FORCE MODEL

CAN HANDLE CONSTANT OR NON-CONSTANT ACCELERATION

LINEAR MODEL

1. DRAW FBD

THE FBD OR "FREE BODY DIAGRAM" IS A PICTURE OF AN OBJECT SHOWING ALL THE FORCES (NOT VELOCITIES, ACCELERATIONS OR OTHER VECTORS) THAT ACT ON THE OBJECT (AS OPPOSED TO FORCES THAT THE OBJECT APPLIES TO OTHER OBJECTS)

2. ΣF

$$\sum F_x \rightarrow^+ = \boxed{} = ma_i = \boxed{}$$

$$\sum F_y \uparrow^+ = \boxed{} = ma_j = \boxed{}$$

$$\sum F_r \rightarrow^+ = \boxed{} = ma_c = \boxed{} = \frac{mv^2}{r}$$

3. SOLVE

If acceleration is NOT constant, then, use
a = dv/dt OR $\alpha = d\omega/dt$...
then you have a differential equation!
Use integral calculus to solve for v(t) or ω(t) using power rule, u-subs, natural logs, or separation of variables

ROTATIONAL MODEL

1. DRAW FBD

2. $\Sigma\tau$

$$\sum \tau = \boxed{} = I\alpha = \boxed{}$$

3. SOLVE

SUPPLEMENTAL EQUATIONS

$$F_s = -kx$$

$$f = \mu F_N$$

$$a_c = \frac{v^2}{r} = \omega^2 r$$

$$F_G = \frac{Gm_1m_2}{r^2}$$

$$\tau = rxF$$

ROTATIONAL INERTIAS

$$I = \int r^2 dm = \sum mr^2$$

$$I_{new} = I_{cm} + md^2$$

$I = mr^2$	$I = mr^2$	$I = \frac{1}{2}mr^2$	$I = \frac{2}{5}mr^2$	$I = \frac{1}{12}mL^2$
SINGLETON MASS	HOOP	SOLID CYLINDER	SOLID SPHERE	THIN ROD

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