

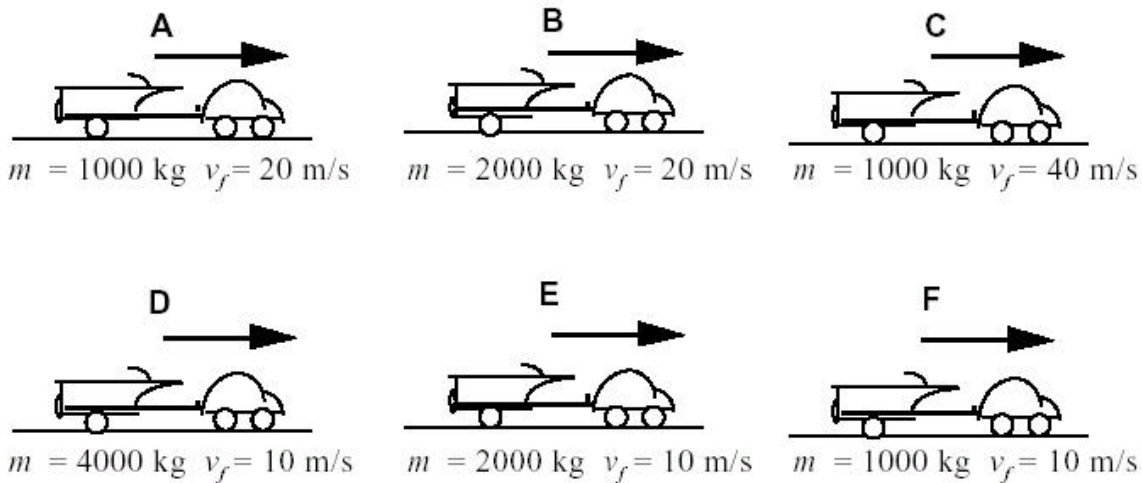
Free Body Diagrams Evaluation

(subset of *Ranking Task Exercises in Physics*)

Directions: Indicate your rankings in the space provided and show explicitly any ties (for example, a ranking of four items might be: Greatest 1 A=B 2 C 3 D 4 Least)

1. Accelerating Car and Boat Trailer—Force Difference (p. 32, P. Golden, A. Dickison, D. Maloney, T. O’Kuma, C. Hieggelke)

Rank from greatest to least on the basis of the difference between the strength (magnitude) of the force the car exerts on the boat trailer and the strength of the force the trailer exerts on the car during the period when the boat trailers are accelerating from rest to the given final speeds. All the trailers and cabs are identical, but the boat trailers have different loads, so the boat trailer masses vary.



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

Or, the differences between the two forces are the same in all situations. _____

Please carefully explain your reasoning.

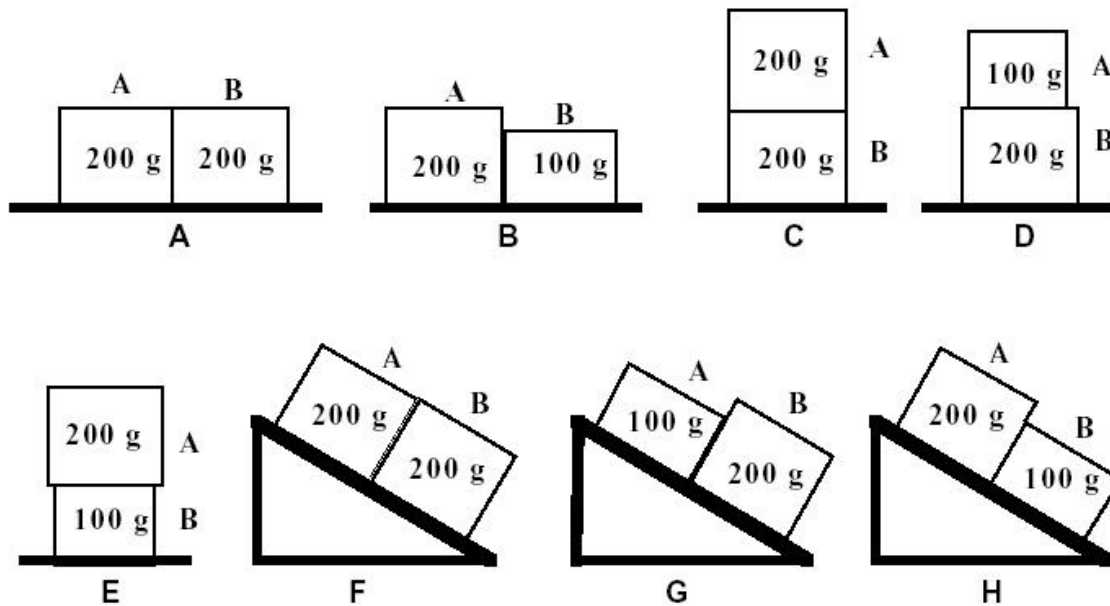
How sure were you of your ranking? (circle one)

