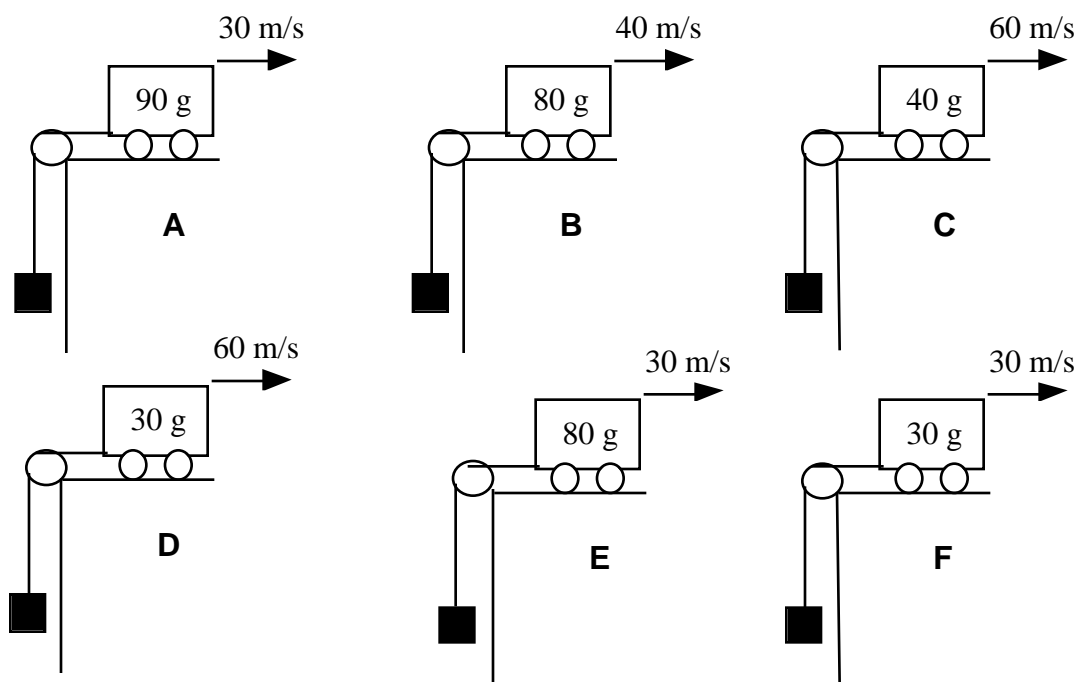


Carts Moving Along Horizontal Surface—String Tension ¹⁴

The six figures below show carts that are moving along horizontal surfaces at various speeds. The carts are the same size and shape but carry different loads, so their masses differ. All of the carts have a massless string attached, which passes over a frictionless massless pulley and is tied to a metal block that is hanging free. All of the metal blocks are identical. As the carts move to the right they pull the blocks up toward the horizontal surface, which is the top of the table.

Rank these situations, from greatest to least, on the basis of the tension in the strings at the instant shown. That is, put first the situation where the string is under the greatest tension, and put last the situation where the string is under the least tension at that instant.



