Collins Engineering Physics Questions – C2E

QUESTIONS

12. A gas at a pressure of $60\,Nm^{-2}$ occupies a volume of $250\,cm^3$. The gas has $\gamma = 1.67$. If the gas is pressurised very quickly and its pressure increases to $150\,Nm^{-2}$, calculate the new volume. Assume no heat leaves the system.

QUESTIONS

13. A gas is initially at a temperature of $40\,°C$ and occupies $450\,cm^3$. The gas has $\gamma = 1.33$. The gas expands very quickly and its temperature drops to $10\,°C$. Assuming no heat leaves the system, calculate its final volume.

QUESTIONS

14. When you are pumping up a tyre on a bicycle (Figure 12), you will have noticed that the bicycle pump becomes warmer. Use the first law of thermodynamics to explain this effect.

Figure 11

15. A gas (whose γ is 1.4) is initially at a pressure of $40\,Nm^{-2}$ and occupies a volume of $10\,m^3$.
    a. If it is compressed *isothermally* to $2\,m^3$, calculate its new pressure.
    b. If, instead, it is compressed *adiabatically* to $2\,m^3$, calculate its new pressure.
    c. Sketch a p–V graph for the changes to show the effect of the two types of compression.

QUESTIONS

16. A gas is compressed by a sequence of constant-volume and constant-pressure processes, as shown in the indicator diagram in Figure 14. Calculate the work being done *on* the gas in total from A to E.

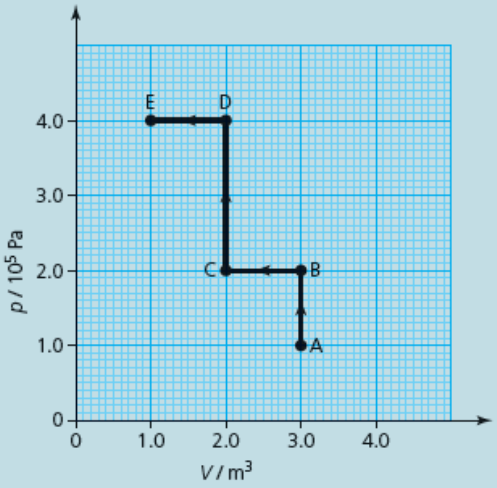

Figure 14

17. A gas does work against the environment, and its pressure and volume change as shown in Figure 15. Estimate the work done by the gas.

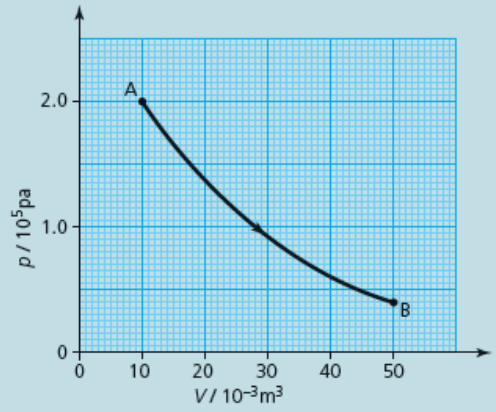

Figure 15