/ 30

Name _____ Date _____ Period _____

Worksheet: Conservation of Momentum III

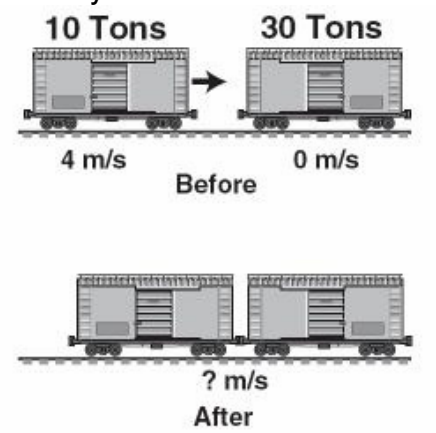
Directions: Answer the following questions concerning the conservation of momentum using the equations below. Show all of you work to receive credit.

$$p = mv \qquad Ft = \Delta(mv) \qquad impulse = F\Delta t$$

$$p_{before} = p_{after} \qquad \textbf{net momentum}_{\textbf{before}} \textbf{ = net momentum}_{\textbf{after}}$$

$$(m_1v_1 + m_2v_2)_{before} = (m_1v_1 + m_2v_2)_{after}$$

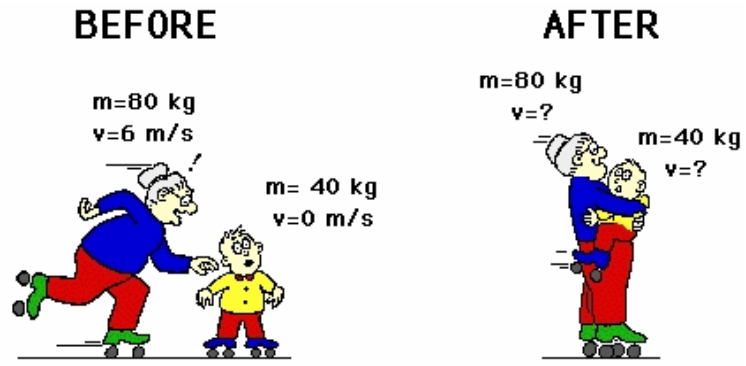
1. When these two freight cars of different mass collide and couple, what will be their resultant velocity?



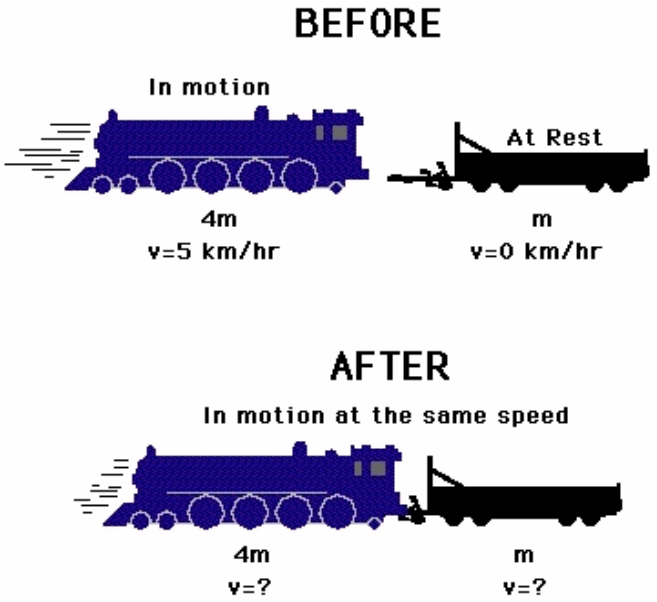
2. A 2 kg blob of putty moving at 4 m/s slams into a 6 kg blob of putty at rest. What is the speed of the two stuck-together blobs immediately after colliding?

3. A football player runs at 8 m/s and plows into a 80 kg referee standing on the field causing the referee to fly forward at 5.0 m/s. If this were a perfectly elastic collision, what would the mass of football player be?

