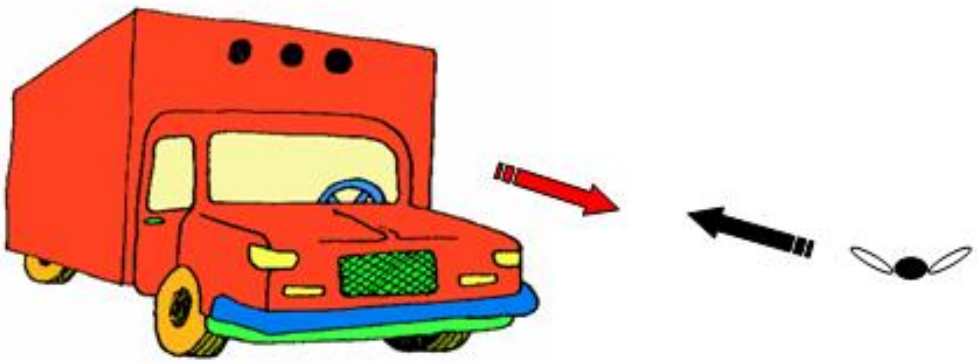
Physics 121 Clicker Questions

Cycle 2

March 20, 2024

A bug is flying down the road toward an oncoming truck. The bug collides with the windshield of the truck with a splat. Which feels more force during the collision?



(A) The truck feels more force from the bug during the collision than the bug feels from the truck.

(B) The bug feels more force from the truck during the collision than the truck feels from the bug.

(C) The bug and the truck feel the same force during the collision.

(D) None of the above.

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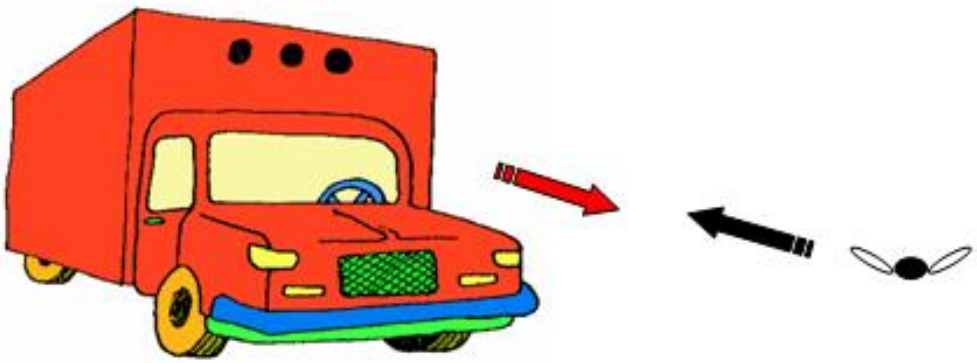


(A) The truck feels more force from the bug during the collision than the bug feels from the truck.

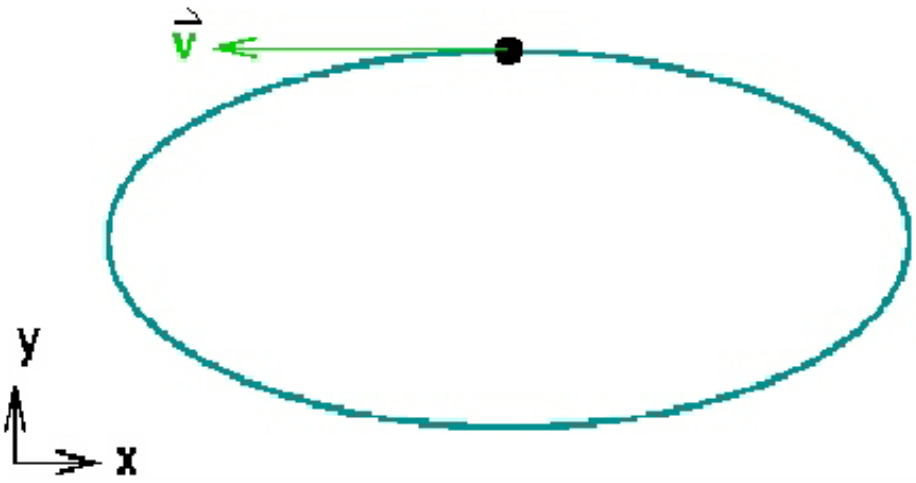
(B) The bug feels more force from the truck during the collision than the truck feels from the bug.

