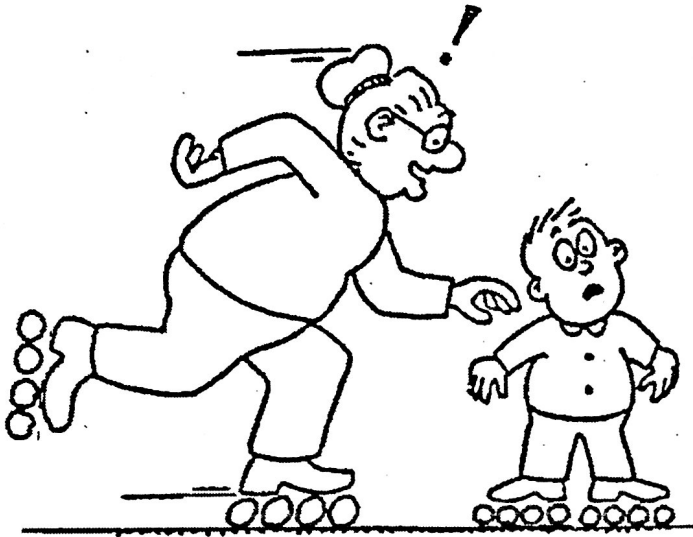


6. Granny whizzes around the rink and is suddenly confronted with Ambrose at rest directly in her path. Rather than knock him over, she picks him up and continues in motion without "braking."



Consider both Granny and Ambrose as two parts of one system. Since no outside forces act on the system, the momentum of the system before collision equals the momentum of the system after collision.

- a. Complete the before-collision data in the table below.

| BEFORE COLLISION | |
|--------------------|-------------------|
| Granny's mass | 80 kg |
| Granny's speed | 3 m/s |
| Granny's momentum | <u>240 kg m/s</u> |
| Ambrose's mass | 40 kg |
| Ambrose's speed | 0 m/s |
| Ambrose's momentum | <u>0 kg m/s</u> |
| Total momentum | <u>240 kg m/s</u> |

- b. After collision, does Granny's speed increase or decrease?
decrease
- c. After collision, does Ambrose's speed increase or decrease?
increase
- d. After collision, what is the total mass of Granny + Ambrose?
120 kg
- e. After collision, what is the total momentum of Granny + Ambrose?
240 kg m/s
- f. Use the conservation of momentum law to find the speed of Granny and Ambrose together after collision. (Show your work in the space below.)



New speed = 2 m/s

$$\text{lastic} - (m+m)v = mv + mv$$

WS7

1. A rifle has a mass of 7-kg and the bullet inside has a mass of 0.7-kg. If the velocity of the bullet is 350-m/s after the rifle is fired, what is the recoil velocity of the rifle?

$$-35 \text{ m/s}$$

2. Two people, one of mass 72.8kg and the other of mass 52.4kg, sit in a stationary rowboat of mass 81.6 kg.
a. If the lighter person jumps EAST out of the boat at 7-m/s, how fast will the heavier person and boat move?

$$-2.38 \text{ m/s}$$

- b. If the heavier person jumps into the water at 4 m/s to rescue the lighter person, how fast will the rowboat move?

$$8.07 \text{ m/s}$$

3. A girl, mass 70.0 kg, is running 3.0 m/s east when she jumps onto a stationary skateboard, mass 2.0 kg. What is the velocity of the girl and skateboard assuming they move off together?

$$2.92 \text{ m/s}$$

4. A wrestler is standing at rest. Another wrestler, running at 5.0 m/s, grabs him and holds onto him, and the two continue with a velocity of 2.7 m/s. If the mass of the second wrestler is 100 kg, what is the mass of the first wrestler?

$$85.19 \text{ kg}$$

5. Find the speed at which a super hero (mass=76.0 kg) must fly into a train (mass = 19537 kg) traveling at 35 m/s to stop it.

$$-8997 \text{ m/s}$$