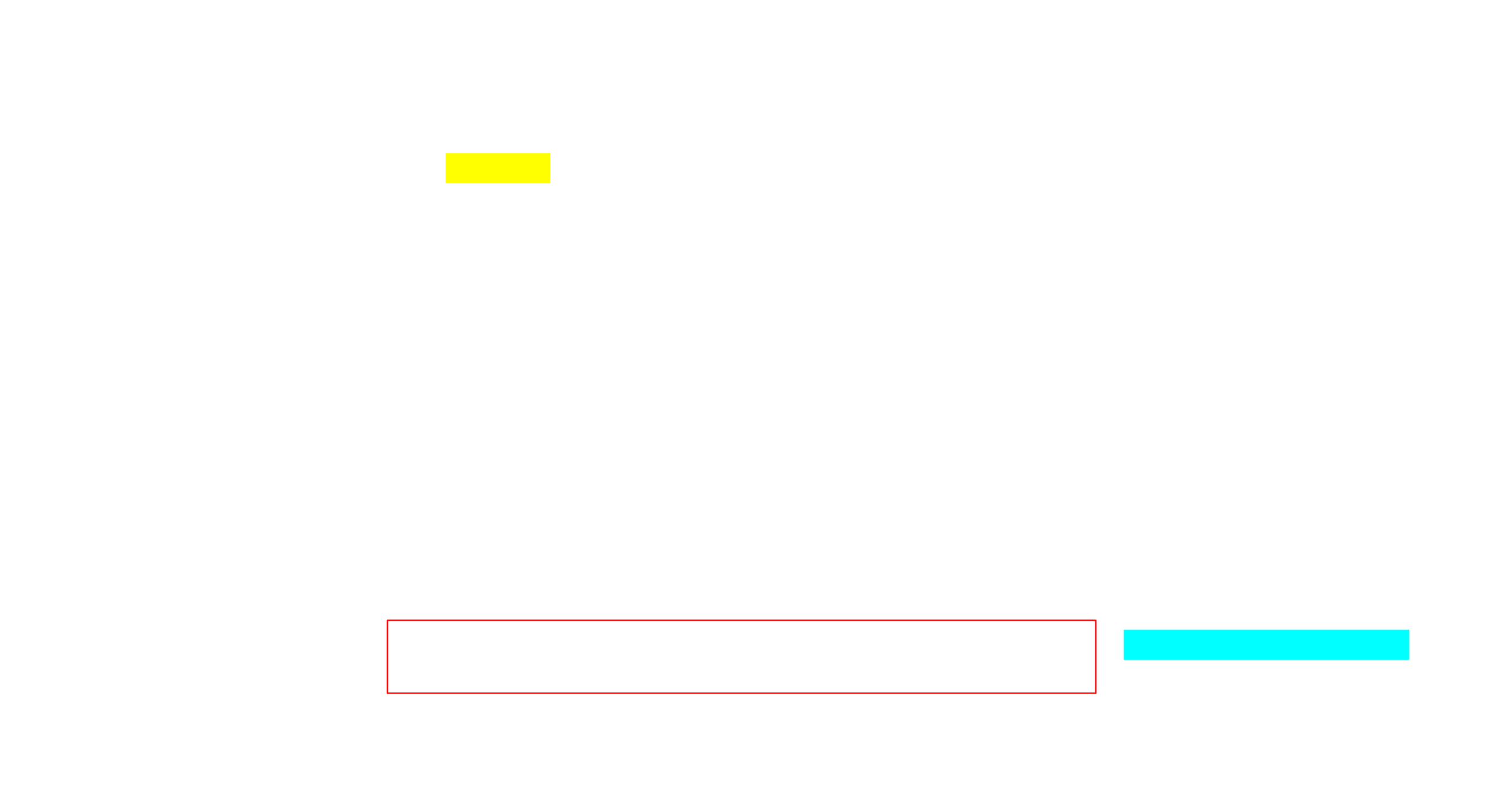


$$\frac{dp_i}{dt} = f$$

$$\downarrow$$

$$x_i \times \frac{dp_i}{dt} = x_i \times f_i$$

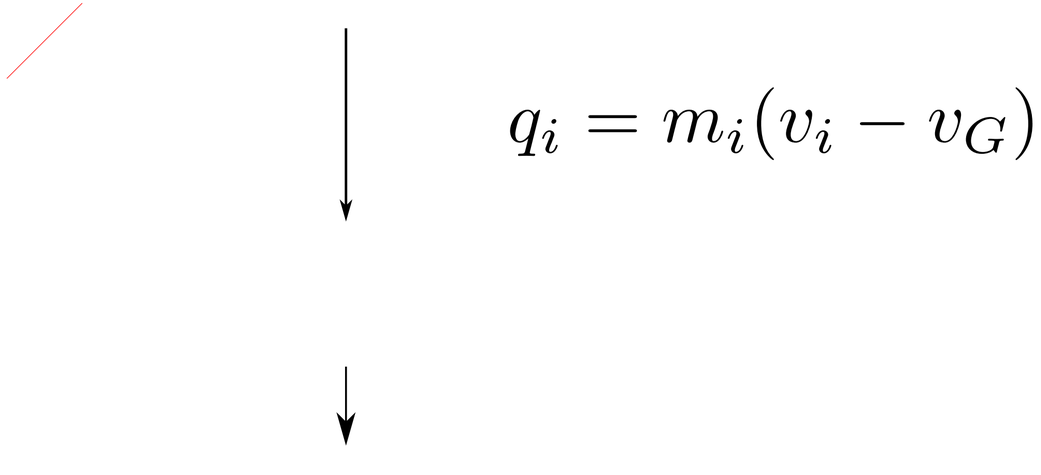
$$\downarrow$$

$$\frac{d}{dt}(x_i \times p_i) = x_i \times f_i$$

$$\downarrow$$

$$\downarrow$$

$$r_i = x_i - x_G$$


$q_i = m_i(v_i - v_G)$

$$\frac{d}{dt}\sum_i (x_i \times p_i) = \sum_i (x_i \times f_i)$$

$$\frac{d}{dt}\sum_i (r_i \times q_i) = \sum_i (r_i \times f_i)$$

$$\frac{d}{dt}\sum_i (m_i r_i \times (w \times r_i)) = \sum_i (r_i \times f_i)$$

$$\frac{d}{dt}(Iw) = \sum_i (r_i \times f_i)$$