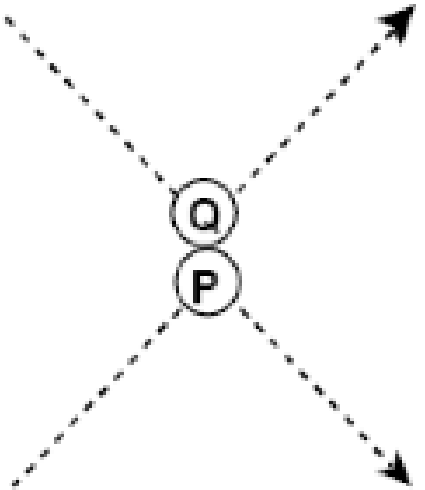
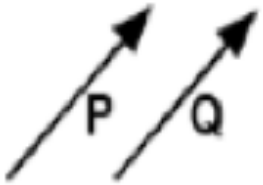
The diagram at the right depicts the path of two colliding steel balls rolling on a table. Which set of arrows best represents the direction of the change in momentum of each ball?

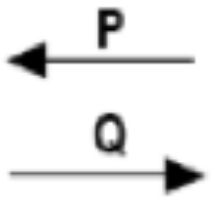


(1)

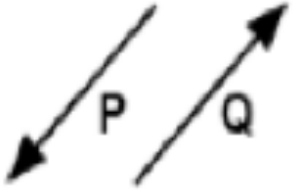
(2)



(3)

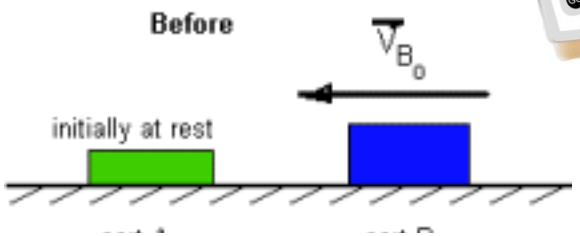


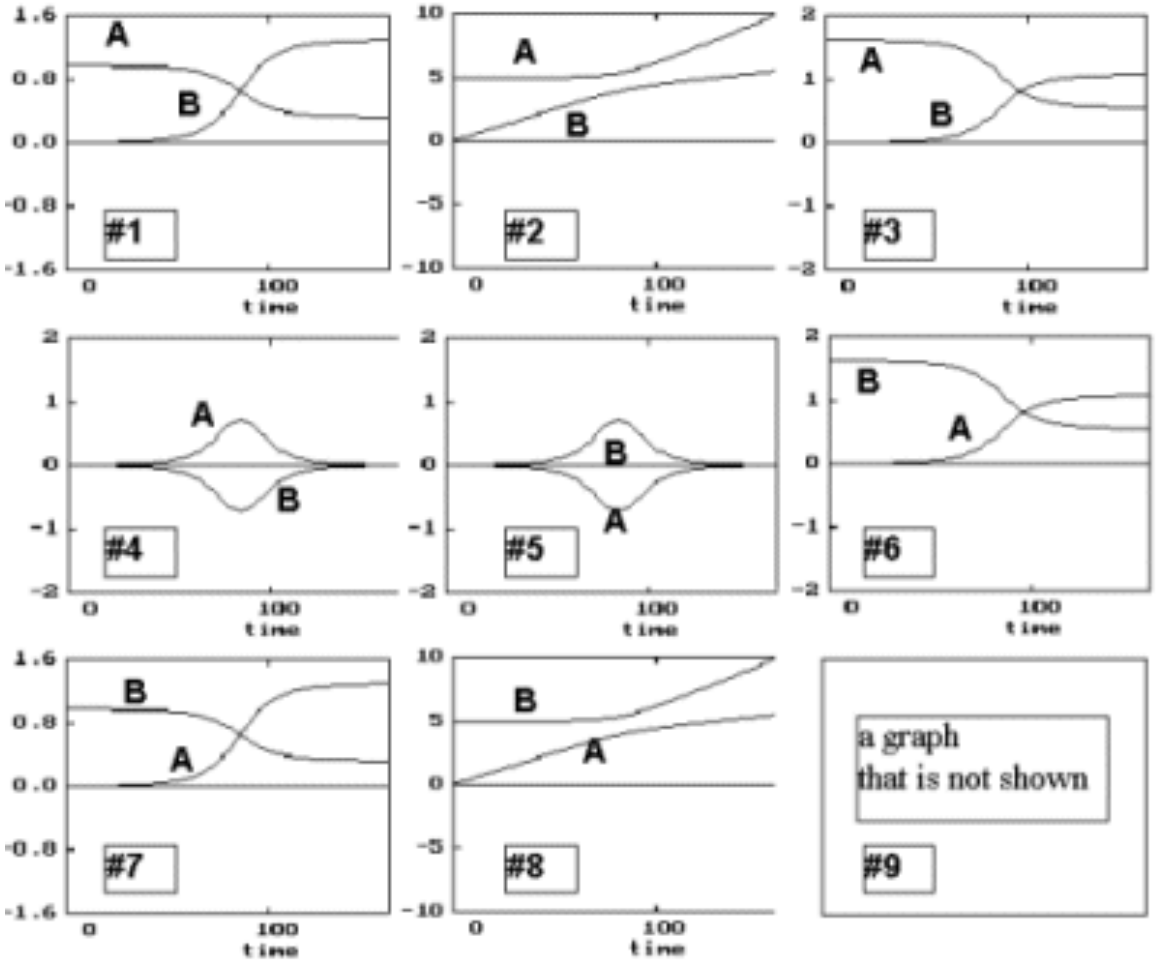
(4)



