

Pushing Off...

Fred (75 kg) and Jane (50 kg) are at rest on skates facing each other. Jane then pushes Fred w/ a constant force $F = 45 \text{ N}$ for a time $\Delta t = 3$ seconds. Who will be moving fastest at the end of the push?

A) Fred

B) Same

C) Jane

Fred

$$F = +45 \text{ N (positive direct.)}$$

$$I = +45 (3) \text{ N-s} = 135 \text{ N-s}$$

$$I = \Delta p$$

$$= mv_f - mv_i$$

$$I/m = v_f - v_i$$

$$v_f = 135 \text{ N-s} / 75 \text{ kg}$$

$$= 1.8 \text{ m/s}$$

Jane

$$F = -45 \text{ N Newton's 3rd law}$$

$$I = -45 (3) \text{ N-s} = -135 \text{ N-s}$$

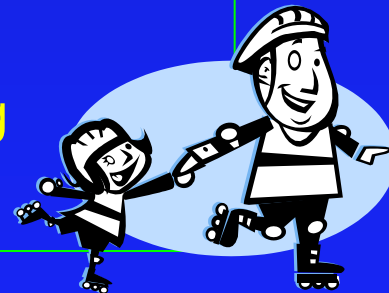
$$I = \Delta p$$

$$= mv_f - mv_i$$

$$I/m = v_f - v_i$$

$$v_f = -135 \text{ N-s} / 50 \text{ kg}$$

$$= -2.7 \text{ m/s}$$



Note: $P_{\text{fred}} + P_{\text{jane}} = (1.8) 75 + (-2.7) 50 = 0$