

Geology/Physics 156 Midterm 2 Exam:

Name: _____

Confine your answers to the space provided and write legibly for the short answer questions. There is a total of 150 points on this exam.

Part I: True or False: Circle your answer. 2 pts each

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|----|--|-----|
| 1 | Descartes was the first to introduce the idea of reductionism | T F |
| 2 | Mathematics provides the illusion that science is perfect and precise | T F |
| 3 | An empiricist would say that the purpose of science is simply to observe accurately | T F |
| 4 | Kant argues that the mind organizes the Universe | T F |
| 5 | Lyell was a champion of Catastrophism | T F |
| 6 | The origin of fossils was well understood by the 18 th century | T F |
| 7 | By the time of Darwin, the age of the earth was known to be at least 1 billion years | T F |
| 8 | From 1750-1800 the Third World had more than 2/3 of global manufacturing | T F |
| 9 | William Herschel discovered the planet Neptune | T F |
| 10 | The Universe of Newton Is Infinite | T F |

Part II: Multiple Choice: Choose the **Best** Answer (4 pts)

- 11 Enlightenment thinkers contributed to changes in relationships between citizens and governments through their primary belief that
- A Most governments are dangerous and need to be overthrown
 - B Monarchy is an antiquated and evil form of government
 - C Governments primary duty is to enforce the Rule of Law
 - D Governments need to define Social Order
 - E None of the above
- 12 The application of Science and Reason forms the basis for
- A The Enlightenment
 - B The Renaissance
 - C The Reformation
 - D The Scientific Revolution
 - E None of the above
- 13 America was most **directly** founded on
- A Newtonian Science
 - B Locke's view of the role of government
 - C Hobbs' view of the role of government
 - D Montesquieu and the separation of power
 - E All of the above

- 14 Enlightenment thinkers believed society was best governed by
- A Religion
 - B The Use of Reason
 - C A Social Contract
 - D Scientific processes
 - E Political Philosophers
- 15 Hobbes believed that all humans were inherently
- A Benevolent
 - B Selfish and evil
 - C Ambitious and motivated
 - D Intelligent and reasonable
 - E Irrational and prone to error
- 16 The notion that the long neck of a giraffe developed over time because of the need to reach food high in trees was proposed by
- A Darwin
 - B Cuvier
 - C Lamarck
 - D Malthus
 - E No one would propose such a preposterous thing
- 17 Darwin spent a lot of time in South America. Which observations there might have suggested to him an old Earth?
- A Patagonian rabbits that had a large range of properties
 - B Glaciation erosion in the Andes
 - C Varying beak sizes of Finches
 - D Varying neck lengths of tortoises
 - E. Inland marine shells found well above sea level in Chile
18. Preconditions of natural selection include
- A The members of a population have variations
 - B Variations can be passed on to offspring
 - C In most populations more individuals are born per generation than can survive
 - D Some individuals have higher survival probability than others
 - E All of the above

19. Which of the following individuals should be viewed as mostly an Empiricist
- A Aristotle
 - B Copernicus
 - C Kepler
 - D Descartes
 - E Newton
20. Which of the following individuals should be viewed mostly as a Rationalist
- A Galileo
 - B Roger Bacon
 - C Descartes
 - D Darwin
 - E None of the above; all are empiricists

Part III: Short Answer Questions: Answer **9 out of 11 (10 points each)** – **Once again, only answer 9 OUT OF THE 11 questions.**

21. *I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.*

Describe what Newton is saying here about the nature of science.

22. Newton describes the attractive between two masses as behaving like

$$F_g \propto \frac{1}{r^2}$$

What evidence is available to support this $1/r^2$ force law?

23. Explain, in the **context of the time**, why the idea of “personal property” equated directly to personal freedom as an Enlightenment ideal.

24. Explain why the Reformation was an important cultural event that also helped to produce a more favorable climate for the generation of new scientific ideas.

25. How does Lyell’s idea of gradualism influence the thinking of Darwin?

26. Explain how “natural selection” should be viewed more as a statistical process and less as an optimization process.

27. What were some of the criticisms that were leveled against Darwin’s theory when it was **first** published?

28. Provide historical examples of how technology can rapidly empower the “Superior” races to successfully invade the lands of the “inferior” races.

29. How did some of the telescopic observations of John Herschel show the universality of Newtonian physics?

30. Explain how the observed anomalous motion of Mercury is similar to the problem of the retrograde motion of Mars. What is the resolution of the anomalous motion of Mercury?

31. Briefly describe the uncertainty principle in quantum mechanics and the message that sends to society about the nature of science.

