Physics 202
Spring 2010
Practice Questions for Chapters 31-33

1. Mission Control sends a brief wake-up call to astronauts in a distant spaceship. Five seconds after the call is sent, Mission Control hears the waking groans of the astronauts. How far away (at most) from Earth is the spaceship?

A) 7.5×10^8 m
B) 15×10^8 m
C) 30×10^8 m
D) 45×10^8 m
E) The spaceship is on the moon.

2. Communications satellites are usually placed in geosynchronous orbits, a distance of 4.43×10^7 m from the center of Earth. What is the time lag for a signal sent from one point on Earth's surface to another via such a satellite? (The radius of Earth $R_E = 6.370 \times 10^6$ m.)

A) 0.13 s
B) 0.25 s
C) 0.51 s
D) 0.29 s
E) 0.15 s

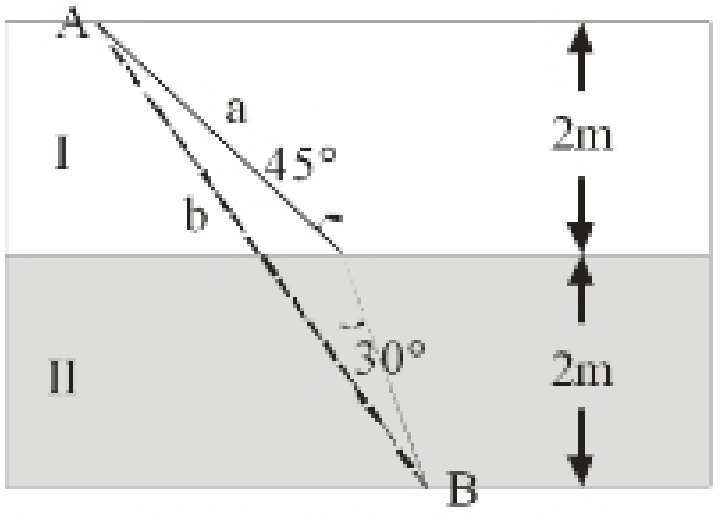
3. Ultra fast pulse lasers can emit pulses of the order 10 fs. The length of each pulse that is 10 fs long is

A) 1.0 μm
B) 2.0 μm
C) 3.0 μm
D) 9.0 μm
E) 12.0 μm

4. Ultra fast pulse lasers can emit pulses of the order 10 fs. If each pulse that is 10 fs long and the wavelength of the laser is 500 nm, the number of wavelengths in each pulse is

A) 6
B) 10
C) 12
D) 50
E) 120

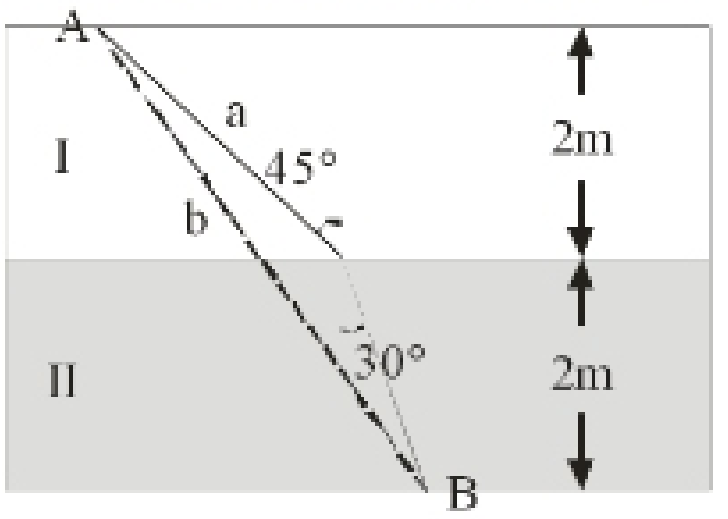
5. An object leaves point A and travels to point B via path a.



In region I, the speed is 100 m/s while in region II, the speed is 71 m/s. How long does it take for the object to go from A to B?

A) 80.0 ms
B) 60.8 ms
C) 40.6 ms
D) 32.4 ms
E) 26.8 ms

6. An object leaves point A and travels in a straight line to point B via path b.



In region I, the speed is 100 m/s while in region II, the speed is 71 m/s. How long does it take for the object to go from A to B?

A) 82.0 ms
B) 70.8 ms
C) 61.3 ms
D) 34.3 ms
E) 27.7 ms

7. As light passes from one medium into another, the angle of refraction is _____ in the medium with the _____ index of refraction and _____ speed of light.

A) smaller; larger; lower
B) smaller; larger; higher
C) larger; smaller; lower
D) larger; larger; lower
E) smaller; smaller; higher

8. Light is incident on a piece of glass in air at an angle of 37.0° from the normal. If the index of refraction of the glass is 1.50, the angle that the refracted ray makes with the normal is approximately

A) 8.6°
B) 21.8°
C) 23.6°
D) 41.8°
E) 56.4°

9. A light wave traveling at speed v_1 in medium 1 passes into medium 2 where its speed is v_2. By which of the following equations is the frequency f_1 of the wave in medium 1 related to its frequency f_2 in medium 2? (θ_1 and θ_2 are the angles of incidence and refraction.)

A) $f_1 \sin\theta_1 = f_2 \sin\theta_2$
B) $f_1 v_2 = f_2 v_1$
C) $f_1 = f_2$
D) $f_1 v_1 = f_2 v_2$
E) $f_1 \sin\theta_2 = f_2 \sin\theta_1$

10. From directly above, you're watching a fish swim 1.83 m beneath the surface of a clear lake ($n = 1.33$). How far beneath the surface does the fish seem to be?

A) 0.914 m
B) 1.37 m
C) 1.83 m
D) 2.44 m
E) 2.93 m