(C) The bug and the truck feel the same force during the collision.

Newton's 3rd Law

(D) None of the above.

A car moves around an oval track as shown. Suppose at the position indicated by the black point, the car is *slowing down.*



Suppose P and Q are positive constants.

Which of these expressions could correspond to the total acceleration of the car at the point indicated?

(A) $P\hat{i} + Q\hat{j}$

(B) $P\hat{i} - Q\hat{j}$

(C) $-P\hat{i} + Q\hat{j}$

(D) $-P\hat{i} - Q\hat{j}$

(E) $\sqrt{P\hat{i}^2 + Q\hat{j}^2}$

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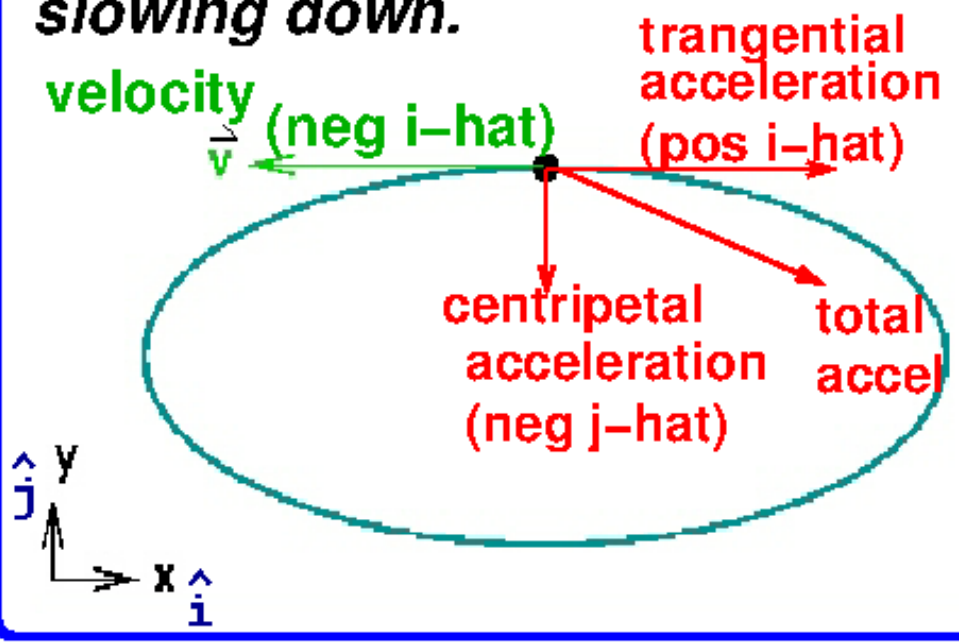

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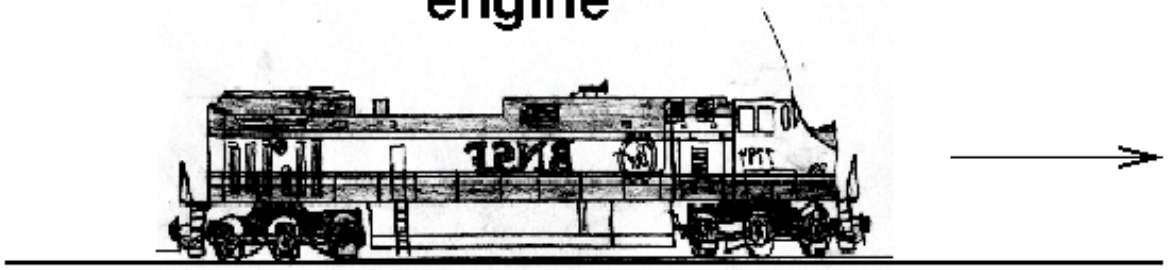
engine



An engine alone is moving to the right as shown. The wheels on the engine turn without sliding or slipping on the track.

