0 English for special purposes, the final exam   1403/03/30

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1 The density of liquid Helium is $(125 \, \mathrm{kg \, m^{-3}})$. The mass of one mole Helium is $(4 \, \mathrm{g})$. The Avogadro number is $(6 \times 10^{23} \, \mathrm{mol^{-1}})$. What is the volume corresponding to one molecule of Helium (the total volume divided by the number of molecules)?

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2 A horse power (hp) is $(750 \, \mathrm{W})$. The energy released in the combustion of gasoline is $(3 \times 10^7 \, \mathrm{J \, lit^{-1}})$. Consider a car with the power $(100 \, \mathrm{hp})$ moving at the speed of $(25 \, \mathrm{m \, s^{-1}})$. How many kilometers does this car move for consuming $(1 \, \mathrm{lit})$ of gasoline?

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3 The potential energy for two charges q at a distance r from each other is $(K \, q^2 \, r^{-1})$, where K is a positive constant. Two similar particles, each of charge q and mass m, are moving towards each other. Initially, their distance from each other is very large and the speed of each is v. As they come closer to each other, their speed decreases, so that at some distance r, their speed becomes zero. This r is proportional to $(m^\alpha \, v^\beta)$, where α and β are constants. What is α?

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4 In the previous problem, what is β?

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5 Denote the right digit of your student number by x. Multiply x by 3. Denote the right digit of the result by y. What is y?

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6 Good luck

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Please write the answers in boxes and return only the answer sheet.

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student number: **0**

1 $\quad 5 \times 10^{-29}\,\mathrm{m}^3$

2 $\quad 10$

3 $\quad -1$

4 $\quad -2$

5

0	1	2	3	4
↓	↓	↓	↓	↓
0	3	6	9	2

5	6	7	8	9
↓	↓	↓	↓	↓
5	8	1	4	7