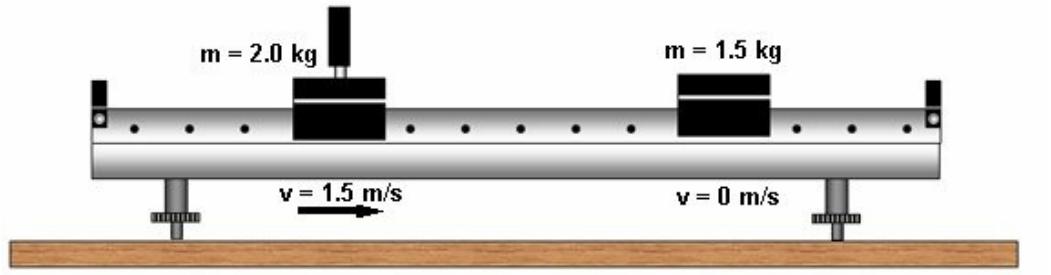
4. Assuming that this is a perfect inelastic collision, calculate the velocity after the collision in the example below.



5. A large locomotive with a mass 4 times that of the smaller motionless railroad car collides and couples together. What is their combined speed after the collision?

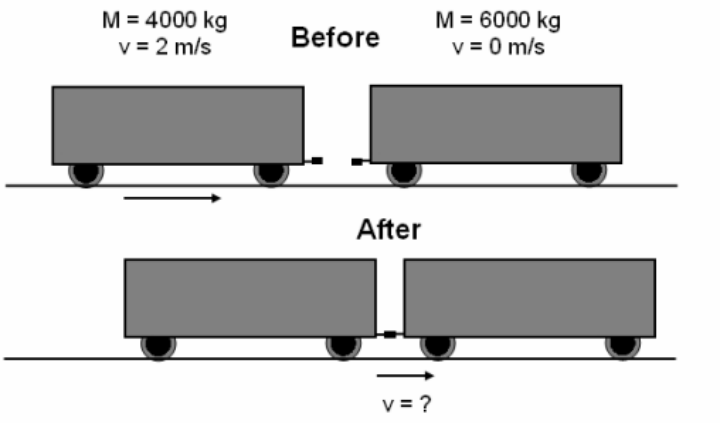


6. A 2.0 kg mass is moving on a frictionless airtrack. It collides into a motionless 1.5 kg mass. What is the the combined speed of the two masses if they stick together on impact?

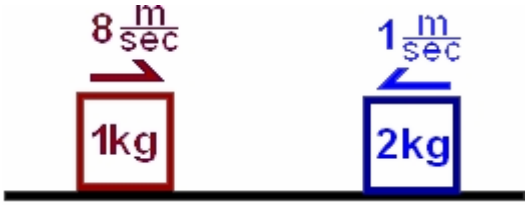


7. A 1000 kg car is rolling down the street at 2.5 m/s. How fast would a 2500 kg car have to collide into it in order to bring it to rest (0 m/s)?

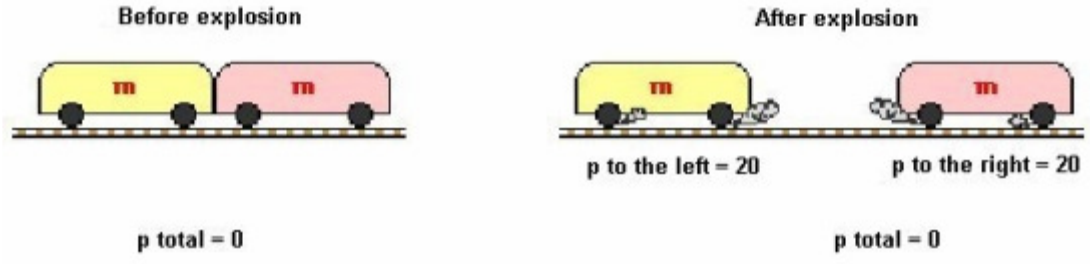
8. A railroad car slams into another railroad car and couples together. What is the combined speed of the railroad cars after the collision?