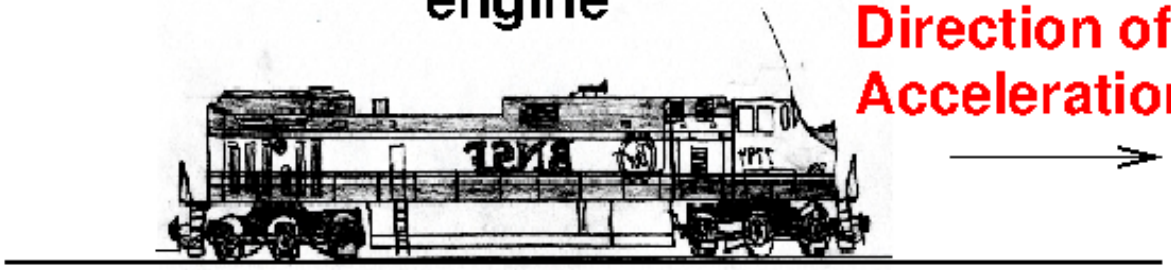
What is the direction of the force of friction applied to the engine?

(A) To the LEFT

(B) To the RIGHT

(C) There is NO FRICTION.

(D) We cannot answer this question without being given more information.



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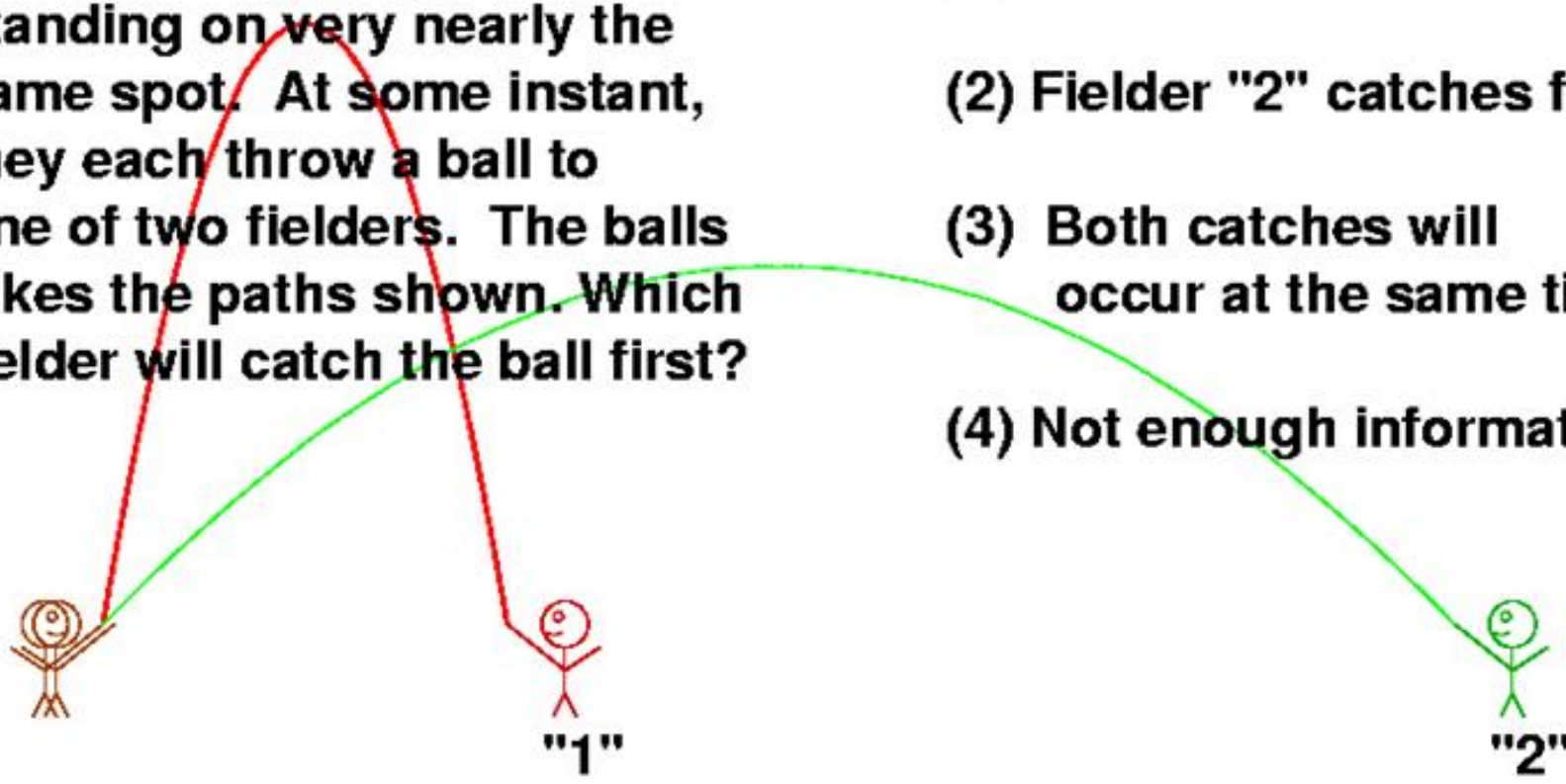
Two baseball players are standing on very nearly the same spot. At some instant, they each throw a ball to one of two fielders. The balls takes the paths shown. Which fielder will catch the ball first?

