

Introductory General Physics - Physics 112 N
College of Sciences
Old Dominion University
Summer Semester 2009
Pre-Test 3: Chapters 23-24-26
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1. A certain electromagnetic field traveling in vacuum has a maximum electric field of 1200 V/m. What is the maximum magnetic field of this wave?

- A) 3.4×10^{-4} T
- B) 4.0×10^{-6} T
- C) 2.2×10^{-5} T
- D) 9.6×10^{-6} T

Answer: B

solution is trivial, as $E=cB$

(10 points)

2. What is the wavelength used by radio station that broadcasts with a carrier frequency of 920 kHz?

- A) 22.6 m
- B) 226 m
- C) 326 m
- D) 175 m
- E) 276 m

Answer: C (use $c = f\lambda$)

(10 points)

3. A double convex thin lens has equal radii of curvature. The focal length of the lens is +54cm and index of refraction of the glass is 1.52. The radius of curvature of each convex surface is closest to:

- A) 56cm
- B) 51cm
- C) 45cm
- D) 62cm
- E) 67cm

Answer:A

use equation $\frac{1}{f} = (n - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

(10 points)

4. A tank contains benzene, which has index of refraction 1.50. A dime is on the bottom of the tank. When viewed at normal incidence the dime appears to be 95cm below the surface of the benzene. What is the actual depth of the benzene?

Answer: 143 cm

use equation

$$\frac{n_a}{s} + \frac{n_b}{s'} = 0$$

(10 points)

5. Which statement about images is correct?

- A) A virtual image cannot be formed on a screen.
- B) A virtual image cannot be viewed by the unaided eye.
- C) A virtual image cannot be photographed.
- D) A real image is erect.
- E) Mirrors always produce real images because they reflect light.

Answer:A

(read corresponding chapter of the book and my lecture notes)

(10 points)

6. You pass 633nm (helium-neon) laser light through a narrow slit and observe the diffraction pattern on a screen 6m away. You find that the distance between the centers of the first minima (dark fringes) on either side of the central bright fringe in the pattern is 27mm. How wide is the slit?

Answer: a=0.28mm

$$a = \frac{R\lambda}{y_1} = \frac{(6.0m)(633 \times 10^{-9}m)}{27 \times 10^{-3}m / 2} = 2.8 \times 10^{-4}m = 0.28mm$$

(10 points)

Total: 70 points