Name:

$1\ pt$ What is the wavelength of radiation emitted when an electron goes from the n = 7 to the n = 4 level of the Bohr hydrogen atom? Give your answer in nm.

1.A◯ 1175.69   **B**◯ 1328.53   **C**◯ 1501.24
    D◯ 1696.40   **E**◯ 1916.93   **F**◯ 2166.13
    G◯ 2447.73   **H**◯ 2765.93

$1\ pt$ Select True or False for the following questions about radioactive decay.

▷ In alpha decay, an electron is emitted.
   2.   **A**◯ True   **B**◯ False

▷ In gamma decay, a neutron is emitted.
   3.   **A**◯ True   **B**◯ False

▷ In beta decay, an electron or a positron is emitted.
   4.   **A**◯ True   **B**◯ False

$1\ pt$ ^{14}C has a half life of 5730 years. If 8.28×10^6 decays are observed during one second from a sample, how many μg of ^{14}C are in the sample? (Remember, there are 6.02×10^{23} atoms in 14g of ^{14}C.)

5.A◯ 44.42   **B**◯ 50.20   **C**◯ 56.73
    D◯ 64.10   **E**◯ 72.43   **F**◯ 81.85
    G◯ 92.49   **H**◯ 104.51

$1\ pt$ The resonant LC circuit in your radio contains a coil with L = 0.133 mH inductance. By turning the radio knob you adjust the capacitor to C = 27.7 pF. What is the wavelength of the radio waves your radio is receiving?
(in m*)*

6.A◯ 9.15×10^1 **B**◯ 1.14×10^2 **C**◯ 1.43×10^2
    D◯ 1.79×10^2 **E**◯ 2.23×10^2 **F**◯ 2.79×10^2
    G◯ 3.49×10^2 **H**◯ 4.36×10^2

$1\ pt$ A spaceship travels past an observer at a speed of 0.669 **c**. The length of the spaceship is 118 m in its rest frame. What is the length of the ship in the reference frame of the observer?
(in m*)*

7.A◯ 1.84×10^1 **B**◯ 2.30×10^1 **C**◯ 2.87×10^1
    D◯ 3.59×10^1 **E**◯ 4.49×10^1 **F**◯ 5.61×10^1
    G◯ 7.02×10^1 **H**◯ 8.77×10^1

$1\ pt$ The mean lifetime of muons in their rest frame is 2.20 μs. Now consider a muon traveling through the Earth's atmosphere at a speed of 0.996 **c**. What is the mean distance traveled before it decays?
(in km*)*

8.A◯ 1.64×10^{-1} **B**◯ 6.57×10^{-1} **C**◯ 1.31
    D◯ 1.97   **E**◯ 4.27   **F**◯ 7.36
    G◯ 1.64×10^1 **H**◯ 1.91×10^1

$1\ pt$ What is the magnitude of the electrostatic repulsive force (in N) between two protons in the nucleus of an atom if they are separated by 8.1 fm?
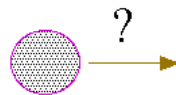(1 meter = 1.0×10^{-15} fm)

9.A◯ 1.4   **B**◯ 1.8   **C**◯ 2.2   **D**◯ 2.8
    E◯ 3.5   **F**◯ 4.4   **G**◯ 5.5   **H**◯ 6.9

$1\ pt$

Due never

A projectile is observed during a very short time of $3.4 \cdot 10^{-24}$ s? What is its minimum energy uncertainty in nJ?

10.A◯ 1.13×10^{-2} **B**◯ 1.33×10^{-2} **C**◯ 1.55×10^{-2}
    D◯ 1.81×10^{-2} **E**◯ 2.12×10^{-2} **F**◯ 2.48×10^{-2}
    G◯ 2.91×10^{-2} **H**◯ 3.40×10^{-2}

$1\ pt$

Select True or False for each of the following statements.

▷ The work function of a surface determines the minimum intensity of light which will cause electrons to be emitted.
   11.   **A**◯ True   **B**◯ False

▷ In the quantum mechanical hydrogen atom, electrons in the n=2 orbit all have the same angular momentum.
   12.   **A**◯ True   **B**◯ False