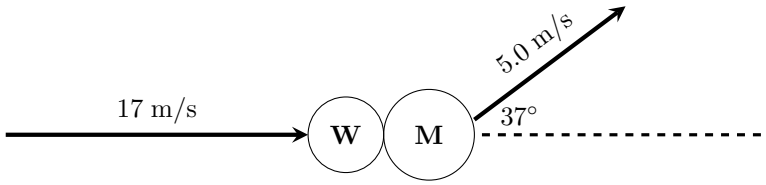
# Momentum Worksheet

1. A neutron whose mass is $1.67 \times 10^{-27}$ kg is travelling to the right at $1.00 \times 10^{3}$ m/s. It strikes a proton (same mass as a neutron) which is travelling upward at $5.00 \times 10^{2}$ m/s. At impact, they combine to form a particle called a deuteron. Find the magnitude and direction of the velocity of the deuteron, assuming that mass is conserved. ($5.6 \times 10^{2}$ m/s @ 27° above the horizontal)

2. A 50 kg girl is in a 30 kg canoe resting in still water. She has a 10 kg anchor with her which she throws over the back of the canoe at a velocity of 5.0 m/s relative to the boat. What is her resultant velocity? (0.56 m/s forward, relative to the water)

3. An 80 kg man is in a 50 kg boat with two rocks of mass 20 kg each. The boat is initially at rest in still water. The man throws one rock off the back at a speed of 5.0 m/s relative to the boat. He then throws the second rock off the back at a speed of 5.0 m/s relative to the boat. What will be the speed of the boat as a result of the two throws? (1.25 m/s forward, relative to the water)

4. A wooden shuffleboard disc of mass 1.0 kg sliding along at a speed of 17 m/s collides with a stationary metal disc of mass 4.0 kg. After the collision, the metal disc is travelling at 5.0 m/s as shown in the diagram below. What is the velocity of the wooden disc after the collision? (12 m/s@ 85° below the horizontal)




5. Two curling stones are sitting in the house close to but not touching each other. The shot rock approaches these two stones at 3.0 m/s and hits them both at the same time. After the collision the two stones move apart as shown in the diagram below. Assume the mass of each of the three stones is 15.0 kg and calculate the velocity of the shot rock after the collision. (0.85 m/s @ 39° below horizontal)