2020 Sec 3 Physics Chapter 7 Reflection

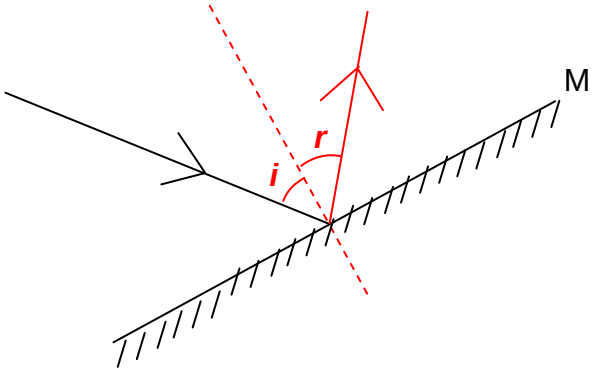
Answers to Examples and Exercises

Exercises

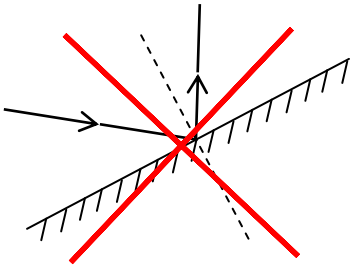
Basic Reflection

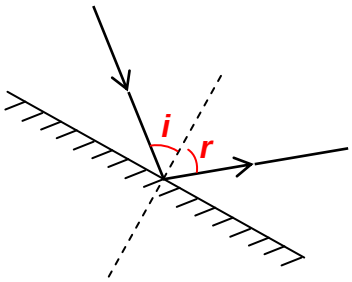
1. (b) $i = 39°$ (c) $r = 39°$

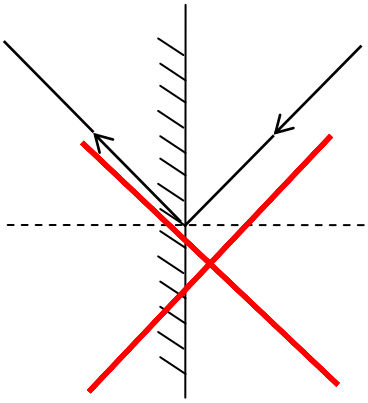
   (e) $\theta = 180° - 39° - 39° = 102°$



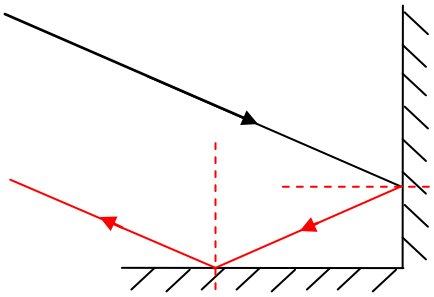
2.





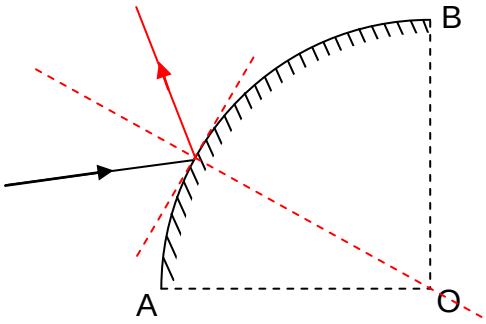


3.

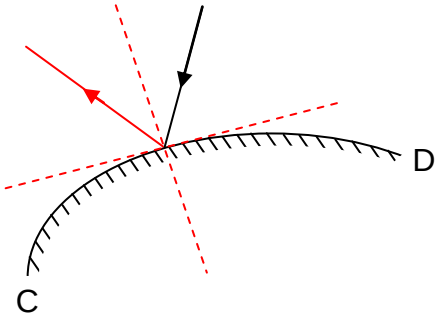


4

(a)



(b)

