

5 Work, energy and power — Part 2

— Answers

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5.1 $P = Fv = 800 \times 15 = 1.2 \times 10^4 \text{ W}$ (12 kW).

5.2 $P = mgv$ -style: useful power $= Fv = 200 \times 0.50 = 100 \text{ W}$.

5.3 efficiency $= \frac{150}{200} \times 100\% = 75\%$.

5.4 $E_p = \frac{1}{2}kx^2 = \frac{1}{2}(40)(0.30^2) = 1.8 \text{ J}$.

5.5 $\frac{1}{2}(100)x^2 = 4.5 \Rightarrow x^2 = 0.090 \Rightarrow x = 0.30 \text{ m}$.

5.6 Power is $P = Fv$. Going faster raises v , *and* the drag force F it must push against also grows with speed — so both factors increase and the power needed climbs much faster than the speed does.