

3 Dynamics – Part 1 —Answers

Answers

3.1 $F = ma$: resultant force = mass $\times$ acceleration (F in N, m in kg, a in m s^{-2}).

3.2 $a = F/m = 12/4.0 = 3.0 \text{ m s}^{-2}$.

3.3 $p = mv = 1500 \times 20 = 3.0 \times 10^4 \text{ kg m s}^{-1}$.

3.4 Before: $p = (0.50)(4.0) = 2.0 \text{ kg m s}^{-1}$. After: combined mass 1.0 kg, so $v = 2.0/1.0 = 2.0 \text{ m s}^{-1}$.

3.5 $W = mg = 6.0 \times 9.8 = 59 \text{ N}$.

3.6 The rocket pushes hot gas out of the back; by Newton's third law the gas pushes the rocket forward with an equal and opposite force. Equivalently, the gas gains backward momentum, so the rocket gains equal forward momentum.