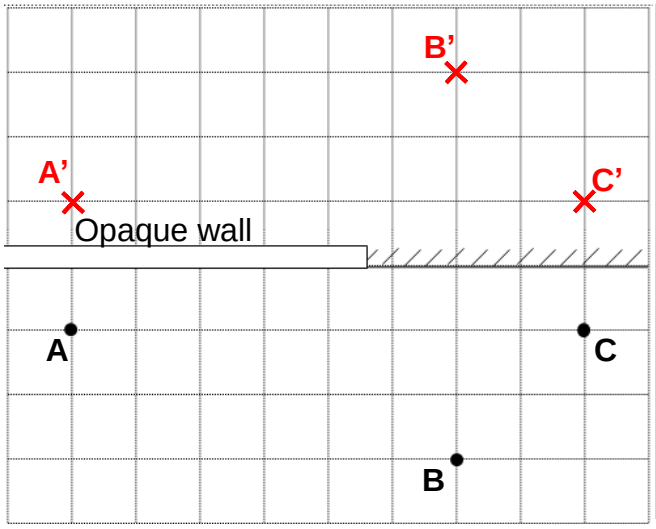


7.4 Basic problem-solving

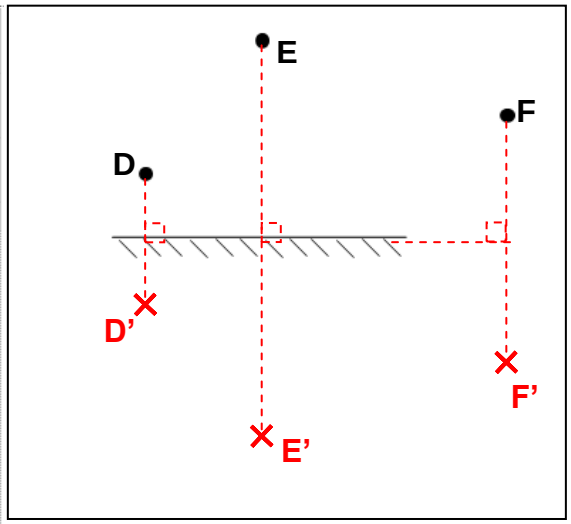
7.4.1 Locating mirror images

Example 7.1

(a)



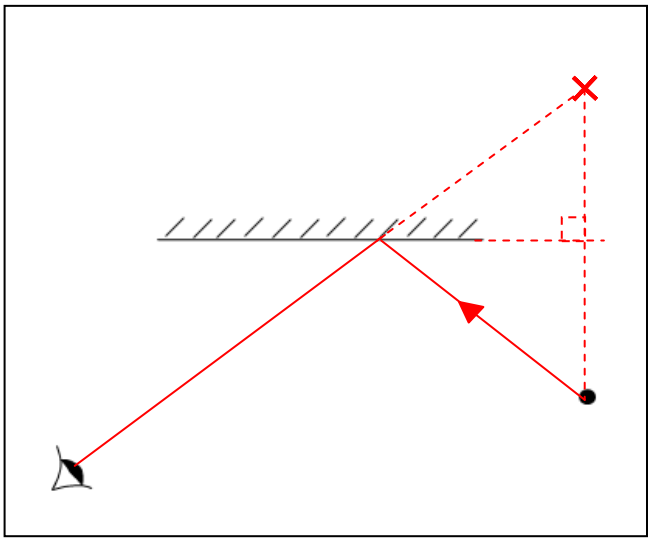
(b)



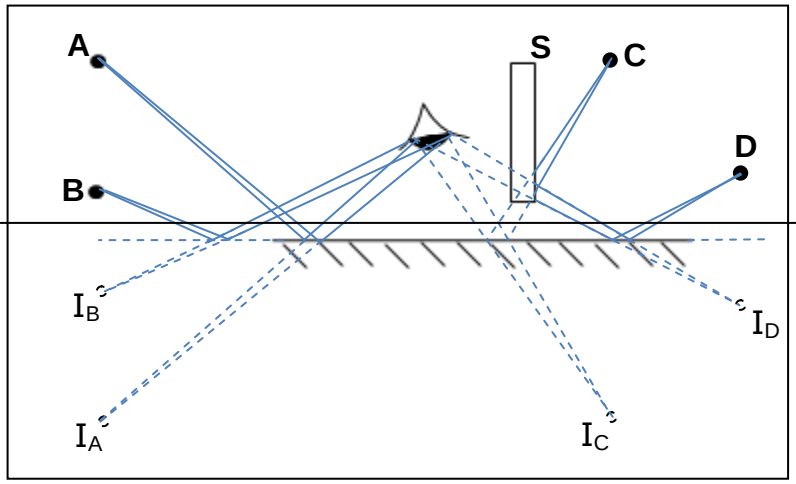
7.4.2 Ray Diagrams

Example 7.4.2

1



2 (a)



