

- 3 (a) State the *first law of thermodynamics*, indicating the direction of all energy changes.

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[2]

- (b) Use the first law of thermodynamics to explain why specific heat capacity of an ideal gas measured at constant volume is lower than the specific heat capacity when measured at constant pressure.

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[2]

- (c) State 2 reasons why temperature of a body is not a measure of the amount of internal energy in a body.

[2]

(d) (i) A car tyre has a fixed internal volume of 0.0360 m^3 . The temperature and pressure of the air inside the car tyre is 25.0°C and $2.62 \times 10^5 \text{ Pa}$ initially. An additional 0.30 mol of air was pumped into the tyre at constant temperature of 25.0°C . Air can be considered as an ideal gas in this case.

(i) 1. Show that the original amount of air particles in the car tyre is 3.8 mol .

[1]

2. Determine the final pressure of the gas inside the tyre.

pressure = Pa [2]

[Total: 9]

