

Answer on Question 48988, Physics, Mechanics — Kinematics — Dynamics A 70 kg person is riding on a frictionless skateboard at 5 m/s. A friend facing him throws a 5 kg ball toward him at 20 m/s. What is his final speed after catching the ball?

Solution

Momentum conservation law is

$$m_{person}v_{person} + m_{ball}v_{ball} = (m_{person} + m_{ball})v$$

where v is final velocity. So we have

$$v = \frac{m_{person}v_{person} + m_{ball}v_{ball}}{m_{person} + m_{ball}} = \frac{70 \cdot 5 + 5 \cdot (-20)}{5 + 75} = 3.125 \text{ m/s}$$