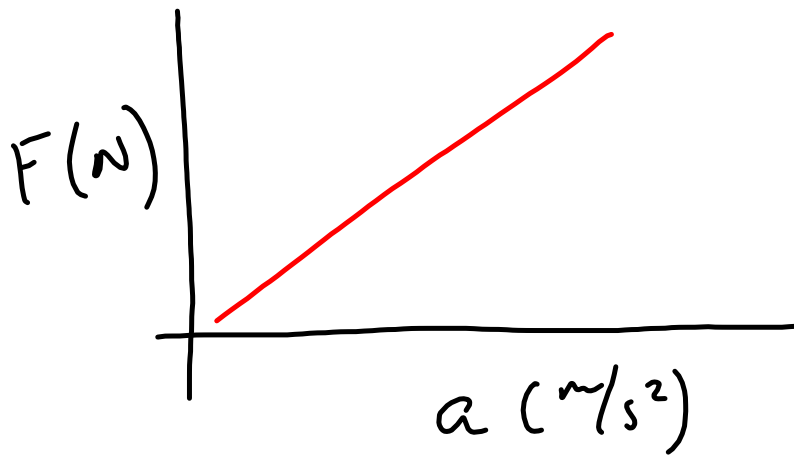


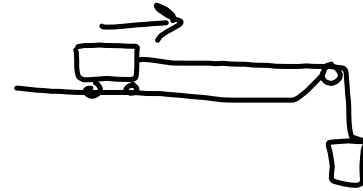
## LAB - MODIFIED ATWOOD'S MACHINE

- Determine relationship between acceleration and force.
- Measure:
  - Force  $\rightarrow$  Force sensor
  - Acceleration  $\rightarrow$  slope of velocity-time graph
- Graph:
  - Force  $\rightarrow$  y-axis
  - Acceleration  $\rightarrow$  x-axis } Find function of best fit and give interpretation

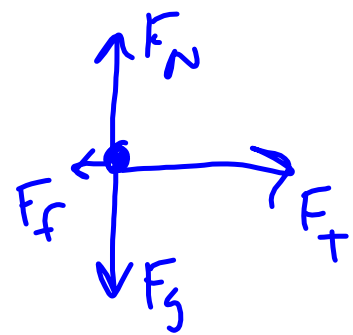


$$\text{slope} = \frac{F}{a}$$

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



FBD for  
cart



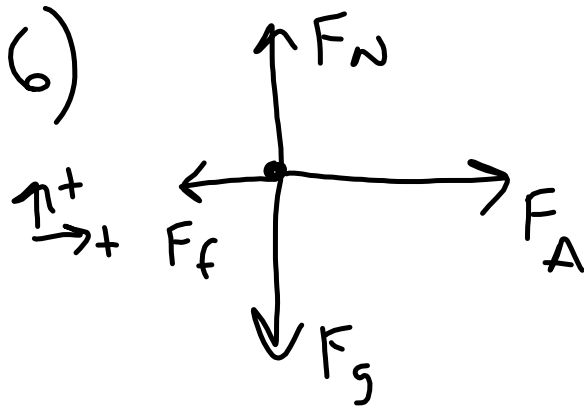
$$\sum \vec{F} = m\vec{a}$$

Newton's  
2nd Law

- Balanced Force Model:
  - $\bar{a} = 0 \text{ m/s}^2$
  - $\sum \bar{F}$  in each direction = 0
- Unbalanced Force Model:
  - $\bar{a}$  is some non-zero value
  - $\sum \bar{F} = m\bar{a}$  in each direction

# Worksheet 1

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$$\sum \vec{F}_y = 0$$

$$F_N = F_g$$

$$\sum \vec{F}_x = m\vec{a}$$

$$F_A - F_f = ma$$

$$a = \frac{F_A - F_f}{m}$$

$$= \frac{5000\text{ N} - 1000\text{ N}}{900\text{ kg}}$$

$$= 4.44\text{ m/s}^2$$