

# EQUILIBRIUM of A PARTICLE

WHAT IS A PARTICLE?

• HAS MASS BUT NO SIZE

∴ ALL FORCES ACT THROUGH A POINT



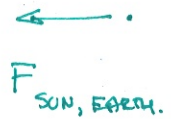
AND SO SOMETIMES WE HAVE

“PARTICLES” (FORCES ACT THROUGH POINT)

IS THE EARTH A PARTICLE?



DEPENDS ON SCALE



FOR EQUILIBRIUM →

$$\sum \vec{F} = m \frac{d\vec{v}}{dt}$$

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

→ 0 ≡

(DEFINES EQUILIBRIUM)

SOL'N TECHNIQUE →

1. IDENTIFY SYSTEM ⇒

DRAW FREE BODY DIAGRAM (FBD)

2. “CUT” CABLES

& REPLACE W/ FORCES

b. “REMOVE” SUPPORTS & REPLACE W/ FORCES

c. SHOW WEIGHT AS DOWNWARD FORCE.

ACTING THROUGH CENTER of MASS.

2. WRITE EQNS of EQUILIBRIUM; IN  
COMPONENT FORM THESE ARE

IMPORANT!  $\rightarrow \sum F_x = 0$

$\uparrow \sum F_y = 0$

?  $\circ \sum F_z = 0$

3. SOLVE THE EQUATIONS!  
MAKE SURE

a. # EQNS = # UNKNOWN

b. EQUATIONS ARE INDEPENDENT.