

**To: Students taking F.4 Physics course in 2003-2004**

Congratulations!! You are admitted to the F.4 Physics course.

The course cannot be described as easy and there are cases in which students were asked to switch to other subjects after one month's trial. Hard and independent work, efficient and effective learning with strong desire in improving understanding are the keys to success. In order to prepare for the course, you are expected to do something during the summer holiday.

- 1. Revise 'Heat' and complete printouts of the three presentation files on 'Heat' posted on web.**
- 2. Complete the section 'Heat' (P. 1 – 51) in 'Physics 1 Worked Examples & Graded Exercises 5<sup>th</sup> edition by Aristo'.**
- 3. Answer (on foolscap papers) the following open-ended conceptual questions related to Mechanics.**

1. If a body has zero velocity, can it be accelerating? If yes, give one example. (Hint: p. 20-28)
2. Can a body be accelerating in a direction opposite to that of its velocity? If yes, give one example. (Hint: p.20-28)
3. A ball is thrown upward from the top of a cliff (at a height of H) and then it falls to the ground. Find the time taken for the whole trip. Show your steps clearly. (Hint: p. 54 -59)
4. Two balls of mass 1 kg and 2 kg are thrown upward with the same velocity, finally they fall back to their projection points. Which quantities are the same for the two balls?
  - (a) the total time of flight
  - (b) the height reached
  - (c) the velocity when they reach the ground
5. The famous Physicist, Galileo, had proposed that no force is needed to keep a body moving uniformly. However, when a book is given a slight push on a table, it stops finally. Why? (Hint: p. 74 – 78)
6. It is said that the air resistance has a greater effect on lighter bodies. According to this, a heavier body falls at a faster rate. However, it is also said that a small iron ball and a large cannon ball reach the ground at the same time. So actually do heavier bodies fall at faster rate? (Hint: p.82 – 84)
7. Balances are used to measure the mass. When used in the Moon, which one (spring balance or beam balance or both) will give the correct mass? (Hint: p. 101)
8. If an object is placed on the floor inside a lift, and then the cable of the lift is cut, would the object flow when the lift is falling freely? (Hint: p. 102 – 103)
9. Why do we feel weightless inside a lift if its cable suddenly breaks? (Hint: p. 102-103)
10. A swimmer swims forward, how should he push the water? Explain with a force diagram. ( Hint: p. 118 – 122)

11. In textbook, it said that for every action force, there is a reaction force which is opposite in direction and of same magnitude. With the two forces, why can we move? (Hint: p.118 – 122)
12. A man standing on a bathroom balance and the reading shows 150 kg (usually the balance has its reading calibrated to kg). The man changes his posture to squatting, during this change, how will the reading of the balance change? Explain your answers.
13. A fly is flying in an empty sealed container and is remaining at the same position by moving its wings. The container is placed on a balance and the balance reading is N. After sometime, the fly died and its body dropped to the bottom of the container. How will the balance reading change? Explain your answer.
14. It is claimed that when we lift a heavy book with constant velocity, we are actually NOT doing any work, why? Why 'constant velocity' is stated in the statement? (Hint: p.136 – 143)
15. A heavy truck had a head-on collision with a small compact car in a car accident. The car is seriously damaged but not the truck. Why? (Hint: 189 – 191)
16. Is there collision that
  - (a) momentum of the system is conserved but the kinetic energy of the system is not conserved?
  - (b) kinetic energy of the system conserved but the momentum of the system is not conserved?
  - (c) kinetic energy and momentum of the system are not conserved?If yes, give example. (Hint: 189 – 200)

**(compulsory for students taking Physics in F.4)**

- ?? Revise `Heat` and complete printouts of the three presentation files on `Heat` posted on web.
- ?? Complete the section `Heat` (P. 1 – 51) in *Physics 1 Worked Examples & Graded Exercises 5<sup>th</sup> edition by Aristo*.
- ?? Answer (on foolscap papers) 16 open-ended conceptual questions related to Mechanics posted on web.