(5)

Two carts are riding on an air track. At time t = 0 cart B is at the origin traveling in the +*x* direction with speed v_{B0} cart A is at the position shown and is at rest. Cart B has twice the mass of cart A. The carts "bump" each other, but don't stick together.

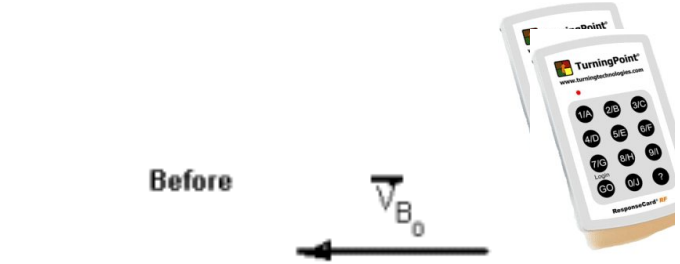


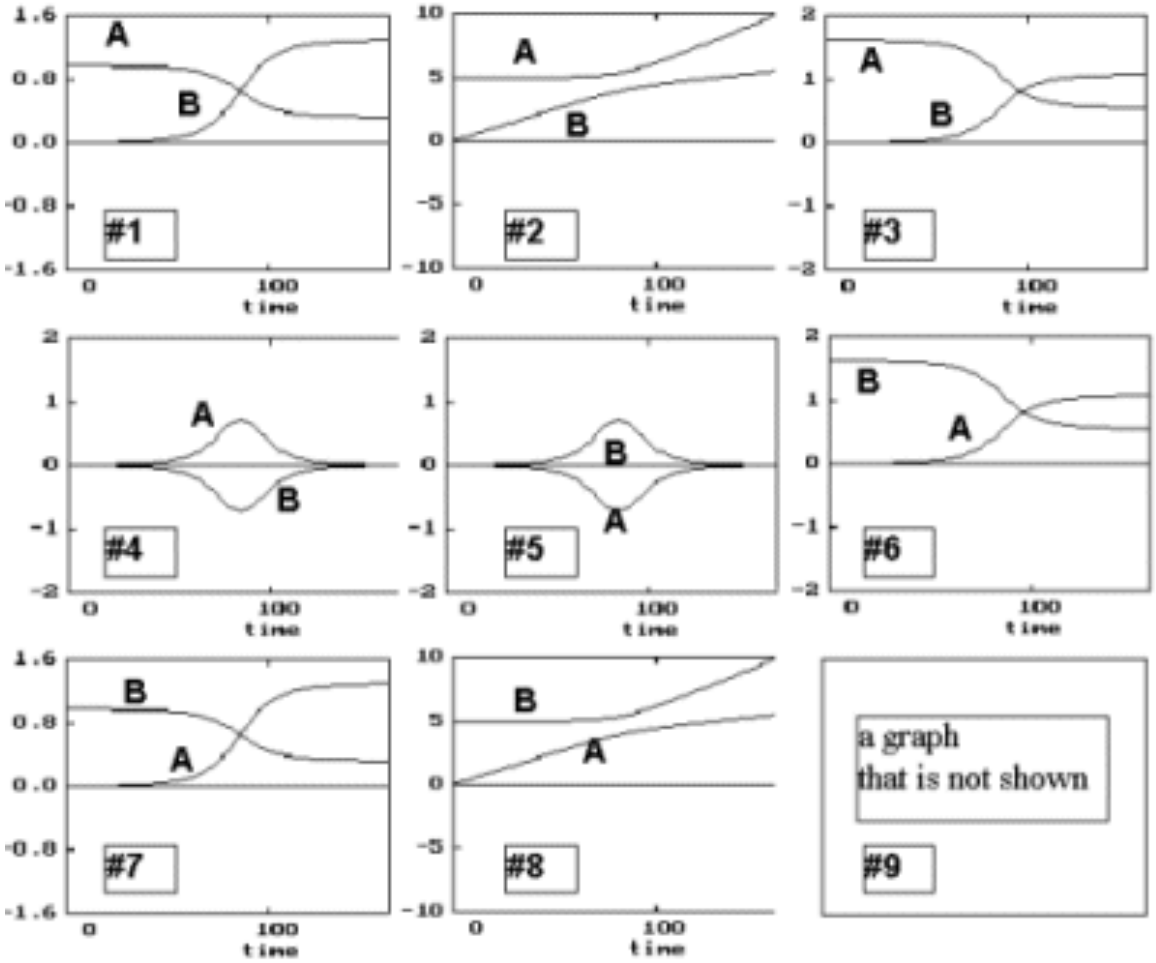


Which graph could represent

The **position** of the carts?

Two carts are riding on an air track. At time t = 0 cart B is at the origin traveling in the +*x* direction with speed v_{B0} cart A is at the position shown and is at rest. Cart B has twice the mass of cart A. The carts "bump" each other, but don't stick together.