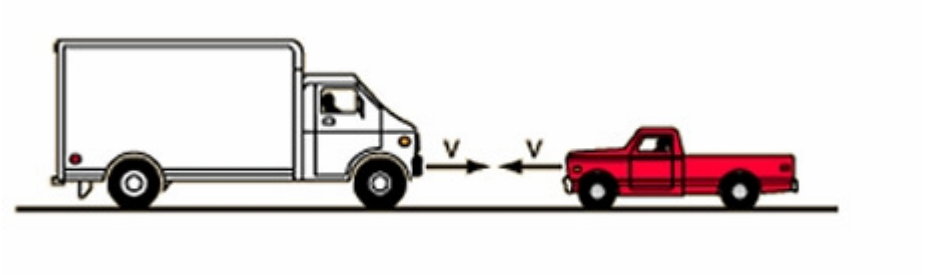
9. Two blocks moving in opposite directions collide and stick together after the collision. What is their combined speed after the collision?



10. An explosion causes the cars to move apart from each other. According to the diagram below, what is the speed of each of the cars as they move away from each other?

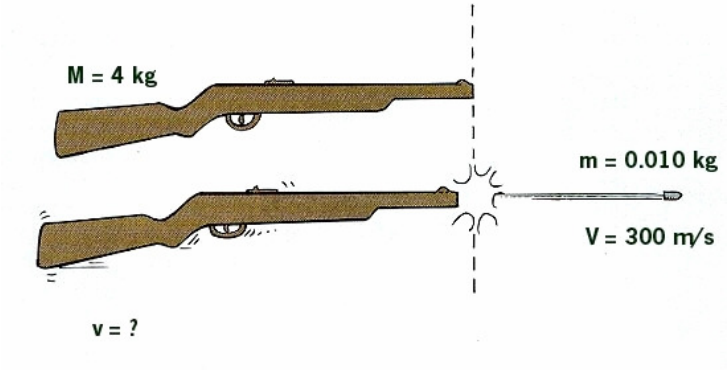


11. A 3000-kg truck moving rightward with a speed of 5 km/hr collides head-on with a 1000-kg car moving leftward with a speed of 10 km/hr. The two vehicles *stick together* and move with the same velocity after the collision. Determine the post-collision speed of the car and truck.

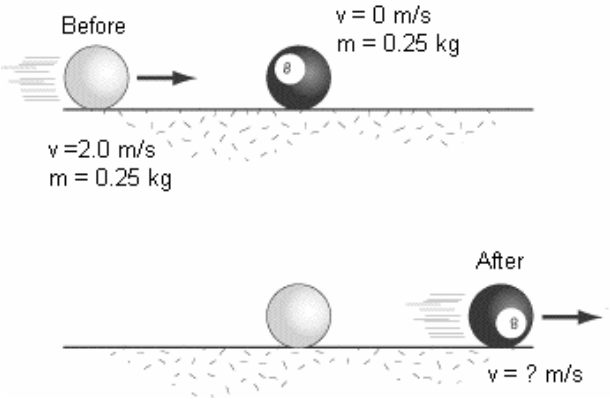


12. During a goal-line stand, a 75-kg fullback moving eastward with a speed of 10 m/s collides head-on with a 100-kg lineman moving westward with a speed of 4 m/s. The two players collide and *stick together*, moving at the same velocity after the collision. Determine the the post-collision velocity of the two players.

13. Calculate the velocity of the rifles recoil after firing.



14. What is the velocity of the "8" ball after the elastic collision below?



15. A 6000 kg railroad car moving at 5 m/s collides into a stationary car with a mass of 4000 kg. If they couple together after the collision, what will be their combined velocity immediately after impact?