)  $F_{\text{NET}} = 300 \text{ N}$   
 $m = 272 \text{ kg}$   
 (1b)  $a = ?$

(2)  $F_{\text{NET}} = m \times a$

(3)  $300 = 272 \times a$

(4)  $\frac{300}{272} = \frac{272}{272} \times a$

$1.103 = (1) \times a$

$1.103 = a$

$= 1.103 \text{ m/s}^2 \text{ TO THE LEFT}$

(5)  $F_{\text{NET}} = m \times a$

$F_{\text{NET}} = 272 \times 1.103$

$F_{\text{NET}} = 300.016 \text{ N}$  ✓