Greatest 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ Least

Or, all of these strings are under the same tension. _____

Or, there is no tension in any of these strings. _____

Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

Basically Guessed

Sure

Very Sure

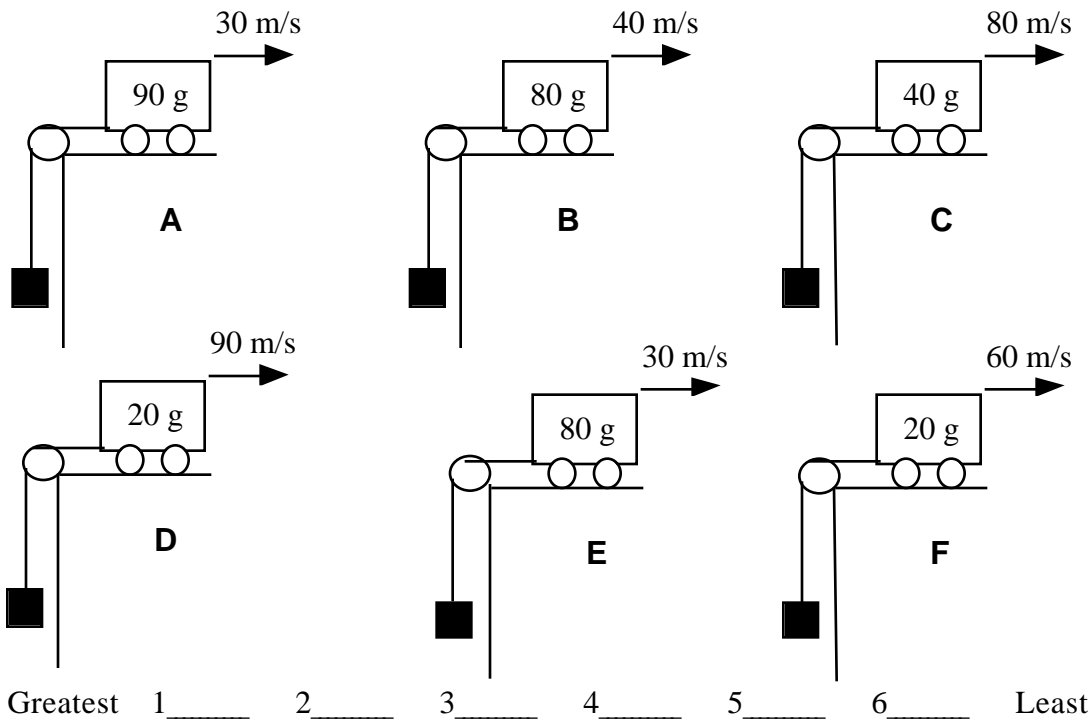
1 2 3 4 5 6 7 8 9 10

¹⁴ D. Maloney

Carts Moving Along Horizontal Surface—Acceleration ¹⁵

The six figures below show carts that are moving along horizontal surfaces at various speeds. The carts are the same size and shape but carry different loads, so their masses differ. All of the carts have a string attached, which passes over a pulley and is tied to a metal block that is hanging free. All of the metal blocks are identical. As the carts move to the right, they will pull the blocks up toward the horizontal surface, which is the top of the table.

Rank these situations, from greatest to least, on the basis of the magnitude of the acceleration of the carts. That is, put first the situation where the cart has the greatest acceleration, and put last the situation where the cart has the smallest acceleration.



Or, all of these carts have the same magnitude acceleration. _____

Or, there is no acceleration in any of these carts. _____

Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

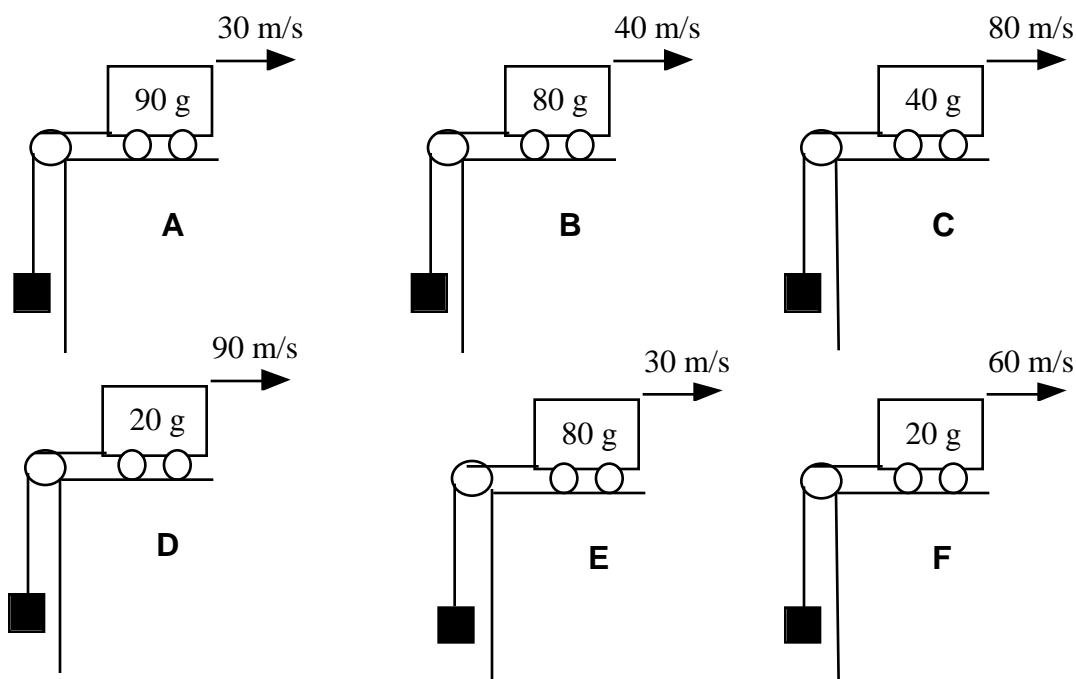
Basically Guessed Sure Very Sure
 1 2 3 4 5 6 7 8 9 10

¹⁵ D. Maloney

Carts Moving Along Horizontal Surface—Slowing Down ¹⁶

The six figures below show carts that are moving along horizontal surfaces at various speeds. The carts are the same size and shape but carry different loads so their masses differ. All of the carts have a string attached, which passes over a pulley and is tied to a metal block that is hanging free. All of the metal blocks are identical. As the carts move to the right they pull the blocks up toward the horizontal surface, which is the top of the table.

Rank these situations, from greatest to least, on the basis of which cart is slowing down most quickly. That is, put first the situation where the cart is slowing down the quickest, and put last the situation where the cart is slowing down at the slowest rate.



Greatest 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ Least

Or, all of these carts are slowing down at the same rate. _____

Or, the carts are not slowing down. _____

Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

Basically Guessed

Sure

Very Sure

1 2 3 4 5 6 7 8 9 10

¹⁶ D. Maloney