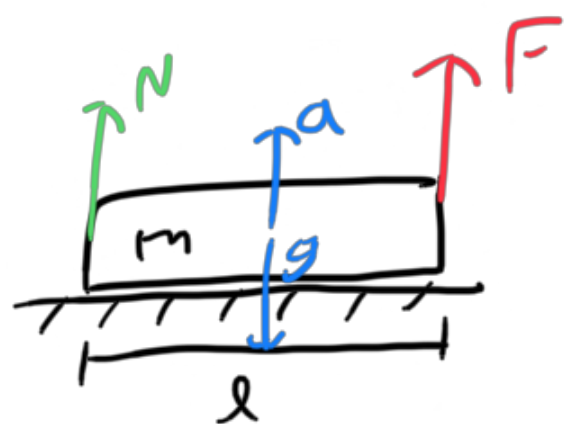


October 20th.F=ma 2018A #9
 $N = ?$
 a, F given.

First, note that the pivot is the left edge of the rod.

To start, $a = r\alpha = \frac{a l}{2}$

$$I = \frac{m l^2}{3}$$

So
$$\tau = F l - \frac{1}{2} m g l$$

$$= m \alpha$$

$$\Rightarrow \alpha = \frac{\tau}{I} = \frac{1}{l} \left(\frac{3}{m} F - \frac{3}{2} g \right)$$

Now, $2a = \alpha l = \left(\frac{3}{m} F - \frac{3}{2} g \right)$

Also, linear acceleration is $a = \frac{F}{m} - g + \frac{N}{m}$.

Solving... $-2a + 3a = -\left(\frac{3}{m} F - \frac{3}{2} g \right) + 3 \left(\frac{F}{m} - g + \frac{N}{m} \right)$

$$a = 0 F - \frac{3}{2} g + \frac{3}{m} N$$

$$N = \frac{1}{3} m a + \frac{1}{2} m g$$