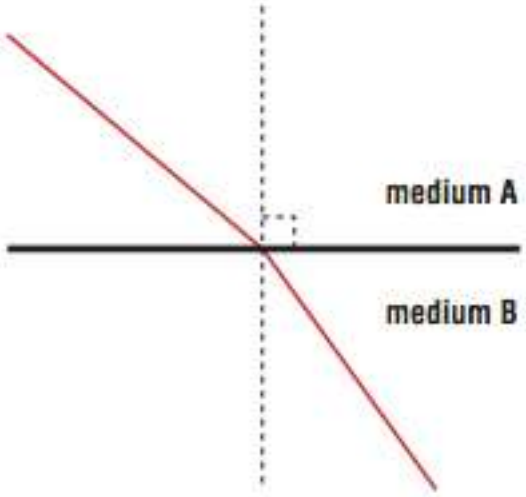
G10 Science: Class 10 Homework

1. The figure below represents a beam of light going from one medium into another.



   a) One medium is air (3.0×10^8 m/s) and the other is ice (2.29×10^8 m/s). Use this information to identify medium A and B. Explain. **[3 marks]**

   b) Do you know which direction the light beam is traveling? Does it matter? Explain. **[2 marks]**

2. The speed of light in vinegar is 2.30×10^8 m/s. Determine the index of refraction for vinegar. **[3 marks]**

3. The speed of light in sapphire is 1.69 x 10^8 m/s. Determine the index of refraction for sapphire. **[3 marks]**

4. The speed of light in an unknown substance is 2.20 x 10^8 m/s.

Medium	Index of refraction (n)
air/vacuum	1.00
ice	1.31
pure water	1.33
ethyl alcohol	1.36
quartz	1.46
vegetable oil	1.47
olive oil	1.48
acrylic	1.49
glass	1.52
zircon	1.92
diamond	2.42

a) Calculate the index of refraction for this substance. **[3 marks]**

b) Use the Index of Refraction Table to determine a possible identity of the unknown substance. **[1 mark]**

5. The critical angle for sapphire is 34.4°. For each angle of incidence, determine if it would result in total internal reflection in a sapphire by writing Yes/No. **[4 marks]**

a) 23.7° _____

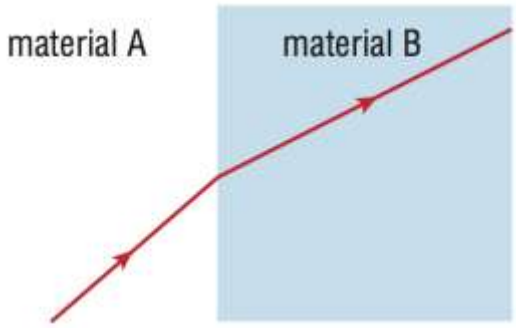
b) 34.7° _____

c) 53.4° _____

d) 31.5° _____

6. Suppose you calculated the speed of light in an unknown substance to be 4.00 x 10^8 m/s. How could you tell if you made an error in your calculations? **[2 marks]**

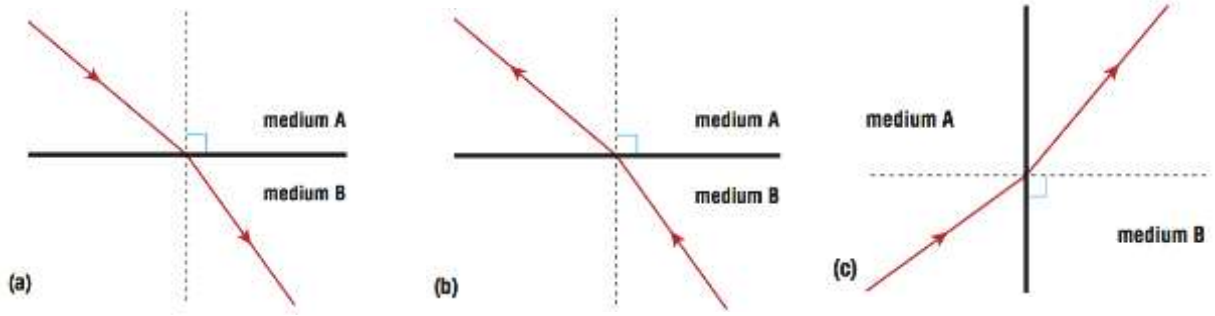
7. The figure below represents a beam of light traveling through two different media.



