Study questions for [K] Chaps 6-8: Anomalies and Crises

Chap 6

1. What is the distinction between discovery and invention?
2. Why is the claim that Priestely discovered oxygen problematic? Why is the claim that Lavoisier discovered oxygen problematic?
3. According to Kuhn, what is the distinction between discovering *that*, and discovering *what*?
4. How were the discoveries of oxygen and X-rays similar? How were they different?
5. What are some characteristics of discoveries in which new sorts of phenomena emerge?
6. Why is normal science so effective in causing anomalies to arise?

Chap 7

7. According to Kuhn, why is the emergence of new theories preceded by a period of professional insecurity?
8. Besides the breakdown of the normal technical puzzle-sovling aspect of the Ptolemaic paradigm, what other factors contributed to the astronomical crisis that faced Copernicus? Of all these factors, which does Kuhn think was the most significant?
9. According to the phlogiston theory, what should happen to a natural body when it is roasted (i.e., heated)? Why did this eventually lead to a crisis for the phlogiston theory?
10. What role did the ether play in the crisis in theories of electromagnetism in the late 1800's?
11. What does Kuhn mean when he says, "As in manufacturing, so in science--retooling is an extravagance to be reserved only for the occassion that demands it."

Chap 8

12. What do scientists *never* do when confronted by even severe and prolonged anomalies?
13. What is the "essential tension" implicit in scientific research?
14. What happens to paradigms (like geometric optics) that have seemed to completely resolve all their problems?
15. Why is it that failure to achieve a solution discredits only the scientist and not the theory?
16. What are some reasons that Kuhn considers for why an anomaly comes to seem more than just another puzzle of normal science?
17. What are the three different ways in which all crises evenutally end?
18. In what sense does Kuhn think that paradigm change is *not* like a gestalt switch?
19. What role does philosophical analysis play in periods of crisis?
20. How does Kuhn explain the observation that most scientists responsible for the invention of new paradigms are young?

Study questions for [K] Chaps 9-13, Postscript Sections 4-7: Revolutions

Chap 9

1. Why does Kuhn think the analogy with political revolutions holds not only for major episodes of scientific change, like the Copernican revolution, but also for "far smaller ones", like the discovery of X-rays?
2. Why are scientific revolutions affected not only by the impact of nature and of logic, but by techniques of persuasive argumentation?
3. According to Kuhn, must the emergence of a new phenomenon (a scientific "discovery") always lead to a revolution? Must the emergence of a new *theory* always lead to a revolution?
4. Why must there be a conflict between the paradigm that discloses an anomaly and the one that later renders the anomaly lawlike?
5. According to Kuhn, in what sense is Einstein's theory fundamentally incompatible with Newton's theory?
6. How could you argue that Newton's theory was not proven wrong by Einstein's, or that the phologiston theory was not proven wrong by the later oxygen theory of combustion?

7. Why does Kuhn think Newtonian dynamics cannot be derived as a special case of relativistic (i.e., "Einsteinian") dynamics?
8. What are the two ways successive paradigms can differ, according to Kuhn?
9. How was Newton's theory of gravity a problem for the standards of explanation associated with the "mechanico-corpuscular" world view of the time?
10. What does Kuhn mean when he says "...paradigms provide scientists not only with a map but also with some of the directions essential for map-making"?

Chap 10

11. According to Kuhn, in what ways are gestalt experiments involving perception similar to paradigm shifts? In what ways are they different?
12. How does Kuhn explain the fact that Chinese astronomers were able to document changes in the heavens much earlier than Western European astronomers?
13. Why does Kuhn think that Lavoisier "worked in a different world" after discovering oxygen?
14. What is the traditional view of Lavoisier and Priestley that contrasts with Kuhn's view? How does Kuhn argue against this view?
15. Does Kuhn think sensory experience is fixed and neutral?
16. On page 129, Kuhn claims that "the scientist after a revolution is still looking at the same world". How can you reconcile this statement with the one in #13 above?
17. Can different paradigms employ the same methods of measurement and techniques of manipulation? If so, how?

Chaps 11-13, Postscipt Sections 4-7

16. What are some ways in which revolutions are hidden from view?
17. According to Kuhn, how is the competition between rival paradigms unlike standard philosophical accounts of testing theories?
18. Does Kuhn view the "lifelong resistance" of some scientists (especially those "...whose productive careers have committed them to an older tradition of normal science") to a new paradigm unscientific?
19. What are some reasons Kuhn thinks a new paradigm is chosen over an older one?
20. How does Kuhn describe progress during normal science?
21. How does Kuhn describe progress during paradigm change?

Study questions for [GS] Chapter 6: Revolutions

1. What are some ways in which normal science and revolutions differ?
2. What two things does large-scale scientific change usually require?
3. Why won't a crisis alone induce scientific change?
4. According to Kuhn, is there anything that all paradigms have in common?
5. Describe the two kinds of scientific change in Kuhn's picture.
6. What does it mean to say that different paradigms in a field are incommensurable with each other?
7. What are the two aspects of the problem of incommensurability?
8. How does the notion of incommensurability depend on a holistic theory of meaning?
9. What is incommensurability of *standards*?
10. According to Kuhn, is science heading toward an ideal paradigm, superior to those that have come before?
11. According to Kuhn, how should we understand progress in science?
12. Why does science appear to progress from the point of view of a given paradigm?
13. What is "problem-solving power"? Is it compatible with the notion of incommensurability?
14. What does it mean to say that, after a revolution, "scientists work in a different world"?