

NEWTON'S 3RD LAW

RECALL THESE 2 QUESTIONS :

1) IS THERE AN UNBALANCED FORCE ON THE OBJECT ?

YES : THE MOTION WILL CHANGE

NO : THE MOTION WILL NOT CHANGE

2) IS THE MOTION OF THE OBJECT CHANGING?

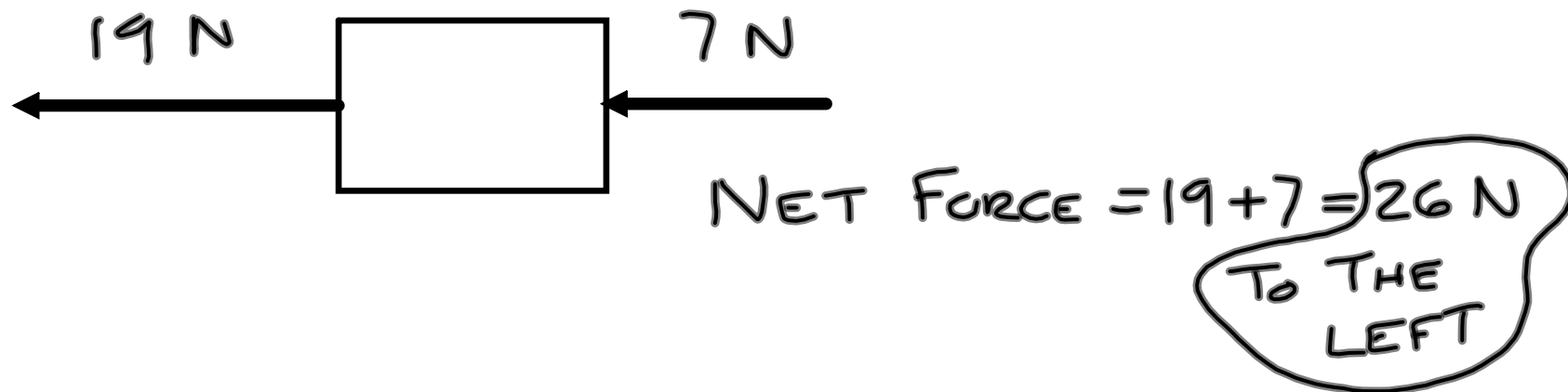
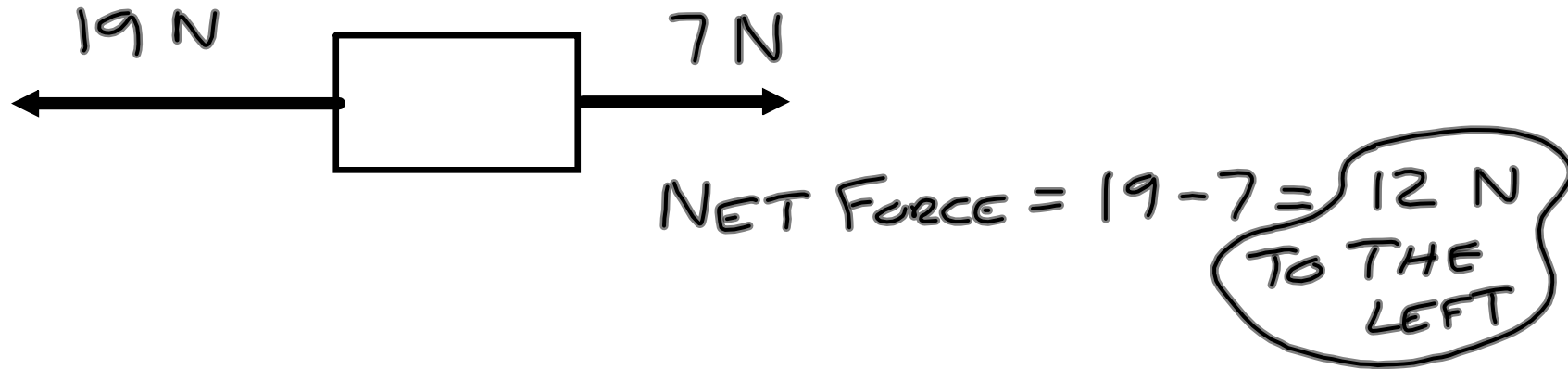
YES : THERE IS AN UNBALANCED FORCE.

NO : FORCES ARE BALANCED.

WHAT IS CHANGING MOTION?

- SPEEDING UP
 - SLOWING DOWN
 - CHANGING DIRECTION
- } ACCELERATION

UNBALANCED FORCE IS SOMETIMES
CALLED NET FORCE.



NEWTON'S 2ND LAW

NET FORCE = MASS \times ACCELERATION

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

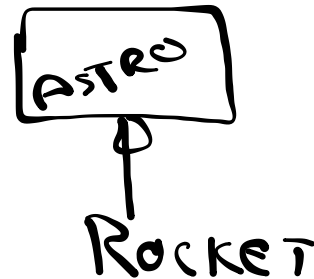
F_{NET} \rightarrow NEWTONS (N)

m \rightarrow KILOGRAMS (kg)

a \rightarrow METERS/SEC/SEC m/s^2

TO SOLVE 2ND LAW PROBLEMS:

1) DRAW A FREE BODY DIAGRAM.



2) USE THE 5 STEPS † $F_{\text{NET}} = ma$

EXAMPLE: A 272 kg car is being pushed by a gorilla and a mouse. The net force applied to the car is 300 N in the direction the mouse is pushing. What is the acceleration of the car?



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

(1b) $a = ?$

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

(3) $300 = 272 \times a$

(4) $\frac{300}{272} = \frac{\cancel{272}^1}{\cancel{272}} \times a$

$1.102941 = a$

$1.10 \frac{\text{m}}{\text{s}^2} = a$

IN DIRECTION
OF MOUSE

(5) $F_{\text{NET}} = m \cdot a$
 $F_{\text{NET}} = 272 \cdot (1.10)$
 $= 299.2 \text{ N}$



