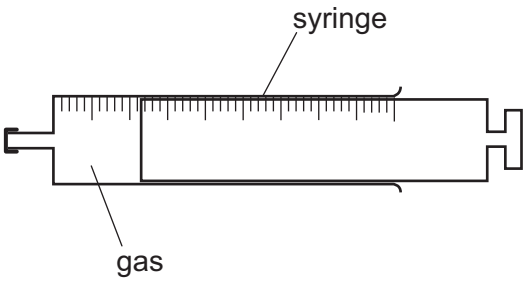
**16** A gas is contained inside a syringe, as shown.




The initial volume of the gas is 2.00 $cm^3$.

Atmospheric pressure is 101 kPa.

What is the work done by the gas on the atmosphere when the gas is heated and expands to a volume of 6.00 $cm^3$?

**A** 404 μJ **B** 404 mJ **C** 404 J **D** 404 kJ

**17** A mechanical device does useful work at rate *X* and wastes energy at rate *Y*.

Which expression gives the efficiency of this device?

**A** $\frac{X}{Y}$ **B** $\frac{(X-Y)}{Y}$ **C** $\frac{X}{(X+Y)}$ **D** $\frac{(X-Y)}{(X+Y)}$

**18** Car P has kinetic energy 240 kJ.

Car Q has half the mass and twice the speed of car P.

What is the kinetic energy of car Q?

**A** 120 kJ **B** 240 kJ **C** 480 kJ **D** 960 kJ

**19** A water pump is driven by an engine. The pump raises a volume of 0.50 $m^3$ of water in 1.0 minute from a depth of 30 m. The pump has an efficiency of 70%.

The density of water is 1000 kg $m^{-3}$.

What is the useful output power from the engine?

**A** 2.5 kW **B** 3.5 kW **C** 150 kW **D** 210 kW