

Report on A1 (2007)

Section A

Q1. 171 attempts, Mean Mark. 3.5, Standard Deviation 1.2

Nearly all students were able to define a function of state. Many were unable to give a generic expression for the change in entropy.

Q2. (Carnot cycle) 171 attempts, Mean Mark 5.9, Standard Deviation 1.4

Generally the question was well done although quite a few students just asserted the formula for the efficiency of the cycle.

Q3. (thermal conductivity) 171 attempts, Mean Mark 3.3, Standard Deviation 2.1

A much harder question, although nearly all students realised they had to equate the heat generated with that diffusing through the gas. The commonest mistake was not to realise the units thermal conductivity are per unit area and then to fail to include the area of the cylinder walls.

Q4. (effusion) 171 attempts, Mean Mark 3.9, Standard Deviation 1.9

An 'easy' effusion question. Most students generated the effusion formula but came horribly unstuck putting in the numbers. Some very odd attempts were made using Stefan's Law and the Clausius Clapeyron equation.

Q5. (mean-free path) 171 attempts, Mean Mark 5.8, Standard Deviation 2.3

Most candidates were able to derive the mean-scattering time between collisions and calculate this for an atmosphere of only nitrogen.

Q6. (isothermal & adiabatic compressibilities) 171 attempts, Mean Mark 3.4, Standard Deviation 2.3

This question was very well done by those who attempted it. However several candidates made no attempt at all.

Section B

Q7. (viscosity) 164 attempts, Mean Mark 16.3, Standard Deviation 3.0

Nearly all candidates could identify the components of the equation and were able to derive the expression for viscosity. Those who couldn't wrote nothing. The numerical part was surprisingly poorly done: candidates didn't realise a shear stress is a force per unit area. Several candidates tripped up converting from rpm to rad/s. Additionally many complicated the problem by trying to make it an integral, i.e. they tried to reproduce the answer to a common tutorial problem not realising this question was easier.

Q8. (partition function) 161 attempts, Mean Mark 13.7, Standard Deviation 4.1

A relatively straightforward question on the partition function which was popular, and which generated a good distribution of marks.

Q9. (Clausius-Clapeyron) 146 attempts, Mean Mark 11.9, Standard Deviation 4.2

This standard question on the Clausius-Clapeyron relation generated a good spread of marks and was popular. Some candidates obtained silly answers by not realising that the vapour pressure of water vapour is atmospheric at the boiling point.

Q10. (normal modes of a string) 41 attempts, Mean Mark 6.7, Standard Deviation 3.8

A few years ago this maths question on modes and Fourier series might have appeared in Prelims and produced good solutions. It was remarkably poorly answered, and seemed for the majority of those who attempted it to be a "question of last resort" hoping to pick up a few marks, whereas in fact many didn't even recognise what the question was about.