2 **(a)** State what is meant by the *internal energy* of a gas.

.....

.....

..... [2]

(b) The first law of thermodynamics may be represented by the equation

$$\Delta U = q + w.$$

State what is meant by each of the following symbols.

$+\Delta U$ .....

$+q$ .....

$+w$ .....

[3]

(c) An amount of 0.18 mol of an ideal gas is held in an insulated cylinder fitted with a piston, as shown in Fig. 2.1.

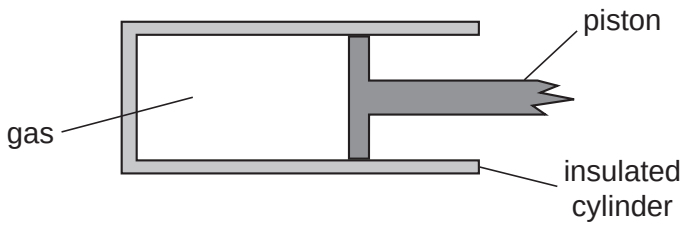

Fig. 2.1

Atmospheric pressure is 1.0×10^5 Pa.

The volume of the gas is suddenly increased from 1.8×10^3 cm^3 to 2.1×10^3 cm^3.

For the expansion of the gas,

(i) calculate the work done by the gas and hence show that the internal energy changes by 30 J,

[3]

(ii) determine the temperature change of the gas and state whether the change is an increase or a decrease.

For Examiner's Use

change = ... K

.....
[3]