

4 Momentum and impulse – Part 1

—Answers

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Work through these after you have tried the questions yourself.

2.1 $p = mv = 2.0 \times 6.0 = 12 \text{ kg m/s}$.

2.2 $J = F\Delta t = 5.0 \times 4.0 = 20 \text{ kg m/s}$.

2.3 $J = \Delta p = mv \Rightarrow 20 = 2.0 \times v \Rightarrow v = 10 \text{ m/s}$.

2.4 bending your knees makes the stop take a longer time; since $F = \Delta p / \Delta t$, a longer time for the same momentum change gives a smaller force.

2.5 $F = \frac{\Delta p}{\Delta t} = \frac{0.20 \times 8.0}{0.50} = \frac{1.6}{0.50} = 3.2 \text{ N}$.

2.6 taking rebound as positive, $\Delta p = m(v - u) = 0.25(10 - (-10)) = 0.25 \times 20 = 5.0 \text{ kg m/s}$.