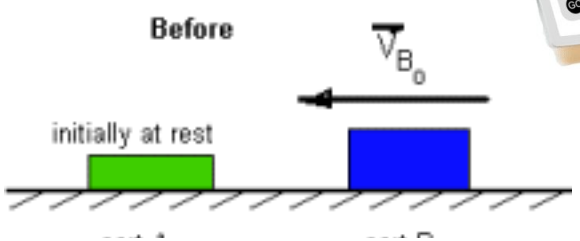


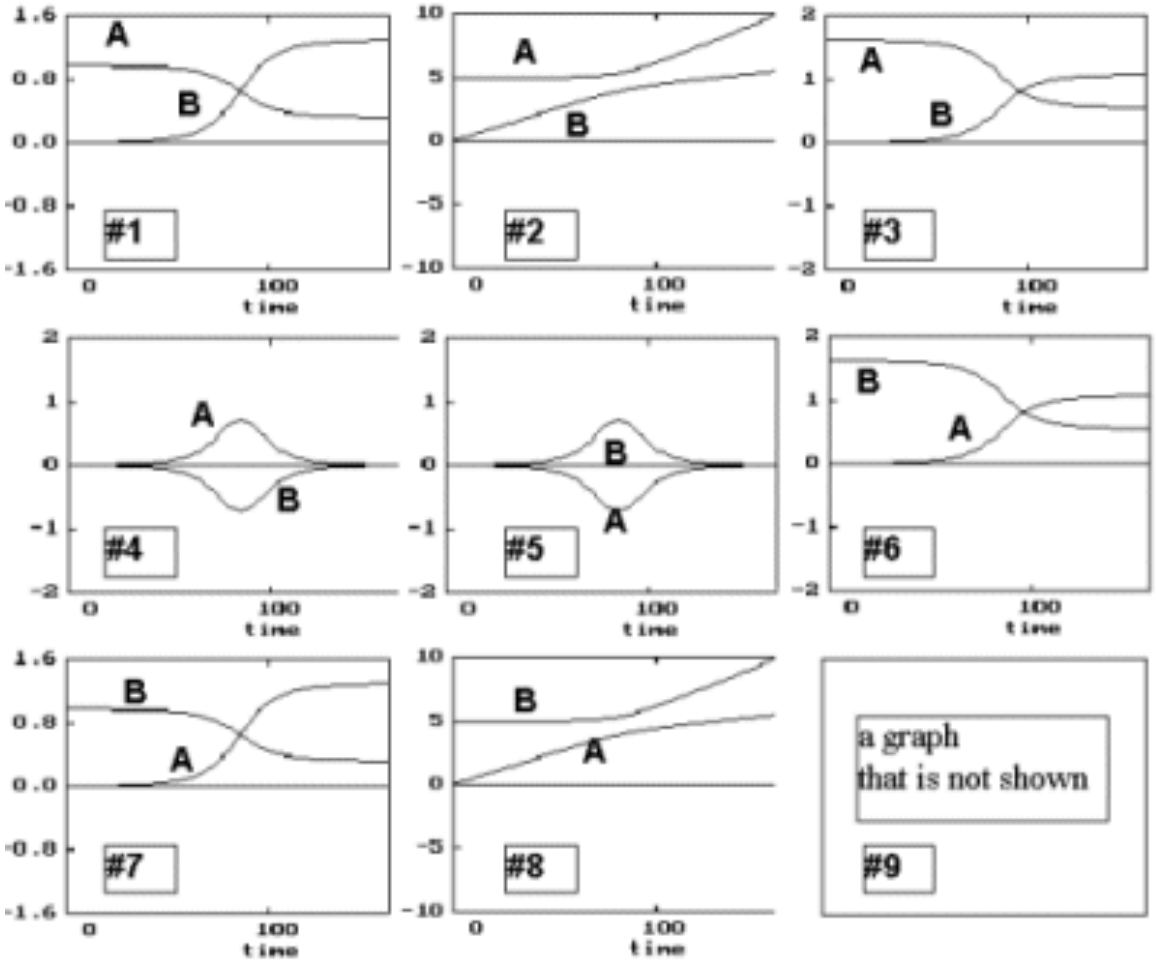


Which graph could represent

The **velocity** of the carts?

Two carts are riding on an air track. At time t = 0 cart B is at the origin traveling in the +*x* direction with speed v_{B0} cart A is at the position shown and is at rest. Cart B has twice the mass of cart A. The carts "bump" each other, but don't stick together.

