Re-examination On being a scientist 1
5 July 2016

1. Which of the following statements is/are not falsifiable?
   a. Planetary positions at the moment of our birth somehow influence our personalities
   b. All substances expand when heated
   c. All points on a (Euclidean) circle are equally distant from the centre
   d. It never rains on Sunday
   e. There is life in outer space
   f. Fried locusts are very tasty
   g. There are no green swans

A: a (too vague), c (definition), e (no way to exclude this option) and f (subjective) are not falsifiable (subtract 3 points for every mistake)

2. Which of the following statements are part of the general guidelines for the use of animals in biomedical research
   a. Don't use animals in case of adequate alternatives
   b. Don't use a higher species if a lower would suffice
   c. No animal experiment should be conducted that would not be permitted on a human
   d. Minimize incidence & severity of pain and distress

A: all except for c. (subtract 5 points for every mistake)

3. Advocates of "open access" publication distinguish the 'green model' and the 'gold model'. What are some of the main differences?

   a. In the gold model the author pays for the publication costs in stead of the subscriber to the journal
   b. In the green model only biodegradable paper is used
   c. In the gold model papers can be submitted to a repository after an embargo period
   d. In the gold model all journals are electronic (on-line) journals

A: a and d are true, b is nonsense and c applies to the green model (subtract 5 points for every mistake)

4. Watson & Crick have received all the credit for the so-called discovery of the century, the structure of DNA. Many scientists, however, now take a more critical stance with regard to their achievement, because

   a. They used Rosalyn Franklin's data without her knowledge or consent
   b. They failed to give enough credit to the work of Franklin
   c. They mainly toyed with models, rather than following the proper scientific method
   d. They relied heavily on the work and advice of several others

e. They didn't realize that the structure they proposed could account for the copying mechanism of the genetic material

A: a and b (subtract 5 points for every mistake)

5. Which characteristics are not part of the modern notion of a scientific discipline?

a. a specific field of research

b. a long standing tradition, reaching back to the seventeenth century
c. a set of research practices
d. a community of experts
e. a life long commitment to the discipline

A; b and e (subtract 5 points for every mistake)

Essay questions

6. It is widely believed that science owes its success to its specific way of working, better known as "the scientific method". Many others, however, claim that the scientific method is little more than a myth. What is the general view of "the scientific method" and why is it dismissed by many critics?

A: Step by step process, something like: question or observations → theory or hunch → hypothesis → experiment → rejection (→ modify hypothesis) or confirmation. (4 points)In practice this is rarely an apt description of how scientists work: projects rarely follow a step by step, linear recipe but are rather messy; some projects aim at practical results rather than theory; some projects are mainly explorative (lack theory or hypothesis); some are based largely on theoretical arguments or thought experiments, rather than real experiments. (6 points)

7. According to *On Being a Scientist: a guide to responsible conduct in science*, "the scientific enterprise is built on a foundation of trust". Explain what the authors mean by this statement.

A: 1. Scientists trust that the results reported by others are valid. 2. Society trusts that the results of research reflect an honest attempt by scientists to describe the world accurately and without bias. (5 points each)

8. What are the main mutual responsibilities of beginning researchers and their advisers?

A: 1. The main role of an adviser or mentor is to help a researcher move along a productive and successful career trajectory. By maintaining and modeling high standards of conduct, advisers and mentors gain the moral authority to demand the same of others. 2. Beginning researchers also have responsibilities toward their advisers and mentors. They should develop clear expectations with advisers and mentors concerning availability and meeting times. Also, beginning researchers have a responsibility to seek out and work with mentors rather than expect that potential mentors will seek them out (though potential mentors often do take the initiative in establishing these relationships). Or anything else that makes sense. (5 points each)

9. Many critics question the desirability or even acceptability of research on the relationship between intelligence and race, class, or sex. Give at least two reasons for their discomfort.

A: Race is an ill founded concept, individuals from same race may have more genetic variation between them than individuals from different races. More importantly correlations suggest but don't show causal relations. Then there are strong suspicions about the motives behind this kind of research, which can easily be abused to legitimize inequalities by t suggesting that the social and economic differences between human groups — primarily races, classes, and sexes — arise from inherited, inborn distinctions and that society, in this sense, is an accurate reflection of biology.

10. John contributed to a large research project, for which he collected and processed part of the data. His master's thesis is largely based on this work. To his astonishment he noticed that his supervisor had submitted an article that listed neither him nor any of the other master students as co-authors. They were only named in the acknowledgements. The paper has not yet been published and his thesis has not yet been graded by his supervisor. Discuss his options.

A: he can 1) inquire about the conventions in such situations before taking action; 2)discuss the matter with the supervisor, accepting the latter's final decision; 3) confront his supervisor and demand to be listed as co-author (possibly ruining their working relationship); 4) contact the editors of then journal and submit a formal complaint (same effect); 5) contact the supervisor's superior, asking for intervention or mediation; 6) contact a confidentiality counsellor (1: 2 pts, 2: 4, 3: 7 pts, 4: 10 pts)