

COLLEGE PHYSICS II T4 NAME ----- **RUSSELL SUMMER**
2007 Chapters 28-30. Show all of your work as this is not a multiple choice test. You may not guess or use the given answers to draw conclusions.

Use the following information for problems 1-4. The proper length of the car is 3.5 m, its rest mass is 3000 kg, and it is moving at a speed of $0.60c$ relative to you. $c = 3.0 \times 10^8$ m/s.

1. You would say that the length of the car is ___ .

- A 2.8
- B 3.5
- C 4.4
- D 0.80

2. You would say that the mass of the car is ___ kg.

- A 2400
- B 3000
- C 3750
- D 4200

3. If the car were converted totally to energy, you would say that it would be ___ $\times 10^{20}$ J.

- A 4.4
- B 3.4
- C 2.4
- D 1.4

4. If the driver said that he played the radio for 3 minutes, you would say that it actually played for ___ minutes.

- A 2.4
- B 3.0
- C 3.8
- D 4.8

5. The frequency of a photon with an energy of 12 eV is ___ $\times 10^{15}$ Hz.
- A 1
 - B 2
 - C 3
 - D 4

6. A photon with an energy of 12.6 eV strikes a surface with a work function of 5.4 eV. The kinetic energy of the photoelectron is ___ eV.
- A 18
 - B 5.4
 - C 12.6
 - D 7.2

For problems 7 and 8.

- A photon with a wavelength of 0.88×10^{-12} m is Compton scattered off of an electron at an angle of 60° .
- 7.) The wavelength of the scattered photon is ___ $\times 10^{-12}$ m.
- A 0.88
 - B 1.22
 - C 2.00
 - D 0.34

8. Calculate the gain in kinetic energy of the scattered electron.

For problems 9 and 10. A photon has a frequency of 2×10^{14} Hz.

9. The momentum of the photon is $__ \times 10^{-28}$ Ns.

A 4.4

B 3.3

C 2.2

D 1.1

10. Calculate the energy of the photon.

11. The energy of a photon needed to make the electron in a hydrogen atom go from $n=1$ state to the $n=3$ state is $__ \text{ eV}$.

A 13.6

B 1.50

C 7.8

D 12.1

12. An electron in the $n=5$ state drops down to the $n=1$ state. The frequency of the emitted photon is ___ $\times 10^{15}$ Hz.
- A 4
 - B 3
 - C 2
 - D 1

13. The work function of silver is 4.73 eV. The minimum frequency to eject a photoelectron from the surface is ___ $\times 10^{15}$ Hz.
- A 4.73
 - B 1.14
 - C 2.08
 - d 9.80

- 14.
- I If the principal quantum number, n , is 3, state:
- A The maximum number of electrons in this shell (4 pts)
 - B All of the possible values of the orbital quantum number, l ← this represent lower case L. (4 pts)
 - C The maximum number of electrons in each of the subshells. (4 pts)
- II How many electrons does the following atom have: $1s^2 2s^2 2p^6 3s^2 3p^1$. (4pts)

15. The following equations are for the Lyman, Balmer, and Paschen series found in the spectrum of hydrogen. Use the correct one to determine the wavelength, λ , of light emitted by hydrogen in a transition from the $n = 3$ to $n = 2$.
- $R = 1.097 \times 10^7$**
- Lyman: $1/\lambda = R(1/1^2 - 1/n^2)$ Balmer: $1/\lambda = R(1/2^2 - 1/n^2)$ Paschen: $1/\lambda = R(1/3^2 - 1/n^2)$