(1) Fielder "1" catches first.

(2) Fielder "2" catches first.

(3) Both catches will occur at the same time.

(4) Not enough information.



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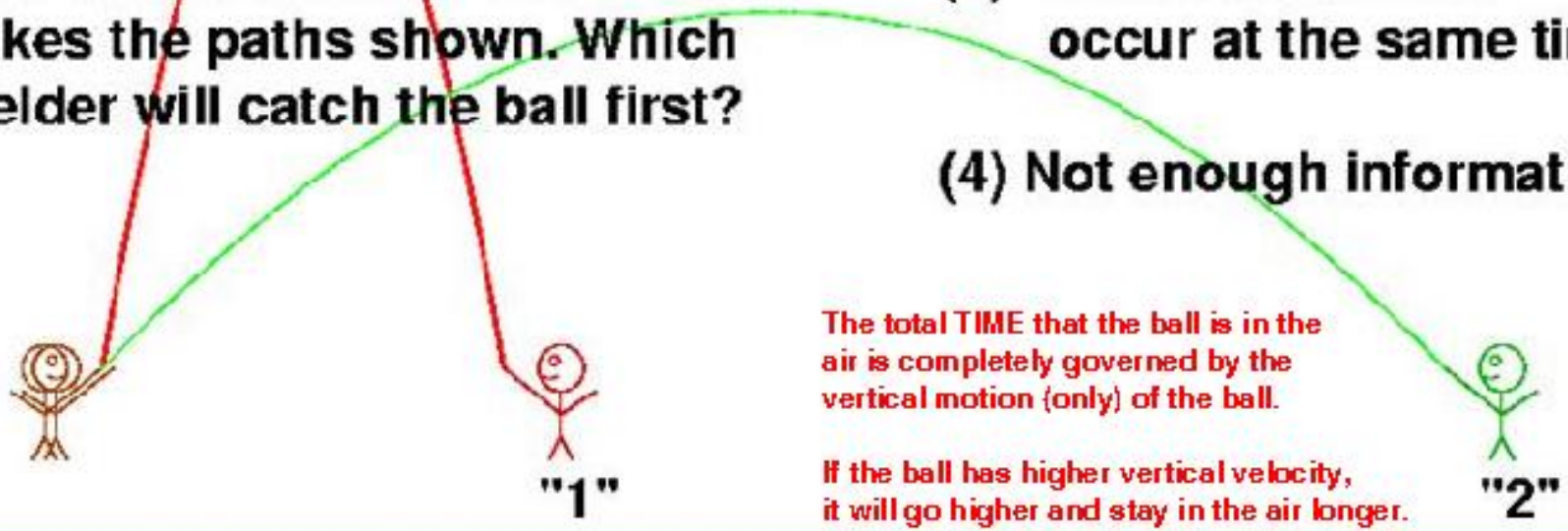
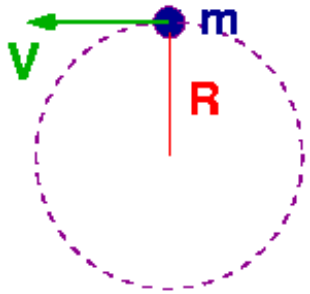


The total TIME that the ball is in the air is completely governed by the vertical motion (only) of the ball.

If the ball has higher vertical velocity, it will go higher and stay in the air longer.

A ball is attached to a string and is swung in a vertical path so that it moves with constant speed V in a circular path with radius R. At the top of the path, which of these expressions has a value equal to the magnitude of the net force on the ball?



A mg

B mV^2/R

C $mV^2/R + mg$

D $mV^2/R - mg$

E We cannot solve this without specifying the force due to the string.

