Physics 112
Quiz #23
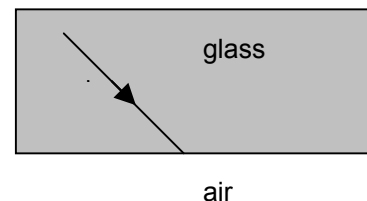## November 27, 2000

Name: _____

IF YOU WANT A QUESTION GRADED OUT OF THREE POINTS (–1 [MINUS ONE] FOR WRONG ANSWER!!) WRITE "3" IN SPACE PROVIDED ON EACH QUESTION.

$c = 3 \times 10^8$ m/s

1. A light ray traveling in glass strikes the surface of the glass at a 45° angle of incidence as it exits into the air. *Assume that there **is** a refracted ray, as well as a reflected ray.* Then the angle between the **reflected** ray (in the glass) and the **refracted** (transmitted) ray is:
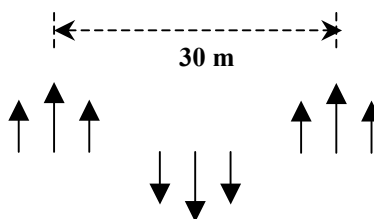
   A. 0°

   B. between 0° and 90°

   C. 90°

   D. between 90° and 180°

   E. 180°

   F. cannot answer this without knowing *exact* index of refraction of the glass

   Grade out of 3? Write "3" here: _____
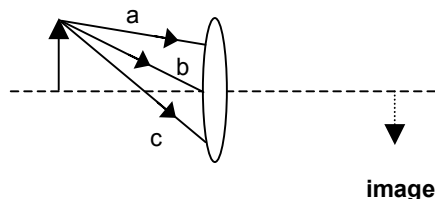
2. The electric field pattern of a traveling electromagnetic wave is shown at one moment in time. What type of wave is this?

   A. a radio wave

   B. an infrared wave

   C. an x-ray

   D. a cosmic ray

3. A convex lens forms an image of an illuminated arrow as shown. (Illuminated arrow is on the left.) Three light rays (a, b, and c) originating from the arrowhead are shown. Which of these rays will pass through the arrowhead in the image?

   A. a only

   B. c only

   C. a and b

   D. b and c

   E. a, b, and c

   F. none of them

   Grade out of 3? Write "3" here: _____

4. Suppose that you are sent in to an apparently empty room, and told to measure the magnitude of the "external" uniform magnetic field at a point two meters from the center of the room (produced by source currents outside the room). You are supplied with a 3-m length of straight wire that has a resistance of 5 ohms, a 20-volt battery, and a spring scale to measure the force on the wire. You connect the wire to the battery and measure the force. The force on the wire seems to depend on how you orient the wire, but after trying all orientations the largest value you observe is 4 N. What is the magnitude of the external magnetic field at that point? *No partial credit; answer must be within 10% of correct answer. –1 point for incorrect or missing units.*

Answer: _____