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p102 , ch25. Optical Instruments Q14

1. A magnifying lens has a focal length of 1cm. A person has a near point of 25cm. What is the magnification of the lens for that person focussed at the near point?

A. 1.6
B. 2.6
C. 26
D. 56
E. 106

2.. A person is designing a Keplerian lens telescope which will have a magnification of ten times. If the focal length of the eyepiece is 2 cm, what is the focal length of the objective?

A. 0.2cm
B. 2.0cm
C. 20 cm
D. 200cm
E. Impossible to tell.

3. A person is designing a Keplerian lens telescope which will have an objective which is 0.25 meters in diameter. If the telescope operates at a wavelength of 5.89×10^{-7} m, what is the resolution of the telescope in radians, i.e., what is the angular blurring in the image formed by the objective?

A. 0
B. 2.9×10^{-8}
C. 2.9×10^{-7}
D. 2.9×10^{-6}
E. Impossible to tell.

4. A person is designing a Keplerian lens telescope which will have an objective which is 0.25 meters in diameter. What is the telescope's light gathering power compared to the night adapted eye whose pupil diameter is 0.005m?

A. 5x
B. 25x
C. 50x
D. 2500x

Q15 ph102 ch26. Special Relativity

1. An observer moving at a uniform speed of 0.7c relative to the earth plays a computer game that takes 10 minutes. An earth observer watching with a telescope will measure how long an interval for the game?

A. 2 minutes
B. 5 minutes
C. 10 minutes
D. 14 minutes
E. 3 x 10^8 minutes

2. A 100 m long spaceship zooming past the earth with a uniform speed of 0.90c relative to the earth will appear to be how long to an observer on the earth?

A. 0.23 m
B. 2.3 m
C. 230 m
D. 1000 m
E. 44 m

3. If the spaceship above zooming past earth at 0.90 c relative to earth has a rest mass of 1 x 10^{6} kg. What would its mass appear to be to an observer on the earth?

A. 1 x 10 ^6 kg
B. 2.3 x 10^ 6 kg
C. 4.6 x 10 ^6 kg
D. 100 x 10 ^6 kg
E. impossible to tell

4. A future spaceship traveling outward from the Earth toward the star alpha Centaurus at 90,000 miles per second encounters light photons from that star. Instruments on the space craft will measure what speed for these photons?

A. The speed of light measured here on earth 186,000 mi/s +90,000 mi/s
B. The speed of light measured here on earth 186,000 mi/s -90,000 mi/s
C. The speed of light measured here on earth (186,000 mi/s)/90,000 mi/s
D. The speed of light measured here on earth 186,000 mi/s

1 A red light photon has a frequency 7.39x1014Hz. The Planck constant is 6.63x10-34Js. What is the energy of this red light photon?

A 4.90x10-18J
B 4.90x10-19J
C 5.00x10-18J
D 5.00x10-19J

2 Suppose a metal requires at least 4.90x10-18J to be added to one of its electrons to cause the electron to be emitted from its surface. What is the minimum energy that a beam of the red light photons (previous question) must have to free electrons from this metal.

A 4.90x10-18J or 10 photons
B 2.45x10-18J or 5 photons
C 1.25x10-18J or 2.5 photons
D Wrong! Each of these photons is just not energetic enough

3 A hydrogen atom has its lowest energy level at -13.6 eV and the next lowest at -3.4 eV. If the atom has one electron at the -3.4 eV energy level, what is the minimum energy photon that this atom can emit via the electron losing energy?

A Any energy between zero and 10.2 eV
B 10.2 eV
C 17.0 eV
D 4 eV

4 Photons emitted by electrons falling down to the lowest energy level of the H atom from higher levels have wavelengths in the _____

A Paschen series
B Balmer series
C Lyman series
D World series

5 Electrons striking a crystal in a Bragg experiment can show which of these processes _____

A reflection only
B interference fringes only
C both answers "A" and "B"
D neither reflection or fringes since electrons are particles (not waves).

1 If the momentum of an electron is known to an accuracy of 8.79x10-25 kg m/s. What is the best accuracy in meters to which its position can be determined?

A 6x10-11m
B 6x10-129m
C 1.2x10-10m
D The level of accuracy only depends on how good the measuring instruments are.

2 If a hydrogen atom electron has a principal quantum number n = 2, the energy level that the electron occupies is

A -13.6 eV
B -3.4 eV
C -1.5 eV
D 0 eV

3 If a hydrogen atom has an electron bound to it with a principal quantum number n = 2, then the orbital quantum number l = ?

A 0
B 1
C Both answers "A" "B" at the same time for that electron.
D Either answer "A" or "B" (but not both).

4 If a hydrogen atom has an electron bound to it with a quantum numbers n = 1 and l = 0 then the magnetic quantum number m may have a value of _____

A only 1
B only 0
C only -1
D any one of 1, 0, or -1

Q18 p102 chapter 29, 30 NuclearPhys&Radioactivity

1. Which reaction is a fission reaction?

A. ${}_1{}^3H + {}_1{}^1H \rightarrow {}_2{}^4He$ + energy

B. ${}_{17}{}^{35}Cl + {}_1{}^1H \rightarrow {}_{16}{}^{32}S + {}_2{}^3He$

C. ${}_{92}{}^{235}U + {}_0{}^1n \rightarrow {}_{54}{}^{140}Xe + {}_{38}{}^{94}Sr + 2\ {}_0{}^1n$ + energy

D. ${}_4{}^9Be + {}_2{}^4He \rightarrow {}_0{}^1n + {}_6{}^{12}C$

2. A radionuclide in liquid solution in a closed flask decays completely. In the flask, besides air originally present, helium gas is found. The decay process was probably

A. α-decay
B. β-decay
C. γ-decay
D. positron emission

3. What is the half-life of a radionuclide if 1/16 of its initial mass is present after 2 hours?

A. 15 min
B. 30 min
C. 45 min
D. 60 min

4. Which is an isotope of ${}_{63}{}^{182}X$?

A. ${}_{62}{}^{182}X$ B. ${}_{64}{}^{182}X$ C. ${}_{63}{}^{180}X$ D. ${}_{62}{}^{180}X$

5. The half-life of ${}_{11}{}^{22}Na$ is 2.6 years. If X grams of sodium isotope are initially present, how much is left after 13 years?

A. 0.03125X B. 0.0769X C. 0.125X D. 0.2X

6. Which reaction equation is incorrect?

A. ${}_1{}^3H + {}_1{}^1H \rightarrow 24He$ + energy

B. ${}_{17}{}^{35}Cl + {}_1{}^1H \rightarrow {}_{16}{}^{32}S + {}_2{}^3He$

C. ${}_{92}{}^{235}U + {}_0{}^1n \rightarrow {}_{54}{}^{140}Xe + {}_{38}{}^{94}Sr + 2\ {}_0{}^1n$ + energy

D. ${}_4{}^9Be + {}_2{}^4He \rightarrow {}_0{}^1n + {}_6{}^{12}C$