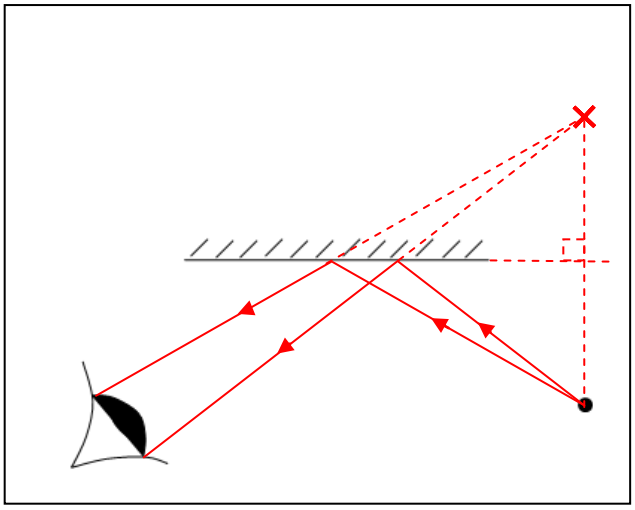
***Note**: single light rays can be used instead of cones of light to determine the answers!*

(b) Only A can be seen in the mirror by the eye.
[*For B, the mirror is too "short", so reflection of B by the mirror is not possible.*
For C, the incident rays are blocked by the screen S so the rays cannot reach the eye.
For D, the reflected rays are blocked by the screen S so the rays cannot reach the eye]

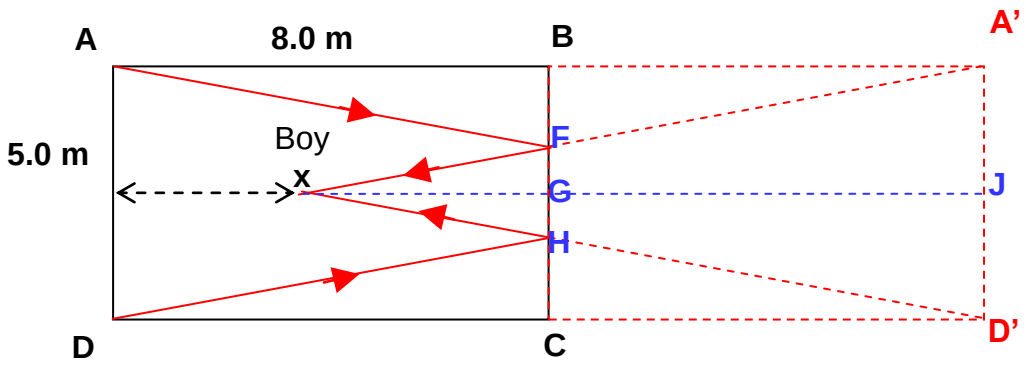
7.5 Advanced problem-solving

7.5.1 Cone of light problems

Example 7.5.1



Example 7.5.2



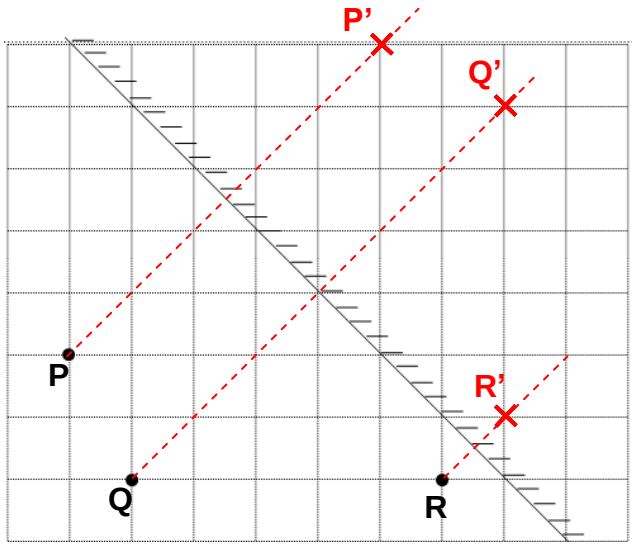
- Object is **Wall AD**. Locate and draw **image** A'D' (dashed line).
- Draw construction lines from A' and D' to the boy (observer): dashed lines behind mirror.
- Draw the light ray from A to mirror to boy (observer) and insert arrows.
- Similarly, draw light ray from D to mirror to boy.
- Label the points E, F, G, H & J.
- The **similar triangles** are EFG & EA'D'. Minimum length of mirror is FH = **L**
  Hence, ratio of sides in similar triangles: FH / EG = A'D' / EJ
  L / (8 m – 3 m) = 5 m / (5 m + 8 m)
  L = 1.9 m (2 s.f.)

