

Science-I

August 12, 2014

Due at 11:30 on Monday August 18, 2014

Please feel free to discuss with others the ‘logic’/‘reasoning’ of questions in this assignment. However, all the ‘final’ work submitted is expected to be written up by yourself, and showing your individual understanding and work for this assignment. All cases of cheating/plagiarising will be reported and recommended F grade for this course, without any exception.

1. Hindu Mythology has a special reverence for the Sun; one of its names literally means ‘giver of all life on earth’. Can this be rationally/scientifically explained ? Explain why (or why not) in about 10 sentences.
2. What is the average walking speed of a human ? Perform the experiment under varying conditions. What is the (average) maximal speed ?
3. For the various process listed below, figure out (by experimentation) the energy, time and length scales involved (mentioning how you estimated them and if not, why it is not estimatable):
 - (a) motion of your eye lid (i.e. blinking)
 - (b) climbing up 1 floor (about 25 steps)
 - (c) walking 30 steps
 - (d) running 30 steps
4. "Mars Chocolate Bar" vs "Petrol":
 - (a) compare their energy content (i.e. extractable energy) and cost
 - (b) In view of your answer to (a), why do they cost the same ?
 - (c) Give an example (a different one !) comparing two commodities which have same energy content but have differing price/cost; clearly mention the energy and cost for both.
5. Mosquitoes mainly eat the nectar and juices from the plants. Assuming that the nectar and fruit juice have same energy content as 'table sugar' (both in terms of volume and mass), find the amount that a mosquito has to consume to keep flying for a whole day. Clearly list the assumptions and their logic. What does this say about the amount of time the mosquito actually flies ?