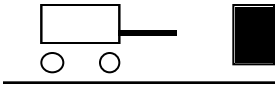
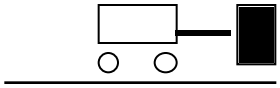
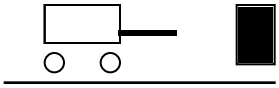
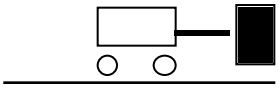
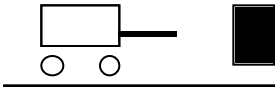
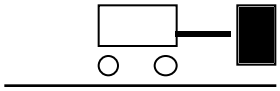
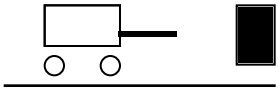
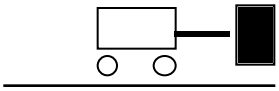
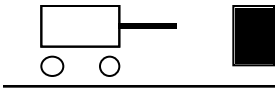
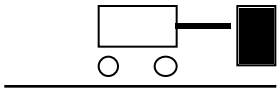
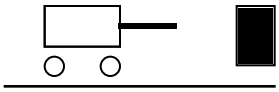
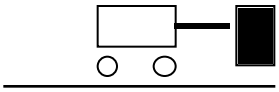
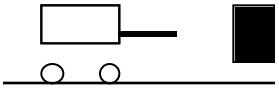
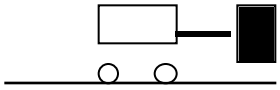
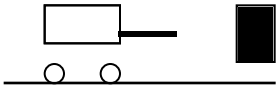
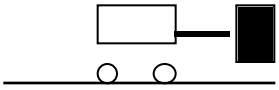
## Bouncing Cart—Change in Momentum I[77]

A cart with a spring plunger runs into a fixed barrier. The mass of the cart, its velocity just before impact with the barrier, and its velocity right after collision are given in each figure.

Rank the change in momentum for each cart from the greatest change in momentum to the least change in momentum ( + direction is to the right and - to the left with –4 < -2).

| Before | After | Before | After |
|---|---|---|---|
| 10 kg **A**  | 10 kg  | 20 kg **E**  | 20 kg  |
| $v_o$ = 3 m/s | $v_f$ = 0 m/s | $v_o$ = 2 m/s | $v_f$ = 0 m/s |
| 10 kg **B**  | 10 kg  | 20 kg **F**  | 20 kg  |
| $v_o$ = 1 m/s | $v_f$ = -1 m/s | $v_o$ = 1 m/s | $v_f$ = -1 m/s |
| 20 kg **C**  | 20 kg  | 10 kg **G**  | 10 kg  |
| $v_o$ = 2 m/s | $v_f$ = -1 m/s | $v_o$ = 2 m/s | $v_f$ = 0 m/s |
| 10 kg **D**  | 10 kg  | 20 kg **H**  | 20 kg  |
| $v_o$ = 3 m/s | $v_f$ = -3 m/s | $v_o$ = 1 m/s | $v_f$ = -2 m/s |

Greatest 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ Least

Or, all the changes in momentum are the same._____

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 |

[77] T. O'Kuma