49. One part of path A represents a constant pressure process. The volume changes from $1.0\,\mathrm{m}^3$ to $4.0\,\mathrm{m}^3$ while the pressure remains at $40\,\mathrm{Pa}$. The work done is

$$W_A = p\,\Delta V = (40\,\mathrm{Pa})\left(4.0\,\mathrm{m}^3 - 1.0\,\mathrm{m}^3\right) = 120\ \mathrm{J}\ .$$

The other part of the path represents a constant volume process. No work is done during this process. The total work done over the entire path is $120\,\mathrm{J}$. To find the work done over path B we need to know the pressure as a function of volume. Then, we can evaluate the integral $W = \int p\,dV$. According to the graph, the pressure is a linear function of the volume, so we may write $p = a + bV$, where a and b are constants. In order for the pressure to be $40\,\mathrm{Pa}$ when the volume is $1.0\,\mathrm{m}^3$ and $10\,\mathrm{Pa}$ when the volume is $4.00\,\mathrm{m}^3$ the values of the constants must be $a = 50\,\mathrm{Pa}$ and $b = -10\,\mathrm{Pa/m}^3$. Thus $p = 50\,\mathrm{Pa} - (10\,\mathrm{Pa/m}^3)V$ and

$$\begin{aligned} W_B &= \int_1^4 p\,dV = \int_1^4 (50 - 10V)\,dV = \left(50V - 5V^2\right)\Big|_1^4 \\ &= 200\,\mathrm{J} - 50\,\mathrm{J} - 80\,\mathrm{J} + 5\,\mathrm{J} = 75\ \mathrm{J}\ . \end{aligned}$$

One part of path C represents a constant pressure process in which the volume changes from $1.0\,\mathrm{m}^3$ to $4.0\,\mathrm{m}^3$ while p remains at $10\,\mathrm{Pa}$. The work done is

$$W_C = p\,\Delta V = (10\,\mathrm{Pa})(4.0\,\mathrm{m}^3 - 1.0\,\mathrm{m}^3) = 30\ \mathrm{J}\ .$$

The other part of the process is at constant volume and no work is done. The total work is $30\,\mathrm{J}$. We note that the work is different for different paths.