

Momentum and the Flow of Mass

Concept Questions

Question 1 Suppose rain falls vertically into an open cart rolling along a straight horizontal track with negligible friction. As a result of the accumulating water, the speed of the cart

1. increases.
2. does not change.
3. decreases.
4. not sure.
5. not enough information is given to decide.

Question 2

Suppose you drop paperclips (“drop” is taken to mean that the clips are released with no horizontal component of velocity) into an open cart rolling along a straight horizontal track with negligible friction. As a result of the accumulating paper clips, does

- 1) the kinetic energy and magnitude of the momentum of the cart increase.
- 2) the kinetic energy and magnitude of the momentum of the cart decrease.
- 3) the kinetic energy and magnitude of the momentum of the cart stay the same.
- 4) the kinetic energy increase and the magnitude of the momentum stay the same.
- 5) the kinetic energy stay the same and the magnitude of the momentum stay increase.
- 6) the kinetic energy decrease and the magnitude of the momentum stay the same.
- 7) the kinetic energy stay the same and the magnitude of the momentum stay decrease.
- 8) the kinetic energy decrease and the magnitude of the momentum increase.
- 9) the kinetic energy increase and the magnitude of the momentum decrease.

Question 3 If a rocket in gravity-free outer space has the same thrust at all times, is its acceleration

1. constant?
2. Increasing?
3. decreasing?

Question 4 When a rocket accelerates in a gravitational field, will it reach a greater final velocity if the fuel burn time is

1. as fast as possible?
2. as slow as possible?
3. The final speed is independent of the fuel burn time?
4. I'm not sure.

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