PHYSICS DEPARTMENT

PHY 1033 Final Exam December 13, 2004
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Name (print): _____

On my honor, I have neither given nor received unauthorized aid on this examination.

Signature: _____

YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.

DIRECTIONS

(1) **Code your test number on your pink answer sheet (use 76–80 for the 5-digit number)**. Code your name on your answer sheet. **Darken circles completely (errors can occur if too light)**. Code your UFID on your answer sheet.
(2) Print your name on this sheet and sign it also.
(3) You may use a calculator and 1 side of handwritten $8\frac{1}{2} \times 11$ formula sheet. No other materials allowed.
(4) Do all scratch work anywhere on this exam that you like. At the end of the test, this exam printout and the formula sheet are to be turned in. No credit will be given without both answer sheet and printout with scratch work most questions demand.
(5) Work the questions in any order. Incorrect answers are not taken into account in any way; you may guess at answers you don't know if you feel that a correct answer is listed. Guessing on all questions will most likely result in failure.
(6) It is not our intention to omit the right answer, but if you believe that none of the answers is correct, please mark the answer closest to your answer.
(7) **Blacken the circle of your intended answer completely, using a number 2 pencil**. Do not make any stray marks or the answer sheet may not read properly.
(8) As an aid to the examiner (and yourself), in case of poorly marked answer sheets, please circle your selected answer on the examination sheet.
(9) **Take g=10 m/s^2 and $c = 3 \times 10^8$ m/s throughout this test.**
(10) Good luck!!!

>>>>>>>>**WHEN YOU FINISH** <<<<<<<<
Hand in the pink answer sheet separately.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1. If a 1-microgram (1 millionth of a gram) antimatter meteor were to strike the earth, the amount of energy of forms other than mass that would be produced would be

   (1) 180 billion joules. (2) 18 joules. (3) 18 million joules. (4) 18 billion joules. (5) 18 thousand joules.

2. Relativity equations for time, length and momentum hold true for
   A. relativistic speeds.
   B. everyday low speeds.

   (1) neither A nor B. (2) B only. (3) — (4) A only. (5) both A and B.

3. A sheet of red paper will look black when illuminated with

   (1) cyan light. (2) none of these. (3) red light. (4) magenta light. (5) yellow light.

4. An object is dropped and freely falls to the ground with an acceleration of 1 g. If it is thrown upward at an angle instead, its acceleration will be

   (1) larger than 1 g. (2) depends on the angle. (3) 1 g downward. (4) 1 g upward. (5) 0 g.

5. The half-life of carbon 14 is 5730 years. If a 1-gram sample of old carbon is 1/8 as radioactive as 1 gram of a current sample, then the age of the old sample is about

   (1) 17,200 years. (2) 22,900 years. (3) 1910 years. (4) 46,000 years. (5) 11,500 years.

6. Most of the radioactivity we personally encounter comes from

   (1) none of these.
   (2) medical X-rays.
   (3) nuclear power plants.
   (4) fallout from past and present testing of nuclear weapons.
   (5) the natural environment.

7. Which color of light carries the most energy per photon?

   (1) blue (2) violet (3) green (4) all the same. (5) red

8. A certain radioactive isotope placed near a Geiger counter registers 160 counts per second. Eight hours later, the counter registers 10 counts per second. What is the half life of the isotope?

   (1) 8 hours (2) 4 hours (3) none of these (4) 6 hours (5) 2 hours

9. The circular orbit of a satellite orbiting the Earth is characterized by a constant

   (1) acceleration. (2) speed. (3) all of these. (4) radial distance. (5) none of these.

10. In the photoelectric effect, doubling the frequency of incident light will cause the maximum energy of ejected electrons to

    (1) more than double. (2) increase, but not double. (3) decrease. (4) double. (5) none of these.

11. The energy of a photon depends on its

    (1) frequency. (2) amplitude. (3) none of these. (4) all of these. (5) speed.

12. Stretch a copper wire so that it is thinner and the resistance between its ends

    (1) increases. (2) decreases. (3) none of these. (4) remains unchanged. (5) disappears.

13. According to the uncertainty principle, the more we know about a particle's momentum, the less we know about its

    (1) speed. (2) mass. (3) none of these. (4) kinetic energy. (5) location.

14. A rock that is tossed upward at a velocity of 15 m/s will hit the ground in _____ s.

    (1) 4 (2) 3 (3) 5 (4) 1.5 (5) 2.5

15. Light will not pass through a pair of Polaroids when their axes are

(1) two of these. (2) parallel. (3) 45 degrees to each other. (4) all of these. (5) perpendicular.

16. Connect a pair of lamps in series and you draw current from the connected battery. Connect the same lamps in parallel and you draw

(1) sometimes more, sometimes less. (2) less current. (3) the same current. (4) more current. (5) no current.

17. The length of a meterstick projected like a spear at 0.87c is seen by a person at rest to be

(1) 1 m. (2) 0.87 m (3) 0.5 m. (4) 1.5 m. (5) 1.25 m.

18. A 5-kg fish swimming at a speed of 1 m/s swallows an absent-minded 1-kg fish at rest. The speed of the larger fish immediately after lunch is

(1) 1 m/s. (2) 5/6 m/s. (3) 2/5 m/s. (4) 1/5 m/s. (5) 3/5 m/s.

19. The ratio of the energy of a photon to its frequency is

(1) the photon's speed. (2) pi. (3) the photon's wavelength. (4) Planck's constant. (5) not known.

20. When a nucleus emits a beta particle, its atomic number

(1) remains constant, and so does its mass number.
(2) remains constant, but its mass number changes.
(3) changes, but its mass number remains constant.
(4) changes, and so does it mass number.
(5) none of these.

21. Which experiment best demonstrates the particle-like nature of light?

(1) photoelectric effect (2) neither (3) — (4) — (5) double-slit experiment