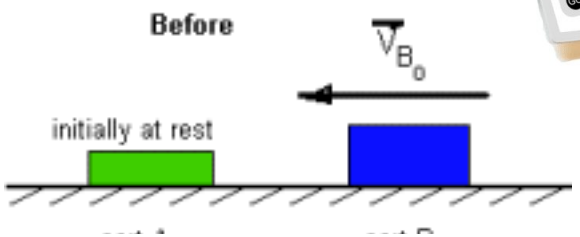


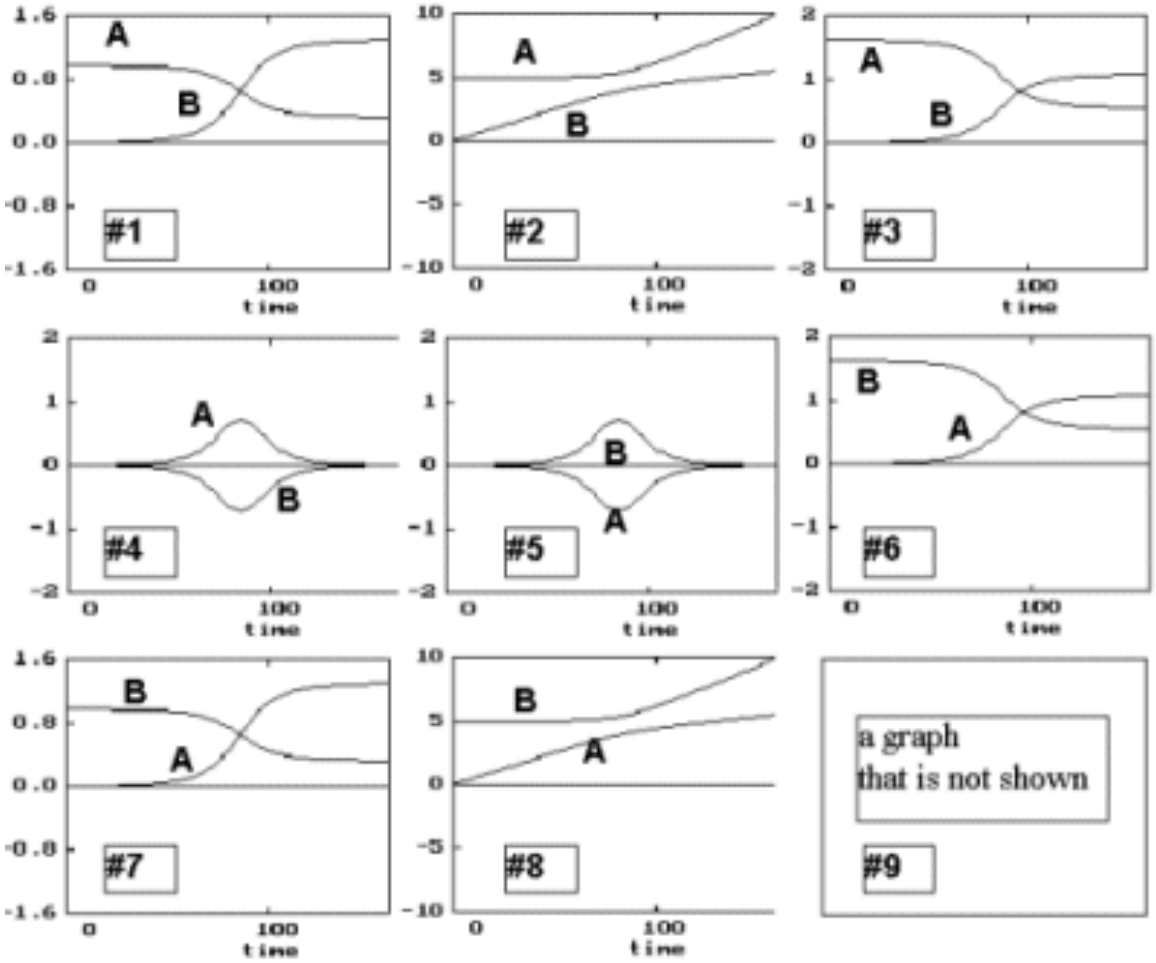


Which graph could represent

The **forces** each cart exerts on the other cart?

Two carts are riding on an air track. At time t = 0 cart B is at the origin traveling in the +*x* direction with speed v_{B0} cart A is at the position shown and is at rest. Cart B has twice the mass of cart A. The carts "bump" each other, but don't stick together.

