

16 Work and the first law — Part 2

— Answers

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Work through these after trying the questions yourself.

16.1 $W = p \Delta V$.

16.2 It does work on the surroundings.

16.3 $\Delta U = q + W$.

16.4 $\Delta U = 50 + 20 = 70 \text{ J}$.

16.5 $W = p \Delta V = (2.0 \times 10^5)(1.5 \times 10^{-3}) = 300 \text{ J}$ on the surroundings.

16.6 The gas does work on the surroundings, so work done *on* it is $W = -50 \text{ J}$. $\Delta U = q + W = 80 + (-50) = 30 \text{ J}$ — internal energy rises by 30 J.

16.7 With $q = 0$, $\Delta U = W$. Compressing the gas does work *on* it (W positive), so ΔU is positive: the internal energy rises and the temperature goes up. (This is why a bicycle pump gets warm.)