Exercises

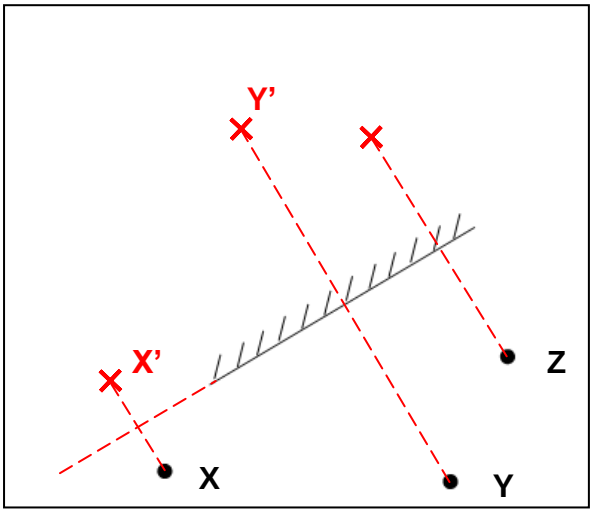
Problem-solving

1

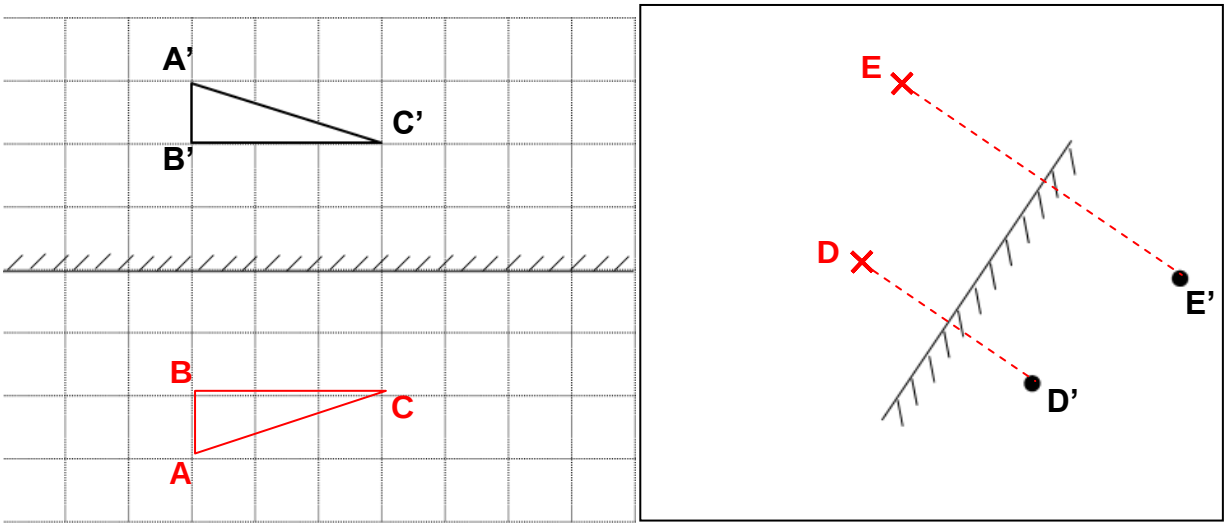
(a)



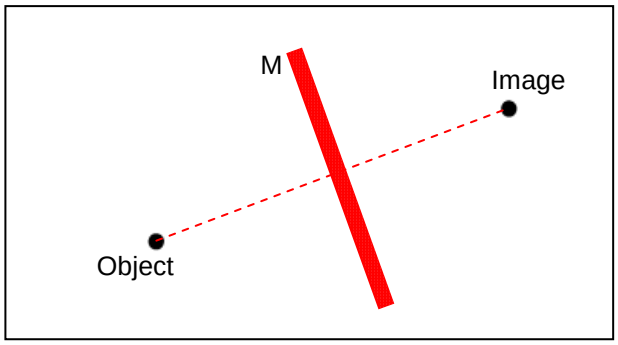
(b)



