

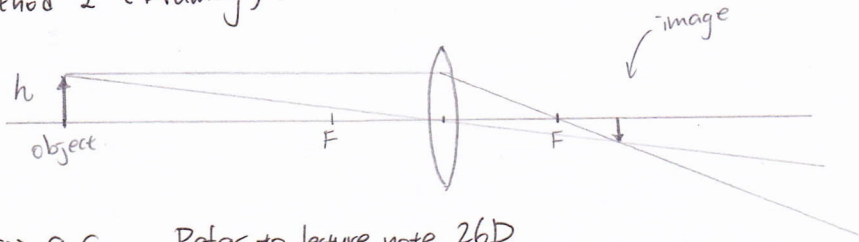
Ch 26. Assigned Questions

2014 Spring
PHYS 1Cb

2. (i) a c (ii) e (iii) a c Refer to the textbook.

3. (b) Method 1 (thin lens equation): $p = 50 \text{ cm}$, $f = 15 \text{ cm}$ $\therefore \frac{1}{p} + \frac{1}{q} = \frac{1}{f} \Rightarrow q = 21 \text{ cm}$
 \therefore image is real, and because $h' = -\frac{q-f}{f} \cdot h = -0.4h$ \therefore image is inverted and smaller.

Method 2 (Drawing):

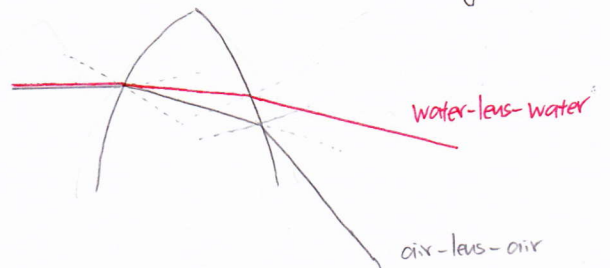
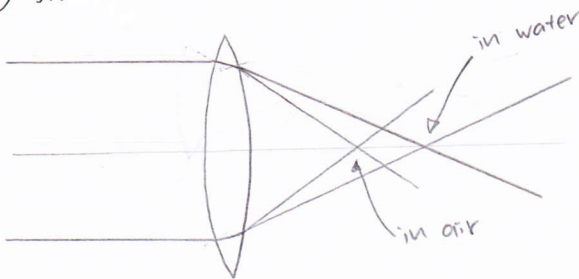


4. (i) e (ii) a c Refer to lecture note 26D

6. $p = 30 \text{ cm}$, $M = \frac{h'}{h} = +1.5$ $\therefore M = -\frac{q}{p} \Rightarrow -\frac{q}{30} = 1.5 \Rightarrow q = -45 \text{ cm}$

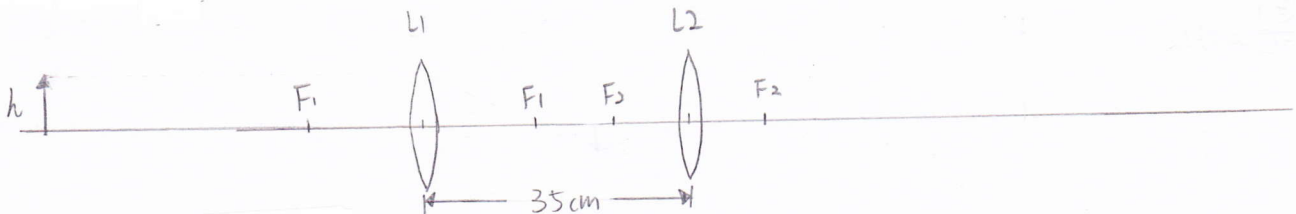
Mirror equation $\frac{1}{p} + \frac{1}{q} = \frac{1}{f} \Rightarrow f = 90 \text{ cm}$ (d)

7. Speed of light is slower in water than in air \Rightarrow when light enters the water from the lens, it'll bend "less" away from the normal.



(d) f will be greater.

8.



find image from L1: $f_1 = 15 \text{ cm}$, $p_1 = 50 \text{ cm}$ $\frac{1}{p_1} + \frac{1}{q_1} = \frac{1}{f_1} \Rightarrow q_1 = 21 \text{ cm}$, $M_1 = -\frac{q_1}{p_1} = -0.42$

find image of q_1 from L2: $f_2 = 10 \text{ cm}$, $p_2 = 35 - 21 = 14$, $\frac{1}{p_2} + \frac{1}{q_2} = \frac{1}{f_2} \Rightarrow q_2 = 35 \text{ cm}$

location of q_1 with respect to L2

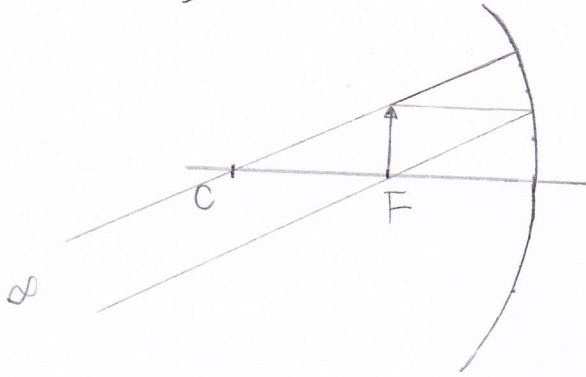
$M_2 = -\frac{q_2}{p_2} = -2.5$

\therefore Overall magnification $M = M_1 M_2 = (-0.42) \cdot (-2.5) = 1.05$

9. (i) C . Only concave mirrors can enlarge the image.

(ii) \therefore impossible to identify the image from 30 cm $\Rightarrow f = 30$ cm

from mirror equation $\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$ we see that if $p = f \Rightarrow$ then $q = \infty$. The image will be at infinity. $\therefore C$



11. $f = 8$ cm, \therefore The image can be seen on the screen \Rightarrow the image is real $\Rightarrow q > 0$

$$\frac{1}{p} + \frac{1}{q} = \frac{1}{8} \quad \Rightarrow \quad \frac{1}{q} = \frac{1}{8} - \frac{1}{p} > 0 \quad \Rightarrow \quad p \text{ must be greater than } 8 \text{ cm. (c)}$$

12. b.