

- 4) A train of mass 4500 kg is rolling eastward down the track at 20 m/s. Another train, of mass 3500 kg, is rolling westward at 25 m/s. The two trains couple. a) What will their final velocity be and b) how far will they have traveled 30 seconds after colliding?

Multiple Choice. Write the letter that best answers each of the following. Two points apiece.

- _____ 5) When two ice skaters initially at rest push off one another, their final momenta are
- equal in magnitude and direction
 - equal in magnitude but opposite in direction
 - in the same direction but of different magnitudes
 - in opposite directions and possibly of different magnitudes
- _____ 6) A shopping cart weighing 12 kg moves with a speed of 5 m/s. A 3 kg food container falls into the shopping cart. What is the speed of the shopping cart after the container falls?
- 1 m/s
 - 2 m/s
 - 3 m/s
 - 4 m/s
 - 5 m/s
- _____ 7) Two billiard balls move on a frictionless surface with speeds of v and $v/2$, as shown. Both of the balls have the same mass, and the collision is perfectly elastic. What is the sum of the velocities of the two balls after the collision?
- $v/2$
 - v
 - $3v/2$
 - $2v$
 - $5v/2$
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- _____ 8) A bullet is shot into a block of wood. Look at statements I, II and III. Which choices are true?
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| I) This is an inelastic collision. | a) Only I is true |
| II) Momentum is conserved. | b) Only I and II are true. |
| III) Kinetic energy is conserved. | c) All three are true. |
| | d) Only I and III are true. |
| | e) Only II and III are true. |
- _____ 9) A firecracker, initially at rest, explodes into two pieces, one twice as massive as the other
- The pieces go in opposite directions; the heavier piece goes twice as fast.
 - The pieces go in the same direction; the heavier piece goes twice as fast.
 - The pieces go in opposite directions; the lighter piece goes twice as fast.
 - The pieces go in the same direction; the lighter piece goes twice as fast.