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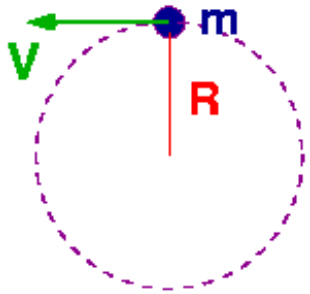


A mg

B mV^2/R $= ma$

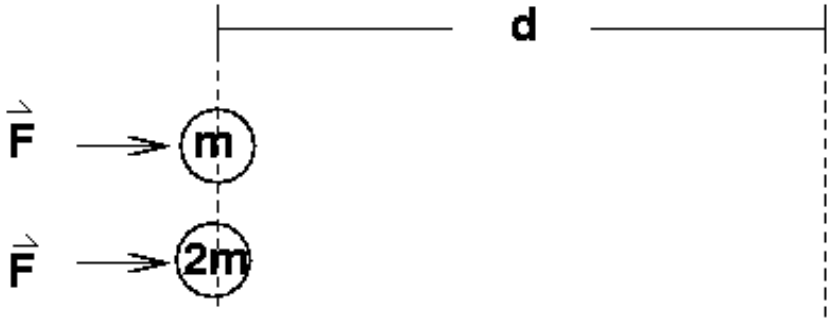
C $mV^2/R + mg$

D $mV^2/R - mg$

E We cannot solve this without specifying the force due to the string.

Two hockey pucks sit at rest on a frictionless ice surface. One puck has mass m, the other puck has mass 2m. A constant force is applied to each puck until they cross a line at distance, d.

Which puck crosses the line first?



(1) Puck with mass m

(2) Puck with mass 2m

(3) The both cross the line at the same time.

(4) It depends on the value of the constants force applied.

(5) None of these.

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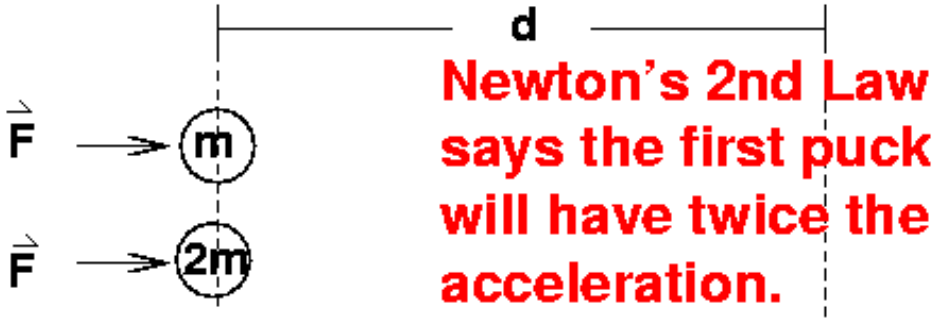


Newton's 2nd Law says the first puck will have twice the acceleration.

(1) Puck with mass m

(2) Puck with mass 2m

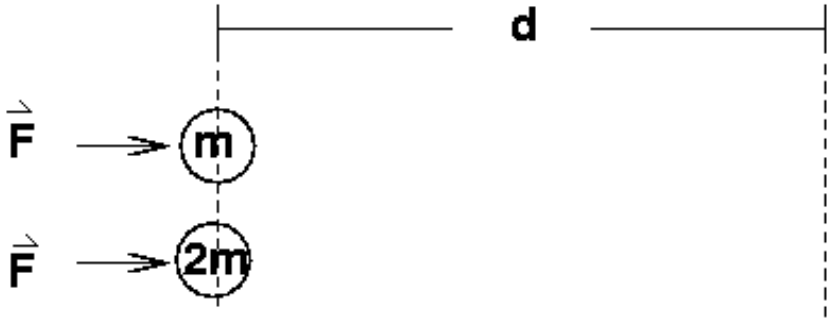
(3) The both cross the line at the same time.

(4) It depends on the value of the constants force applied.

(5) None of these.

Two hockey pucks sit at rest on a frictionless ice surface. One puck has mass m, the other puck has mass 2m. A constant force is applied to each puck until they cross the finish line.

Which puck has the greater kinetic energy when it crosses the line?