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

2. Two Accelerating Blocks—Force Difference (p. 42, D. Maloney, C. Hieggelke)

Shown below are eight arrangements of two wooden blocks both moving left to right at 2 m/s and accelerating in the same direction at 3 m/s^2 . There are two different mass blocks, either 100 g or 200 g. In all of the arrangements, the blocks are in contact, that is, they are touching each other. As you can see, one of the blocks given in each arrangement is labeled **A**, and the other is labeled **B**. The mass of each block is given in the figures.

Rank these arrangements from largest to smallest on the basis of the difference of the strengths (magnitudes) of the forces between the force **A** exerts on **B** and the force **B** exerts on **A**. In other words, the arrangement where the force **A** exerts on **B** minus the force **B** exerts on **A** is the largest will rank first. In the same way the arrangement where the force **A** exerts on **B** minus the force **B** exerts on **A** is the smallest will rank last. Keep in mind that some of these values might be negative. If **B** is exerting a stronger force on **A** than **A** exerts on **B**, then the difference will be negative. Negative values are smaller than positive values or zero. (A force is a push or a pull.)



Largest 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ Smallest

Or, all of these differences will be the same. _____

If you think all of the differences will be the same, what is the approximate value of the difference? _____

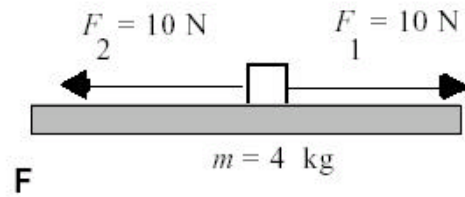
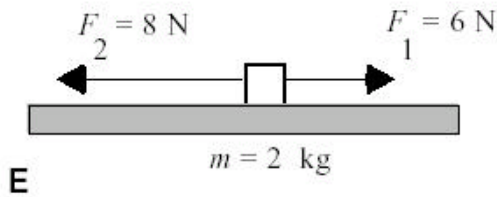
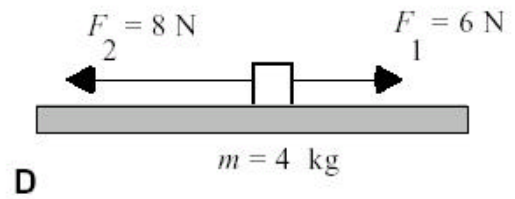
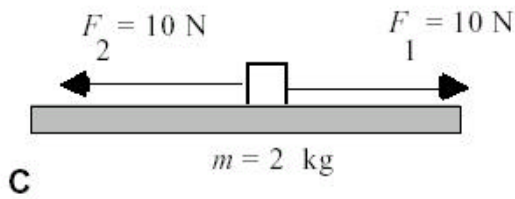
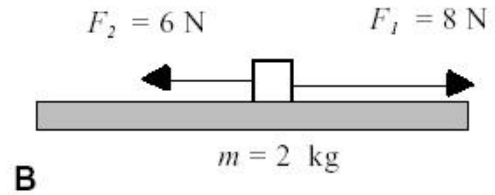
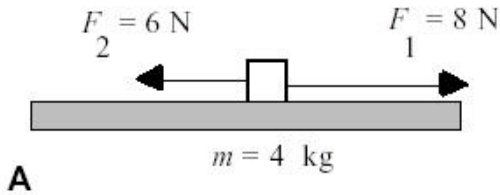
Please carefully explain your reasoning.

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

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

4. Forces on Objects on Smooth Surfaces—Velocity Change (p. 34, R. Krupp)

Two forces act on an object that is on a frictionless surface, as shown below. Rank these situations from greatest change in velocity to least change in velocity. (Note: All vectors directed to the right are positive, and those to the left are negative. Also, $0 \text{ m/s} > -10 \text{ m/s}$.)



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

Or, the change in velocity is the same in all cases. _____

Or, the velocity will not change in any of these situations. _____

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