

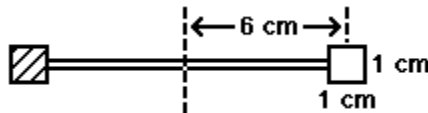
PHYSICS 6C PRACTICE QUIZ 1

THE FOLLOWING MULTIPLE CHOICE QUESTIONS ARE NOT TO BE TURNED IN FOR GRADING. THEY ARE INTENDED AS A SELF EVALUATION QUIZ AND PRACTICE FOR THE FIRST MIDTERM EXAM

MULTIPLE CHOICE. Choose the ONE alternative that BEST completes the statement or answers the question.

- 1) An 800 kHz radio signal is detected at a point 6.6 km distant from a transmitter tower. The electric field amplitude of the signal at that point is 780 mV/m. Assume that the signal power is radiated uniformly in all directions and that radio waves incident upon the ground are completely absorbed. The magnetic field amplitude of the signal at that point, in nT, is closest to:
- A) 2.6
 - B) 2.1
 - C) 1.6
 - D) 3.1
 - E) 3.6

Figure 1

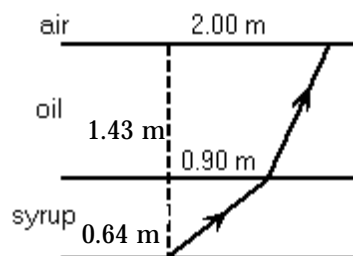


A radiometer has two square vanes (1 cm by 1 cm), attached to a light horizontal cross arm, and pivoted about a vertical axis through the center. The center of each vane is 6 cm from the axis. One vane is silvered and it reflects all radiant energy incident upon it. The other vane is blackened and it absorbs all incident radiant energy. Radiant energy, which has an intensity of 300 W/m^2 , is incident normally upon the vanes.

- 2) In Figure 1, the torque on the vane assembly, about the vertical axis, is closest to:
- A) zero
 - B) $6 \times 10^{-12} \text{ N} \cdot \text{m}$
 - C) $1.2 \times 10^{-11} \text{ N} \cdot \text{m}$
 - D) $1.8 \times 10^{-11} \text{ N} \cdot \text{m}$
 - E) $2.4 \times 10^{-11} \text{ N} \cdot \text{m}$
- 3) A ray in glass is incident onto a water-glass interface, at an angle of incidence equal to half the critical angle for that interface. The indices of refraction for water and the glass are 1.33 and 1.43, respectively. The angle that the refracted ray in the water makes with the normal is closest to:
- A) 37°
 - B) 42°
 - C) 47°
 - D) 32°
 - E) 27°

4)

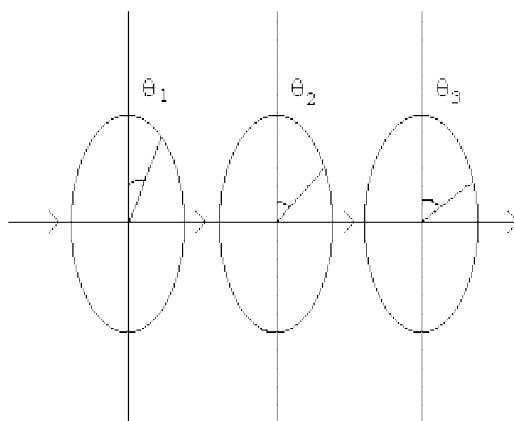
Figure 2



A tank holds a layer of oil, 1.43 m thick, which floats on a layer of syrup that is 0.64 m thick. Both liquids are clear and do not intermix. A ray, which originates at the bottom of the tank on a vertical axis, crosses the oil-syrup interface at a point 0.90 m from the axis. The ray continues and arrives at the oil-air interface, 2.00 m from the axis and at the critical angle. In Figure 2, the index of refraction of the oil is closest to:

- A) 1.64
- B) 1.62
- C) 1.60
- D) 1.66
- E) 1.68

Figure 3



5) Figure 3 shows three polarizing disks having parallel planes with the direction of the transmission axis in each case. The disks are centered on a common axis. If a plane polarized beam of light is incident from left on the first disk with an intensity of 40 W/m^2 . What is the transmitted intensity coming out of the third disk, when $\theta_1 = 10^\circ$, $\theta_2 = 40^\circ$, $\theta_3 = 70^\circ$?

- A) 40 W/m^2
- B) 18 W/m^2
- C) 1.5 W/m^2
- D) 0 W/m^2
- E) 22 W/m^2

- 6) The energy density of an electromagnetic wave is
- A) entirely in the electric field.
 - B) entirely in the magnetic field.
 - C) $1/4$ in the electric field and $3/4$ in the magnetic field.
 - D) $1/4$ in the magnetic field and $3/4$ in the electric field.
 - E) equally divided between the magnetic and the electric fields.