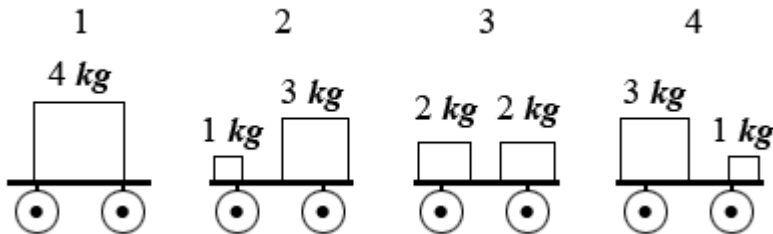


### Answer on Question #62379-Physics-Other

Each of the four identical carts above is loaded with a total mass of 4 kilograms. All of the carts are initially at rest on the same level surface. Forces of the same magnitude directed to the right act on each of the carts for the same length of time. If friction and air resistance are negligible, which cart will have the greatest velocity when the forces cease to act.

<The answer is all four carts will have the same velocity. > But why



### Solution

The velocities are all the same. According to Newton's second law,  $F = ma$ , the acceleration  $a$  (determined by the equation  $a = \frac{F}{m}$ ) depends only on the force  $F$  and the total mass  $m$ , so the distribution of mass on each cart has no effect. The total mass and the magnitude and direction of the force are the same for each cart, so the acceleration is the same. Finally, since the time over which the forces act is the same, the velocities (equal to the acceleration multiplied by the time) are also the same.

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