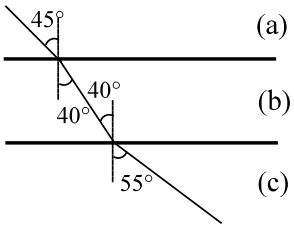
PART A: MULTIPLE CHOICE (10 MARKS)

Choose the best response in each case and place your answer in the appropriate space on your answer sheet.

1. When light travels from a slow medium into a fast medium, it:
   (a) bends toward the normal.
   (b) bends to travel along the normal.
   (c) bends away from the normal.
   (d) doesn't bend at all.

2. If a light ray, travelling through air, is incident on a plane glass surface at an angle of 45°, then:
   (a) $\theta_R > \theta_i$ (b) $\theta_R = \theta_i$
   (c) $\theta_R < \theta_i$

3. A ray of light travels through different media as shown. In which material does the light travel the fastest?



4. You see a submerged seashell that you want to bring home. Where you should place your net in order to pick up the shell?
   (a) directly above the image of the shell
   (b) directly behind the image of the shell
   (c) directly in front of the image of the shell
   (d) directly below the image of the shell

5. Which of the following cannot be explained using refraction?
   (a) apparent depth (b) solar cookers
   (c) flattened sun (d) shimmering

6. What is the speed of light in zircon (n_z = 1.92) if the speed of light in air is 3.00 x 10^8 m/s?
   (a) 5.76 x 10^8 m/s (b) 3.00 x 10^8 m/s
   (c) 1.56 x 10^8 m/s (d) 1.08 x 10^8 m/s

7. What is the index of refraction of a material if the speed of light in the material is 1.65 x 10^8 m/s and the speed of light in air is 3.00 × 10^8 m/s?
   (a) 0.55 (b) 1.35
   (c) 1.82 (d) 4.95

8. Light travels from water (n_W = 1.33) into crown glass (n_G = 1.52). The angle of incidence in water is 40.0°. What is the angle of refraction in crown glass?
   (a) 47.3° (b) 34.2°
   (c) 28.9° (d) 25.0°

9. Total internal reflection of light can only occur when a light ray goes from:
   (a) a slow medium into a fast medium and $\theta_i > \theta_C$.
   (b) a slow medium into a fast medium and $\theta_i < \theta_C$.
   (c) a fast medium into a slow medium and $\theta_i > \theta_C$.
   (d) a fast medium into a slow medium and $\theta_i < \theta_C$.

10. Total internal reflection is used in various optical devices except:
    (a) diamonds (b) fibre optics
    (c) triangular prisms (d) microscopes

PART B: MATCH (5 MARKS)

Match the definition from the 1st column to the best term in the 2nd column and place the matching letter in the appropriate space on your answer sheet.

1. Reflection of light at the boundary between two transparent media.
2. Mirage formed in the ground.
3. Separation of white light into its spectral colours.
4. Angle of incidence that produces an angle of refraction of 90°.
5. Appears at certain points in the sky because droplets of water reflect the spectrum into the eye of the observer.

A) apparent depth
B) critical angle
C) dispersion
D) index of refraction
E) inferior mirage
F) rainbow
G) refraction
H) Snell's law
I) superior mirage
J) total internal reflection

SNC2D PHYSICS: REFRACTION & TIR QUIZ#3

PART A: MULTIPLE CHOICE (10 MARKS)

1	2	3	4	5	6	7	8	9	10

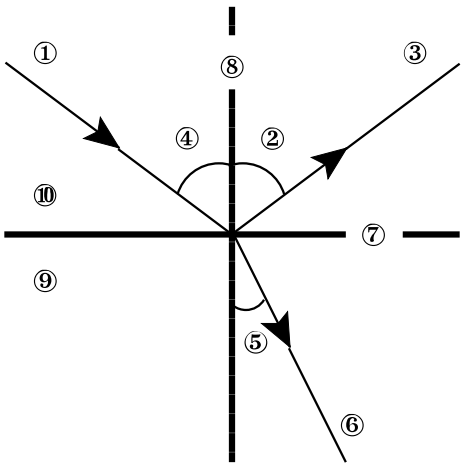
PART B: MATCH (5 MARKS)

1	2	3	4	5

PART C: SHORT ANSWER (15 MARKS)

Answer the following questions in the space provided.

{10} 1. (a) Match the labels below to the correct item in the diagram and then place the # in the space provided.
(b) Number and name the remaining items.



(a) ___ angle of reflection ___ angle of refraction
___ boundary between mediums ___ fast medium
___ incident ray ___ slow medium

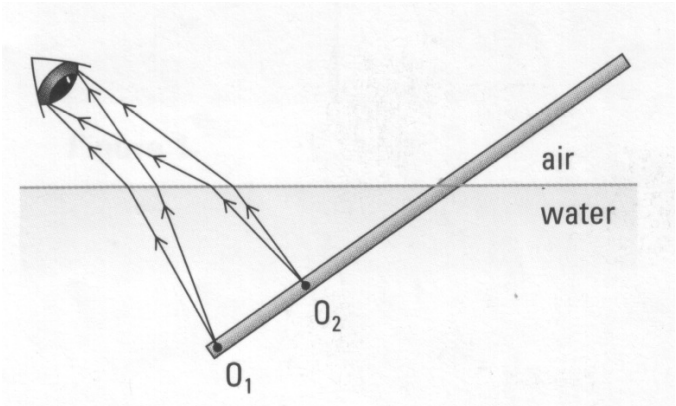
(b) _____

{2} 2. What 2 two conditions are necessary for total internal reflection to occur?

① _____

② _____

{3} 3. A stick in water appears bent when viewed from above. Find the image points of O_1 and O_2 and label them V_1 and V_2. Use V_1 and V_2 to draw the apparent position of the segment of the stick below the surface.



PART D: PROBLEMS (25 MARKS)

Answer the following questions on a separate sheet of paper. You may use the back of this sheet if you wish.

{4} 1. The speed of light in leaded glass is 1.66×10^8 m/s. What is the index of refraction of this type of glass?

{4} 2. What is the speed of light through alcohol given that alcohol has a refractive index of 1.36?

{4} 3. When light passes from water (n = 1.33) into diamond (n = 2.42) at an angle of 45° from the normal, what is the angle of refraction?

{4} 4. A red laser beam travels from flint glass (n = 1.61) into lemon oil. The angle of incidence is 40° and the angle of refraction is 44°. What is the refractive index of lemon oil?

{4} 5. Calculate the critical angle for light travelling from lucite (n_L = 1.97) into water (n_W = 1.33).

{5} 6. Two types of mirages can occur, depending on the temperature variation. Explain, with the aid of diagram, the formation of either a superior or inferior mirage. Be sure to label your diagram accordingly!