

5 Work, energy and power – Part 1

—Answers

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5.1 $W = Fs = 30 \times 6.0 = 180 \text{ J}.$

5.2 $W = Fs \cos \theta = 40 \times 10 \times \cos 60^\circ = 40 \times 10 \times 0.5 = 200 \text{ J}.$

5.3 $E_k = \frac{1}{2}mv^2 = \frac{1}{2}(1200)(15^2) = 1.35 \times 10^5 \text{ J}.$

5.4 $v = \sqrt{2gh} = \sqrt{2(9.8)(5.0)} = \sqrt{98} = 9.9 \text{ m s}^{-1}.$

5.5 $P = W/t = 4500/30 = 150 \text{ W}.$

5.6 $\text{efficiency} = \frac{9}{60} = 0.15 \text{ (15\%).}$

5.7 The braking force does work Fd to remove the kinetic energy $\frac{1}{2}mv^2$. Since the energy depends on v^2 , doubling the speed gives *four times* the kinetic energy, so the braking distance becomes about *four times* as long.