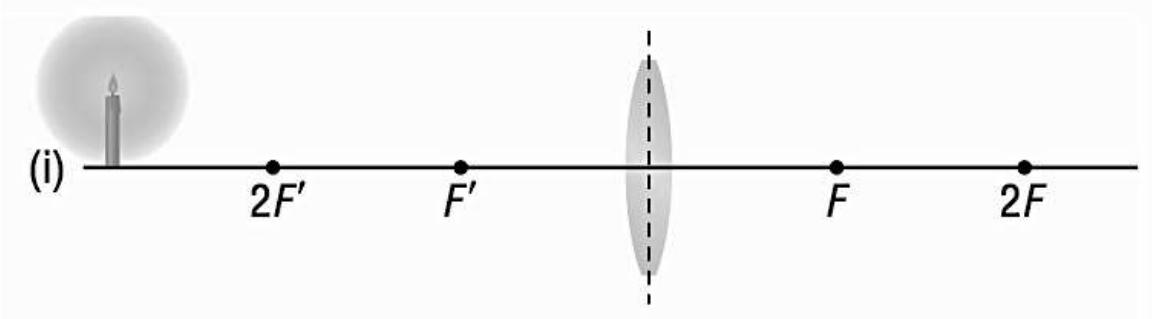
a) Which medium has the greater index of refraction? How do you know? **[2 marks]**

b) Which medium will light travel slower? How do you know? **[2 marks]**

8. The following figures show light traveling through two different media. In which diagrams would total internal reflection be possible if the angle of incidence were increased? Justify your answer. **[3 marks]**



9. Add light rays to the diagram to locate the image for each object. Describe the image using SALT. **[20 marks]**



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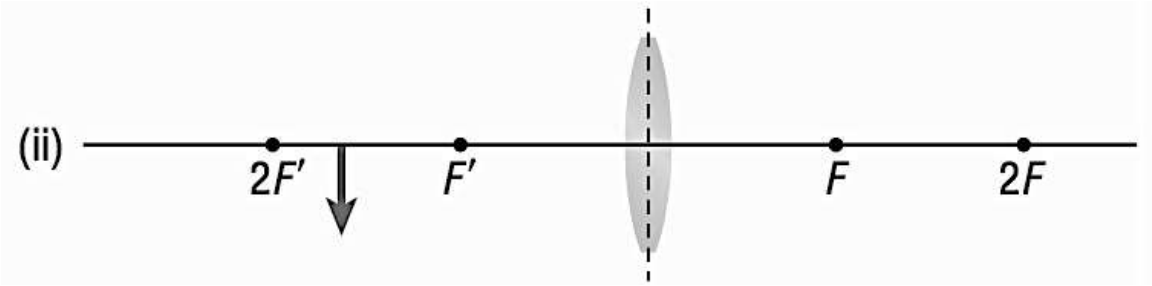

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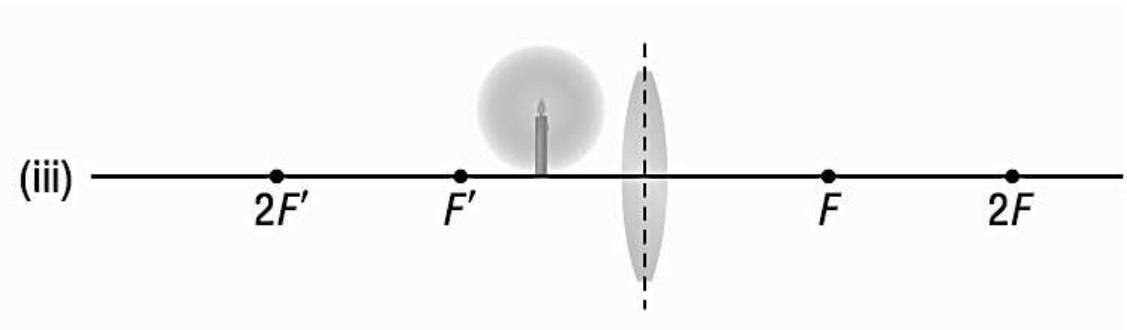

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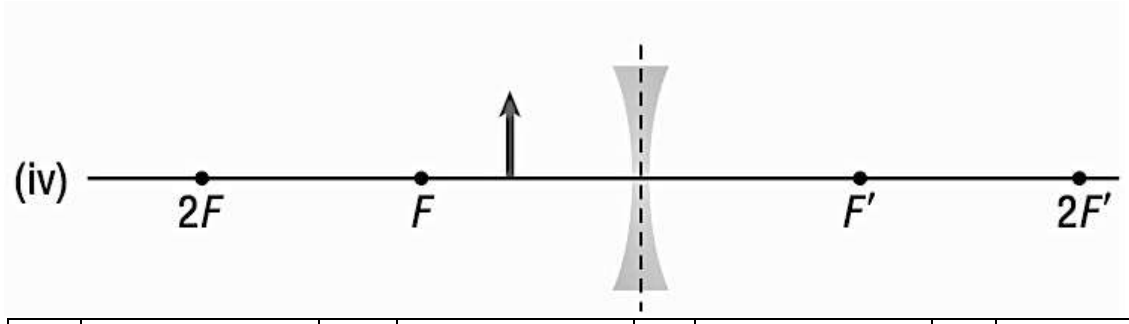

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