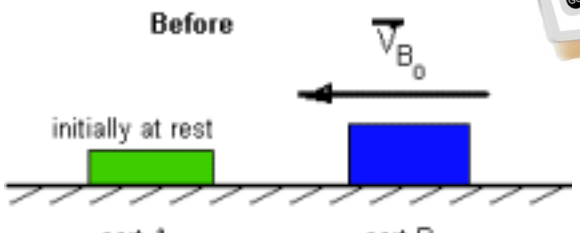




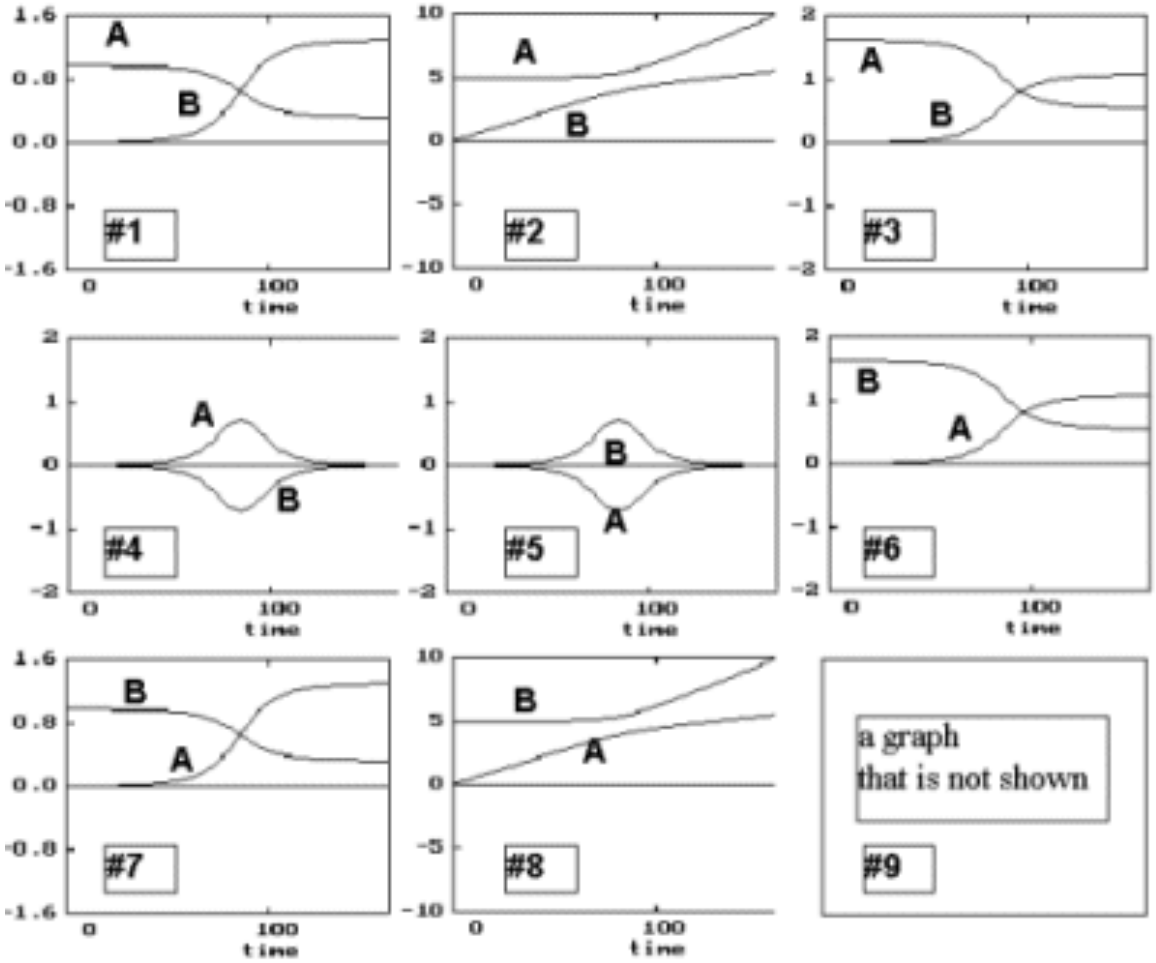
Which graph could represent

The **momentum** of the carts?

Two carts are riding on an air track. At time t = 0 cart B is at the origin traveling in the +*x* direction with speed v_{B0} cart A is at the position shown and is at rest. Cart B has twice the mass of cart A. The carts "bump" each other, but don't stick together.

