Name: _____ Block: _____

Momentum

1. A large 10. kg medicine ball is caught by a 70. kg student on the track team. If the ball was moving at $4.0\,\frac{\text{m}}{\text{s}}$, how fast will the student be moving after catching the ball?

$\boxed{0.5\,\frac{\text{m}}{\text{s}}}$

2. An 0.010 kg bullet is fired down the barrel of a gun, which is pointed to your left. The bullet accelerates from rest to a velocity of $400.\,\frac{\text{m}}{\text{s}}$. What velocity does the 1.5 kg gun acquire as a result of this impulse? (*Note that neither the bullet nor the gun is moving before the "collision."*)

$\boxed{2.7\,\frac{\text{m}}{\text{s}}\,\rightarrow}$

3. A student is rushing to class and collides with a vice principal, who was standing still just before the collision. The vice principal has a mass of 100. kg, and the student has a mass of 50. kg, and had a velocity of $2.0\,\frac{\text{m}}{\text{s}}$ before the collision. What is the velocity of the entangled vice principal and student after they collide?

$\boxed{0.67\,\frac{\text{m}}{\text{s}}}$

4. A 730 kg Mini runs into a stationary 2500 kg SUV. If the Mini was moving at $10.\frac{\text{m}}{\text{s}}$, how fast will it be moving after making a completely *inelastic* collision with the SUV?

$\boxed{2.3\,\frac{\text{m}}{\text{s}}}$

5. A 6.0 kg bowling ball moving at $3.5\,\frac{\text{m}}{\text{s}}$ to the right makes a collision, head-on, with a stationary 0.70 kg bowling pin. If the ball is moving $2.77\,\frac{\text{m}}{\text{s}}$ to the right after the collision, what will be the velocity (magnitude and direction) of the pin?

$\boxed{6.25\,\frac{\text{m}}{\text{s}}\rightarrow}$

6. A pair of 0.20 kg billiard balls make an elastic collision. Before the collision, the 4-ball was moving $0.50\,\frac{\text{m}}{\text{s}}$ to the right, and the 8-ball was moving $1.0\,\frac{\text{m}}{\text{s}}$ to the left. After the collision, the 4-ball is now moving at $1.0\,\frac{\text{m}}{\text{s}}$ to the left. What is the velocity (magnitude and direction) of the 8-ball after the collision?

$\boxed{0.50\,\frac{\text{m}}{\text{s}}\rightarrow}$

7. A 75 kg astronaut on a space walk pushes to the right on a 1000. kg satellite. If the velocity of the satellite after the push is $0.75\,\frac{\text{m}}{\text{s}}$, what is the velocity of the astronaut?

$\boxed{10\,\frac{\text{m}}{\text{s}}\leftarrow}$