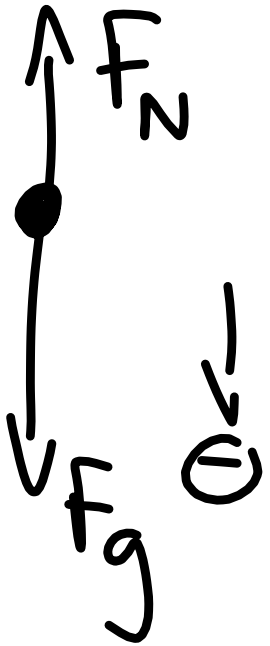
④

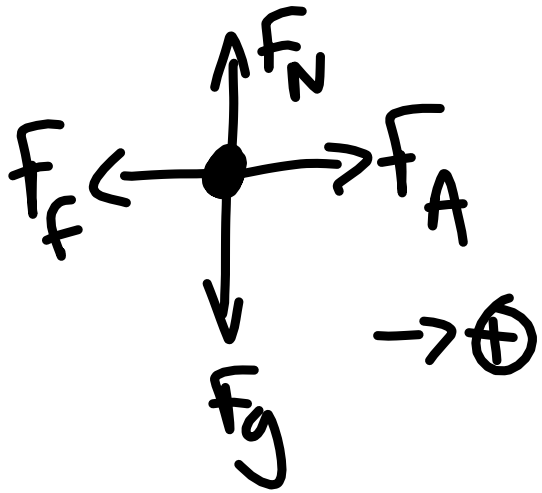


$$\Sigma \vec{F}_y = F_N - F_g = ma$$

$$F_N = ma + F_g$$

$$F_N = (12)(-2) + (9.81)(12)$$

(5)