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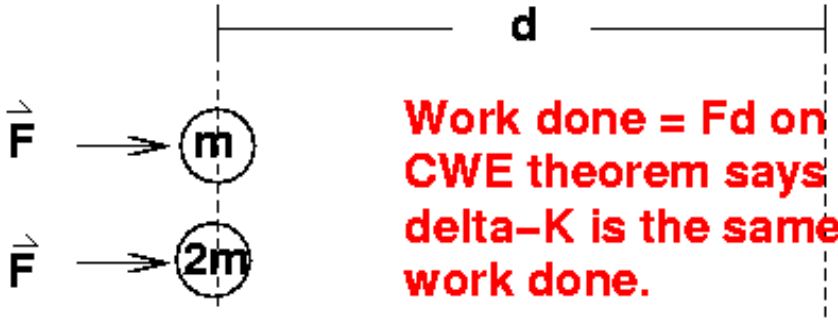


Work done = Fd on both.
CWE theorem says that delta–K is the same as the work done.

(1) Puck with mass m

(2) Puck with mass 2m

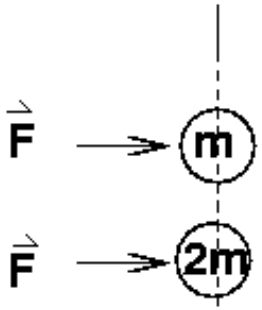
(3) The both have the same kinetic energy.

(4) It depends on the value of the constants force applied.

(5) None of these.

Two hockey pucks sit at rest on a frictionless ice surface. One puck has mass m, the other puck has mass 2m. A constant force is applied to each puck for a fixed time intervale t.

Which puck has the greater linear momentum at time t?



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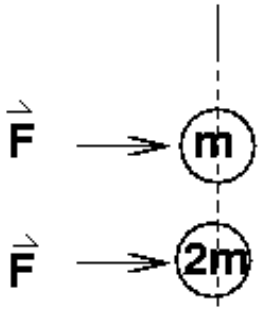


delta–p is Ft for constant force. Both pucks have the same impulse applied.

(1) Puck with mass m

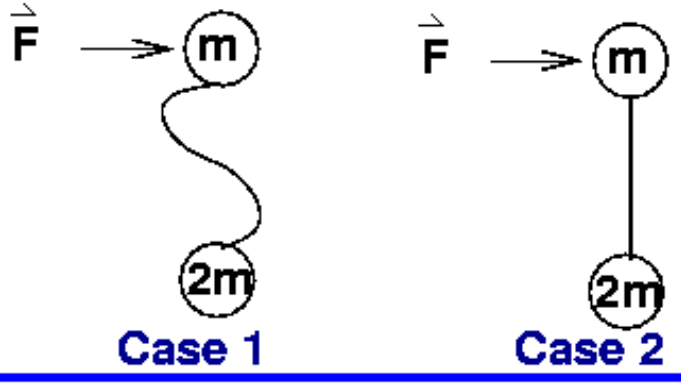
(2) Puck with mass 2m

(3) The both have the same linear momentum.

(4) It depends on the value of the constants force applied.

(5) None of these.

Two hockey pucks sit at rest on a frictionless ice surface. A constant external force is applied to one of these pucks as shown. The pucks are physically connected. In Case 1 the pucks are connected by a loose piece of string of arbitrary length. In Case 2 the pucks are connected by a massless rigid rod.



In which Case will the center of mass of the two pucks achieve the greatest speed after a fixed interval, (delta–t)?

(1) Case 1

(2) Case 2

(3) The are exactly equal.

(4) The are roughly equal.

(5) It depends critically on the length of the string.

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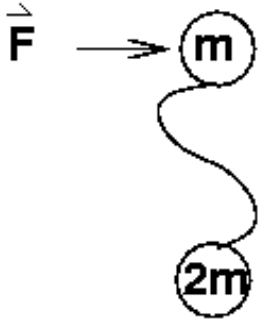
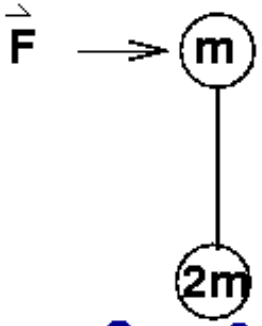


Case 1



Case 2

In which Case will the center of mass of the two pucks achieve the greatest speed after a fixed interval, (delta–t)?

(1) Case 1

(2) Case 2

(3) The are exactly equal.

(4) The are roughly equal.

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