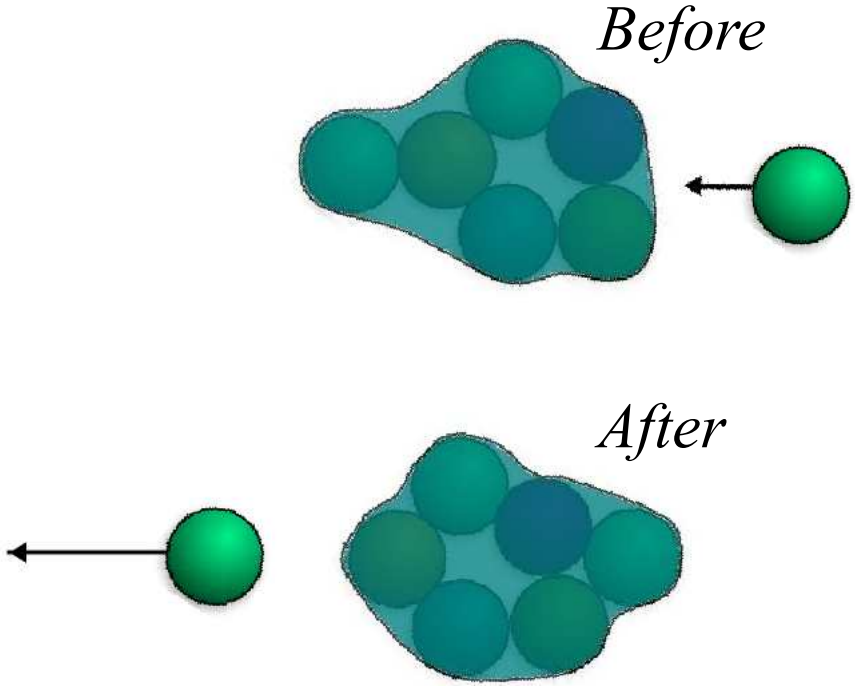


What would a graph of the **total momentum** of the carts look like?



A molecular cluster at rest collides with an atom. As a result, the atom becomes strongly bound to the cluster and an identical atom (from a different part of the molecule) gets shot off with much higher speed. What can you say about the motion of the reformed cluster after the collision?

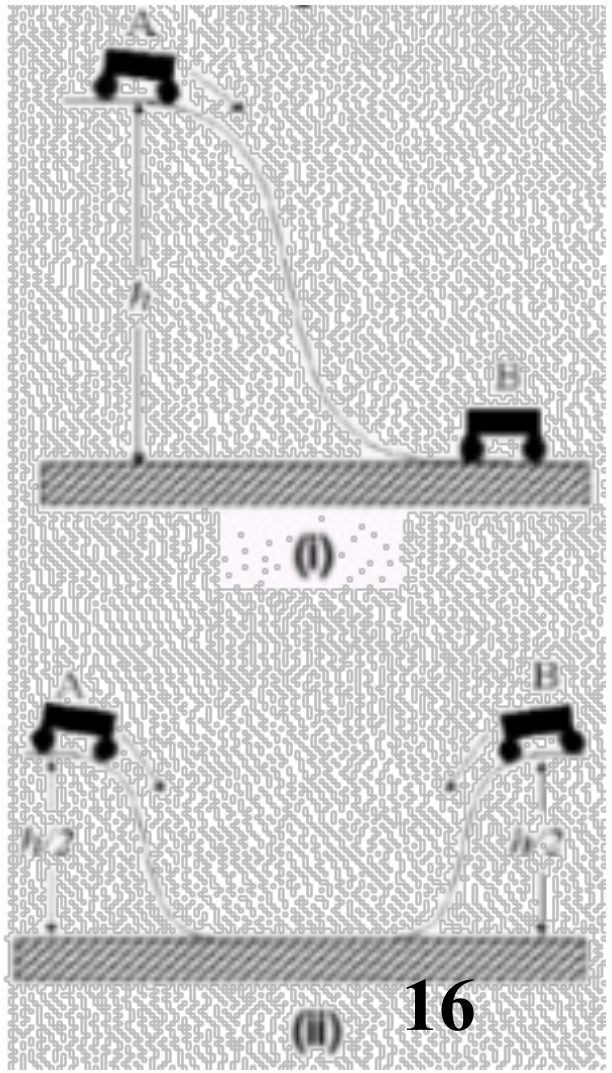
A. It will be stationary.
B. It will move to the left.
C. It will move to the right.
D. This is not really possible, despite the claim that it is.
E. You can't say anything about it from the information given.
F. Something else.



