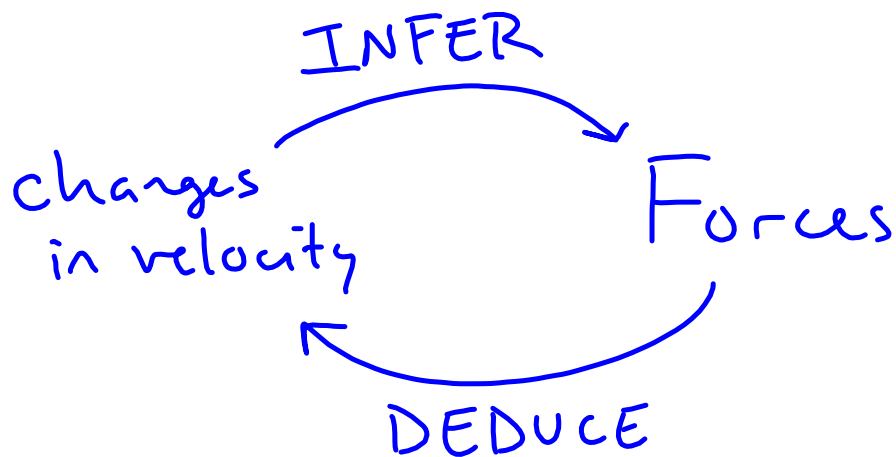


# MODEL DESCRIPTION:

## Unbalanced Force Model

### DESCRIPTION

Acceleration occurs when we have unbalanced forces.



## PROPERTIES :

## • MEASURED

- Force ( $\bar{F}$ )  $\rightarrow$  N
- Mass ( $m$ )  $\rightarrow$  kg
- displacement ( $\Delta\bar{x}$ )  $\rightarrow$  m
- angle ( $\theta$ )  $\rightarrow$   $^{\circ}$  (degrees)

## • Calculated :

- velocity ( $\bar{v}$ )  $\rightarrow$  m/s
- acceleration ( $\bar{a}$ )  $\rightarrow$  m/s<sup>2</sup>
- Weight ( $\bar{F}_g$ )  $\rightarrow$  N
- coefficient of friction ( $\mu$ )  $\rightarrow$  unitless

# REPRESENTATIONS

- Written/Verbal
- Diagrammatic
  - Force Diagrams (Free-Body Diagrams)
  - Motion Map
- Graphically
  - $F_f - F_N$
  - $F - m$
  - $F - \text{surface area}$
- Mathematically
  - $F_{\text{net}} = ma$
  - $F_g = mc_g$
  - $F_f = \mu F_N$ 

this equation connects the x- and y-directions
  - Trig relationships

## RULES OF BEHAVIOR

- Unbalanced forces cause acceleration (change in velocity).
- If have acceleration, have net force.
- Direction of net force and acceleration vectors are the same.