$\rightarrow +$

$F = ma$

$450t + 9 - \mu F_N = ma$

$450t + 9 - (.30 \times 2 \times 9.81) = ma$

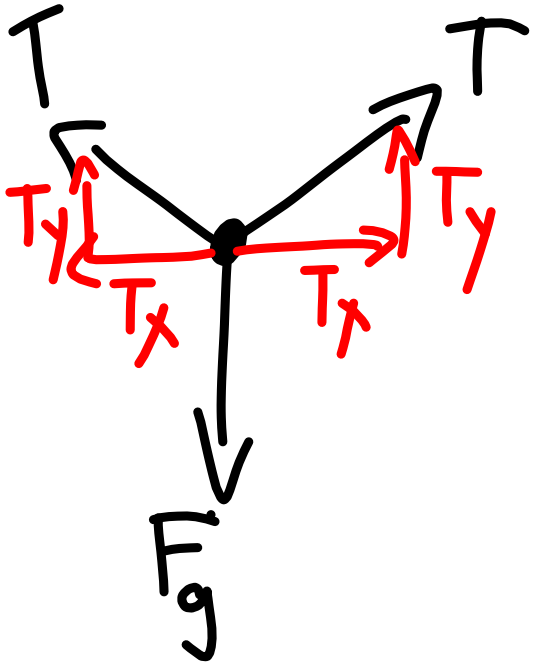
6

$$F_s = kx$$

$$F_s = (k_1 + k_2)x$$

$$F_s = (2k_2 + k_2)x$$

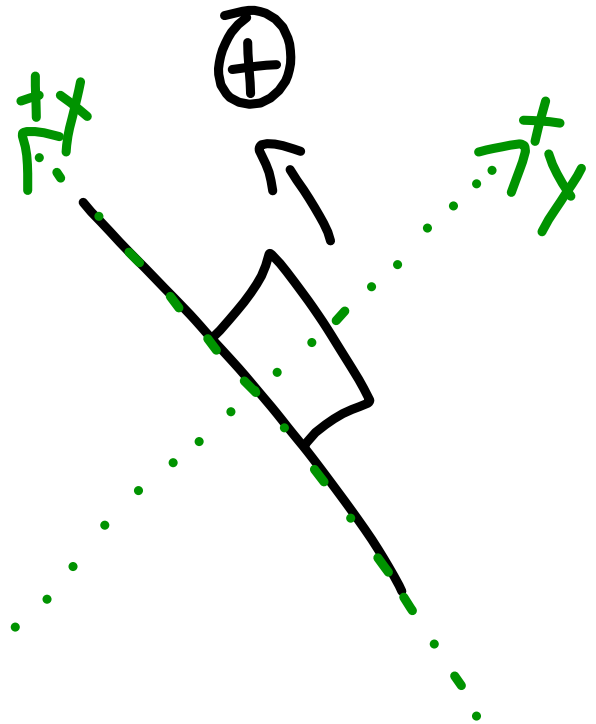
$$mg = 3k_2x$$

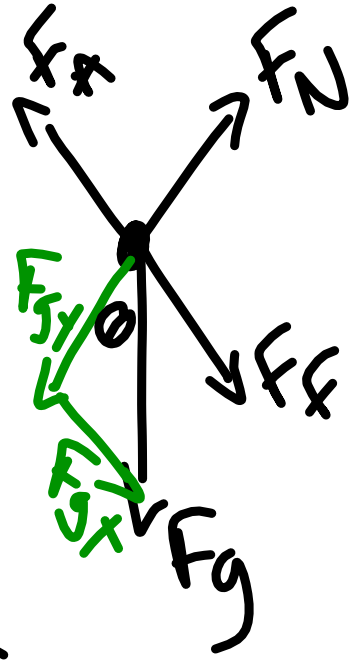


$$\Sigma \vec{F}_y = -F_g + 2T_y = 0$$

$$2T\sin\theta = mg$$

⑧





$$\Sigma \vec{F}_y = F_N - F_{gy} = 0 \rightsquigarrow F_N = F_{gy}$$

$$\Sigma \vec{F}_x = F_A - F_F - F_{gx} = 0 \qquad F_N = F_g \cos\theta$$

$$F_A - \mu m g \cos\theta - mg\sin\theta = 0$$

Constant acceleration Equations

I. $a = \frac{dv}{dt}$

$$\int_0^t a\,dt = \int_{v_0}^{v} dv$$

$$at = v - v_0$$

$$at = v - v_0$$

$$v_0 + at = v$$

$$\boxed{v = v_0 + at}$$

$$v(t) = v_0 + at$$

II. $v = \frac{dx}{dt}$

$$\int_0^t v\,dt = \int_{x_0}^{x} dx$$

$$\int_0^t v_0 + at\,dt = \int_{x_0}^{x} dx$$

$$v_0 t + \frac{at^2}{2} = x - x_0$$

$$v_0 t + \frac{1}{2}at^2 = x - x_0$$

$$v_0 t + \frac{1}{2} a t^2 = x - x_0$$

$$\boxed{x = x_0 + v_0 t + \frac{1}{2} a t^2}$$

$$d = v_i t + \frac{1}{2} a t^2$$

$$x(t) = x_0 + v_0 t + \frac{1}{2} a t^2$$

III

$$\frac{dv}{dx} \rightarrow \frac{\frac{m}{s}}{m} \rightarrow \frac{m}{s} \cdot \frac{1}{m} = \frac{1}{s}$$

$$\frac{dv}{dx} = \frac{dv}{dx}$$

$$\frac{dv}{dx} = \frac{dv}{dx} \cdot 1$$

$$\frac{dv}{dx} = \frac{dv}{dx} \cdot 1$$

$$\frac{dv}{dx} = \frac{dv}{dx} \cdot \frac{dt}{dt}$$

$$\frac{dv}{dx} = \frac{dv}{dt} \cdot \frac{dt}{dx}$$

$$\frac{dv}{dx} = a \cdot \frac{1}{v}$$

$$\frac{dv}{dx} = a \cdot \frac{1}{v}$$

$$\frac{dv}{dx} = \frac{a}{v}$$

$$\int_{v_0}^{v} v\,dv = \int_{x_0}^{x} a\,dx$$

$$\frac{v^2}{2} = ax$$

$$\frac{v^2}{2} = ax$$

$$\frac{1}{2}v^2 = ax$$

$$\frac{1}{2}(v^2 - v_0^2) = ax$$

$$\boxed{v^2 = v_0^2 + 2ax}$$

$$v^2(x) = v_0^2 + 2ax$$