Waves Worksheet - Refraction

1. **Calculate the absolute refractive index for a clear plastic material if the velocity of light in the plastic is 2.5 x 108 ms-1. (1.2)**
2. **A ray of light in air is incident at an angle of 40.8o on the surface of the same plastic material used in Q.1. Determine the angle of refraction in the plastic. (33o)**
3. **A ray of light passes from kerosene to glass. The angle of incidence of the light is 45.2o and the relative refractive index from kerosene to glass is 1.08. Calculate the angle of refraction in the glass. (41o)**
4. **Using relevant information from Q.3, calculate the absolute index of refraction of kerosene if the absolute index of refraction of glass is 1.5. (1.39)**
5. **A ray of light passes from air into a glass prism at an angle of incidence of 35o. If the angle of refraction in the glass is 23.7o, what is the speed of the light in the glass? (2.1 x 108 ms-1)**
6. **The absolute refractive index of water is 4/3 and that of glass is 3/2. Find the relative refractive index for light traveling from water to glass. (9/8)**
7. **The critical angle for diamond is 24o. Determine the refractive index of diamond. (2.46)**
8. **Fused silica has a refractive index of 1.46. Calculate its critical angle. (43.2o)  
   Find the subsequent paths of rays of light incident internally on a fused silica – air interface at angles of incidence of:**
   1. **35o**
   2. **65o**
9. **For yellow light, the refractive index of glass is 1.6 and the refractive index of water is 1.2. Which ONE of the following statements is correct?**
   1. **The wavelength of yellow light in glass is longer than the wavelength of yellow light in water.**
   2. **For the same angle of incidence, the angle of refraction for yellow light passing from air to water is smaller than the angle of refraction for yellow light passing from air to glass.**
   3. **Total internal reflection cannot occur when yellow light travels from water to glass.**
   4. **Light travels faster in glass than in water.**

**Answers for 8 (a) & (b) and 9 are over page.**

Answers

8 (a) ray is refracted across the boundary at 57° angle of refraction  
  
8 (b) ray is totally internally reflected at 65° angle of reflection

9 C – total internal reflection can only occur for a ray passing from a higher to a lower  
 refractive index material.