Two identical carts A and B roll down a hill and collide as shown in the figures at the right.

(i): A starts from rest. It rolls down and collides head-on with B which is initially at rest on the ground. The two carts stick together.

(ii): A and B are at rest on opposite sides of the hill. They roll down, collide head-on and stick together.



Which statement is true about the two-cart system <u>just before</u> the carts collide in the two cases?

1. The momentum of the system is zero in case (ii).
2. The momentum of the system is greater in case (i) than in case (ii).
3. The momentum of the system is greater in case (ii) than in case ii).
4. The momentum of the system is the same in both cases (but not 0).
5. More than one statement is true.

Two identical carts A and B roll down a hill and collide as shown in the figures at the right.

(i): A starts from rest. It rolls down and collides head-on with B which is initially at rest on the ground. The two carts stick together.

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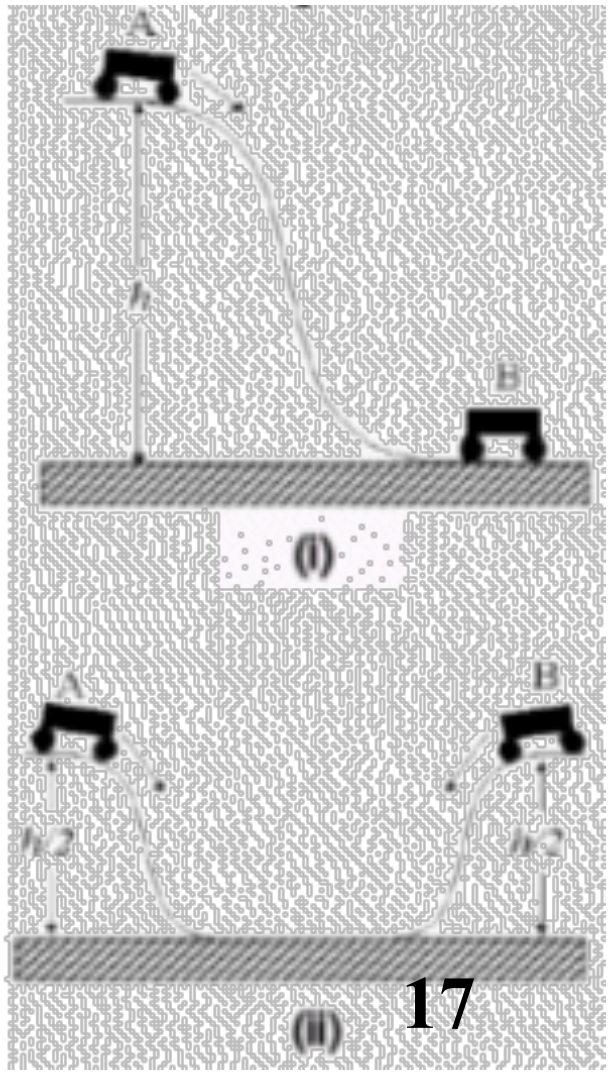

Which statement is true about the two-cart system <u>just after</u> the carts collide and stick in the two cases?

1. The momentum of the system is zero in case (ii).
2. The momentum of the system is greater in case (i) than in case (ii).
3. The momentum of the system is greater in case (ii) than in case ii).
4. The momentum of the system is the same in both cases (but not 0).
5. More than one statement is true.