ANSWER KEY

DIRECTIONS: Answer all questions. Read the questions carefully; the wording matters.

PART I.

Multiple Choice. 9 questions. 1 point each. Circle the *best* answer. Circle only *one* answer for each question.

1. According to Samir Okasha, a plausible candidate for a distinguishing feature of science is its methods. Which of the following does Okasha *not* list as a characteristic method of science?

   (a) Experiments
   (b) Observations
   (c) Theory construction
   (d) **Use of technology ✓**
   - **Source of answer: Okasha p. 1**
   - **On study guide: #10**

   (e) None of the above

2. Hilary Putnam is critical of Rudolf Carnap's understanding of how justification works in science. Which of the following expresses Putnam's view on the matter?

   (a) Observation terms *never* justify theoretical terms
   (b) **Justification in science proceeds in any direction that may be handy ✓**
   - **Source of answer: Putnam p. 334**
   - **On study guide: #34**

   (c) Sciences that attempt to explain or justify claims rather than simply describe them are broken-backed
   (d) Claims about theoretical terms can't be justified using *causal* concepts about observation terms
   (e) There is no excuse (or justification) for people not realizing, after 89 years, that *Hilary* spelled with one 'l' is a man's name

3. N. R. Hanson argues that fundamental physics is primarily a search for intelligibility and that microphysicists seek new modes of conceptual organization. Given his view that knowledge, experience, and theories determine our conceptual organizations, why might this make settling scientific disputes difficult?

   (a) Because physicists can always argue that measuring instruments have been miscalibrated
   (b) Because government-backed organizations such as NASA set research agendas
   (c) Because different data can be given different interpretations
   (d) **Because physicists with different theories, while looking at the same thing, can see different things ✓**

- **Source of answer: Hanson p. 347**
- **On study guide: #37**

(e) Because people don't realize that experimental physics is more important than theoretical physics

4. According to the physicist from the in-class multiverse video (Matthew Johnson), why is it incorrect to claim that the multiverse hypothesis is not scientific?

(a) Critics do not understand the mathematics sufficiently

(b) There may exist a universe in which the hypothesis *is* scientific

(c) **At least some versions of the hypothesis make predictions** ✓

- **Source of answer: Directly from video**
- **On study guide: #2**

(d) Computer simulations show the hypothesis is true

(e) The laws of nature were different shortly after the Big Bang

5. W. T. Stace calls forces in physics fictions. Which of the following does he also believe?

(a) Physics should focus on discovering particles such as quarks and leptons instead of forces

(b) **Some physical laws that use the term force are true** ✓

- **Source of answer: Stace p. 353-54**
- **On study guide: #42 (#41 on revised study guide)**

(c) We can understand how causation works at the atomic level using forces

(d) We can't compare Einstein's concept of the force of gravity with Newton's

(e) Since the Standard Model in physics does not have a good account of the force of gravity, it is more supported, not less

6. In connection to the Necker Cube example, N. R. Hanson argues that instantaneous interpretation is an idea which philosophers force on the world to preserve a pet epistemological or metaphysical theory. What is another way to characterize this criticism?

(a) Philosophers have a naive concept of data

(b) Philosophers misunderstand the history of science

(c) **Philosophers are making Ad Hoc revisions to their theories** ✓

- **Source of answer: Knowing what Ad Hoc means**
- **On study guide: #36**

(d) Philosophers are only seeing with their eyes, not their minds

(e) Philosophers are "hypnotized, drugged, drunk, [and] distracted"

7. How does Rudolf Carnap distinguish empirical laws from theoretical laws?

(a) Empirical laws are more general than theoretical laws

(b) Empirical laws are more well established than theoretical laws

(c) Theoretical laws eventually become empirical laws

(d) **Theoretical laws contain different kinds of terms than empirical laws ✓**

- **Source of answer: Carnap p. 318**
- **On study guide: #30**

(e) All of the above

8. Rudolf Carnap warns against rejecting too rashly anticipatory visions of scientific theories, such as Democritus' idea that everything consists of atoms. However, Carnap adds that the anticipatory theory must meet the following criterion:

