



Two lab carts with low-friction wheels are placed on a level surface. The carts have different masses, and each cart has a spring scale attached to it. A long, stretched elastic cord pulls on the carts, as shown in the diagram above. The scales show how hard the cord pulls on the carts.

- The scales show that the two pulls are always _____. (*equal, unequal*)
- The forces (pulls) exerted on the carts by the cord cause both carts to begin moving after they are released. If both carts are released at the same time, they _____ stay together. (*do, do not*)
- The cart with the _____ mass wins the race. (*greater, smaller*) To make the race a tie, the rubber band would have to pull harder on the cart which has _____er mass.
- If we repeated this experiment on a different planet where the gravity is weaker, the answers to #3 would be _____. (*the same, different*)
- The gravitational pulls on the carts are _____ (*equal, unequal*) because they had different masses.
- If we move the carts to a different planet the gravitational _____ on them would be different (because the planet would have different gravity) but the _____ of the carts would be unchanged. (*forces, masses, speeds, temperatures*)
- The “gravitational pull” on a cart is the same thing as the cart’s _____. (*weight, mass*)
- Suppose we hold the two carts together and drop them both at the same time:
 - Some people say that the one with *greater* mass will fall faster because gravity pulls harder on it. Do you agree? _____ -Why or why not? *Try not to contradict #5.*
 - Some people say the one with the *smaller* mass will fall faster, because that’s the one that won the race in #3, above. Do you agree? _____ -Why, or why not?
 - Perhaps you noticed that freely-falling objects stay together while falling, even if their weights are different. Some people conclude that the gravitational pulls on the two different objects must be equal. Does #5 & 8ab agree with that conclusion? ____ If not, explain. *Try not to contradict #7.*
- Suppose you want to make two different objects speed up in exactly the same way, so that neither one wins the race: Some people say the rubber band must pull on them with equal forces, as in #1:
 - Do you agree? _____ *Please explain:*
 - Some people say the rubber band must pull harder on one of them. Do you agree? _____ If so, which one must be pulled harder? _____ Does #3 agree? ____
- What word above means the same thing as “pull”? _____ With what instrument would you measure a “pull”? _____ -What *units* would be used? _____ or _____
- Kilograms are units of _____. We use a balance to compare the _____ of an object with a standard amount of _____. -Does #6 agree with #11? ____ *If not, please explain.*