

1991

Comprehensive Examination in Physics

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Recommended Citation

Cooney, Timothy (1991) "Comprehensive Examination in Physics," *Iowa Science Teachers Journal*: Vol. 28: No. 1, Article 5.

Available at: <https://scholarworks.uni.edu/istj/vol28/iss1/5>

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COMPREHENSIVE EXAMINATION IN PHYSICS

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The following exam has been developed over several years of physics teaching and research. It is designed to serve as the comprehensive final exam for graduating seniors completing physics at Northern University High School in Cedar Falls, Iowa.

1. **PHYSICS:** Explain the nature of matter. Include in your answer an evaluation of the impact of the development of mathematics on physics.

2. **PHILOSOPHY OF PHYSICS:** Sketch the development of human thought. Estimate the significance on the history of physics. Compare with the development of any other kind of thought.

3. **BIOPHYSICS:** Create life. Estimate the difference in subsequent human and scientific development if this form of life had developed 500 million years earlier, with special attention to its probable effect on the English parliamentary system. Prove your thesis.

4. **ENGINEERING:** The disassembled parts of a high-powered rifle have been placed in a box on your desk. You will find an instruction manual, printed in Aleut. In ten minutes, a raging, hungry polar bear will be admitted to the room. Take whatever action you feel is appropriate. Be prepared to justify your decision.

5. **PHYSICS AND MEDICINE:** You have been provided with a high-powered laser, a razor blade, a piece of gauze and a bottle of Scotch. Remove your appendix. Do not suture until your work has been inspected by your teacher. You have fifteen minutes.

6. **PUBLIC SPEAKING:** Discuss both the general and specific theories of relativity. You may use any ancient language except Latin or Greek.

7. **PHYSICS OF SOUND:** Write a piano concerto. Orchestrate and perform it with flute and drum, explaining the physics of each instrument. You will find an electronic keyboard under your chair.

8. **NUCLEAR PHYSICS:** Estimate the socio-political problems, if any, which might accompany the end of the world through mutually assured destruction. Conduct an experiment to test your hypothesis.

9. **HISTORY:** Describe the history of the papacy from its origins to the present day, concentrating especially, but not exclusively, on its social, political, economic, religious and philosophical impact on the development of physics and scientific reasoning in Europe, Asia, the Americas and Africa. Be brief, concise and specific.

EXTRA CREDIT

10. **PHYSICS AND TRUTH:** Take a position for or against truth. Prove the validity of your argument.

11. **GENERAL KNOWLEDGE:** Describe in detail your general knowledge. Try to be completely objective and specific.

Editor's Note: The author has expressed the wish that apologies be extended to any author (perhaps Newton) who may have originated the root questions. As with most of our exams, the author acknowledges that he originated some ideas and appropriated others. Although the questions have been refined over many years, the author freely gives permission for their adaptation to the particular needs of the readers' more advanced students.