(a) The theory must contain more than one theoretical term

(b) The theory must only use causal inferences relating to objects of perception

(c) The theory must be able to explain at least as much as the currently accepted theory

(d) The theory must be immune to Ad Hoc revisions

(e) **The theory must at least have the possibility of being tested at some future time ✓**

- **Source of answer: Carnap p. 330**
- **On study guide: #27**

9. Despite the efforts of Karl Popper and others, no one has come up with fully successful criteria demarcating science from pseudo-science. Invoking the philosopher Ludwig Wittgenstein's discussion of 'games', Samir Okasha suggests that we may never find such criteria. Why?

(a) Because sciences, like games, are typically competitive, which is also true of pseudo-sciences

(b) Because sciences, like games, involve statistical randomness

(c) Because sciences, like games, are social activities

(d) **Because sciences, like games, have no fixed set of features that define them ✓**

- **Source of answer: Okasha p. 13**
- **On study guide: #13**

(e) Because sciences, like games, though they may be interesting, are not necessary for human flourishing

PART II.

Short Answer (1-3 sentences). 8 questions. 2 points each. Make your answers *clear* and *specific*. Please write the number of each question next to your answer in the Blue Book.

1. Why does Darwin's theory of evolution, as originally put forward, pose a problem for Rudolf Carnap's observable/nonobservable distinction, according to Hilary Putnam?

- **ANSWER: Because the theory only refers to observables.**
  - **Source of answer: Putnam p. 334**

  - **On study guide: #31, verbatim**

2. While there is no consensus on the definition of philosophy, there are three *kinds of answers* that can be given. What are they?

   - **ANSWER: Descriptive, methodological, and thematic answers.**
     - **Source of answer: Lecture graphic from April 1**
     - **On study guide: #3, nearly verbatim**

3. Karl Popper argues that people who explain away data that appear to conflict with their theories, rather than accepting that the theories have been refuted, are practicing pseudo-science. What is Samir Okasha's criticism of this view?

   - **ANSWER: This procedure is routinely used by respectable scientists and has led to important discoveries.**
     - **Source of answer: Okasha p. 11-12**
     - **On study guide: #9, nearly verbatim**

4. According to W. T. Stace, why have human beings invented and discuss metaphysical monsters such as forces and bumps in space-time despite the fact that they are nothing but fictions?

   - **ANSWER: Because we have never emancipated ourselves from the idea that science explains things. Or, because we want to know 'why'. Or, because they help our imaginations.**
     - **Source of answer: Stace p. 355**
     - **On study guide: #42 (#41 on revised study guide)**

5. According to John Ziman what quality or feature do science, religion, law, and philosophy share?

   - **ANSWER: They are "more or less coherent set[s] of ideas".**
     - **Source of answer: Ziman p. 49**
     - **On study guide: #17, nearly verbatim**

6. According to Rudolf Carnap, what is the supreme value of a new theory?

   - **ANSWER: The power to predict new empirical laws.**
     - **Source of answer: Carnap p. 320**
     - **On study guide: #30**

7. According to Samir Okasha, what is the principal task of philosophy of science?

   - **ANSWER: "To analyse the methods of enquiry used in the various science."**
     - **Source of answer: Okasha p. 9**
     - **On study guide: #12, verbatim**

8. John Ziman contends that technology, art and religion are possible for Robinson Crusoe, but not law and science. Why?

    - **ANSWER: Because law and science are social activities.**
        - **Source of answer: Ziman p. 51**
        - **On study guide: #16, nearly verbatim**

PART III.

Extra Credit. 2 questions. 1 point each.

1. Which band has recorded the best version of the theme to *Chariots of Fire*?

    Answer: _____

    - **ANSWER: The Bad Plus**

2. In the in-class video, Hilary Putnam stated that no one really understands quantum mechanics. Nevertheless, he believes that there is something about the science that is (two words):

    Answer: _____ _____

    - **ANSWER: Fundamentally right**