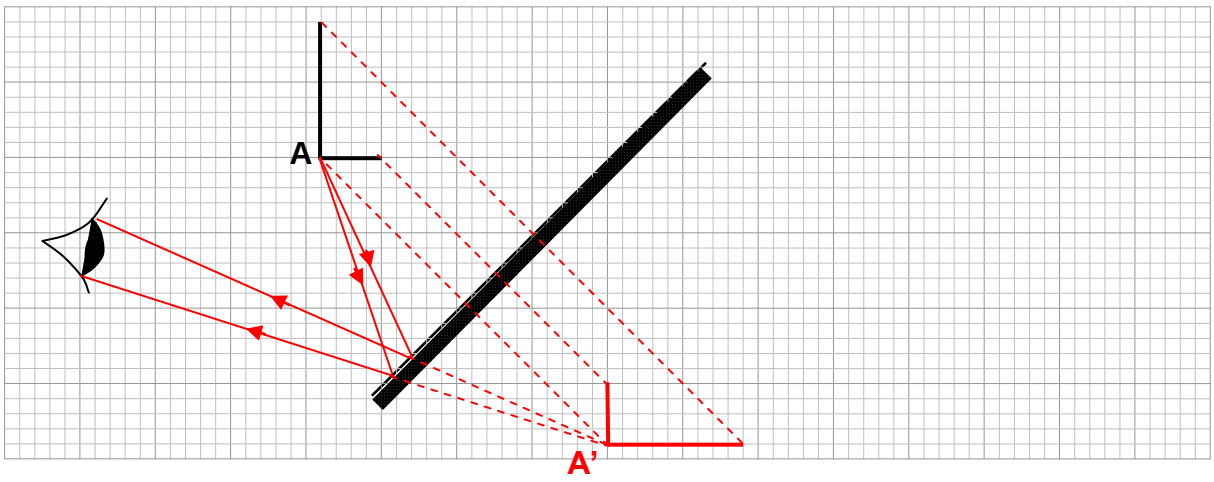
2 (a) (b)


A'
C'
B'
B
C
A
E
D
E'
D'

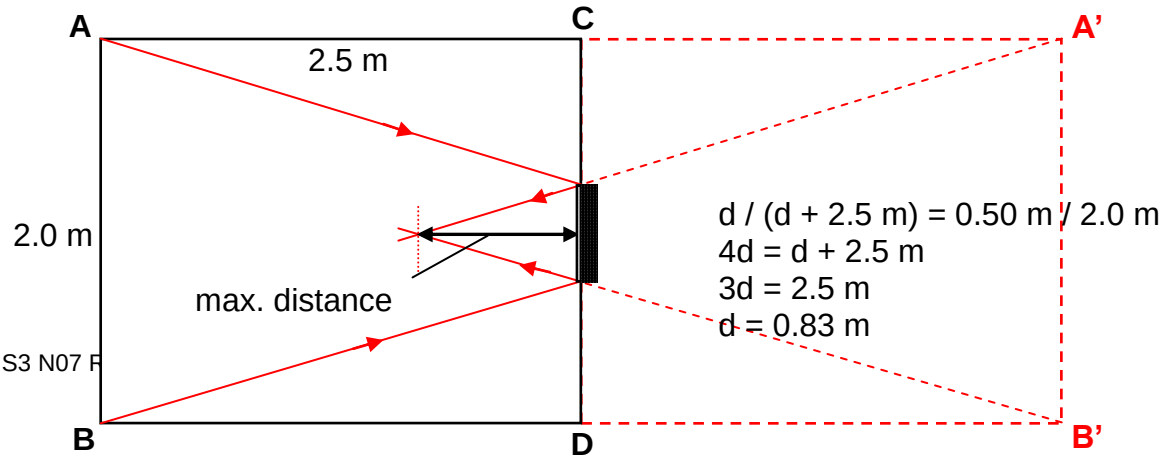
3


M
Image
Object

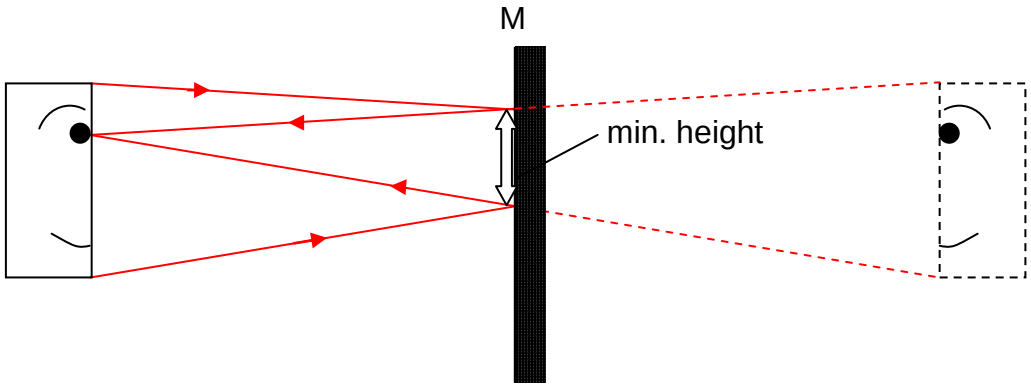
4.


A
A'

5

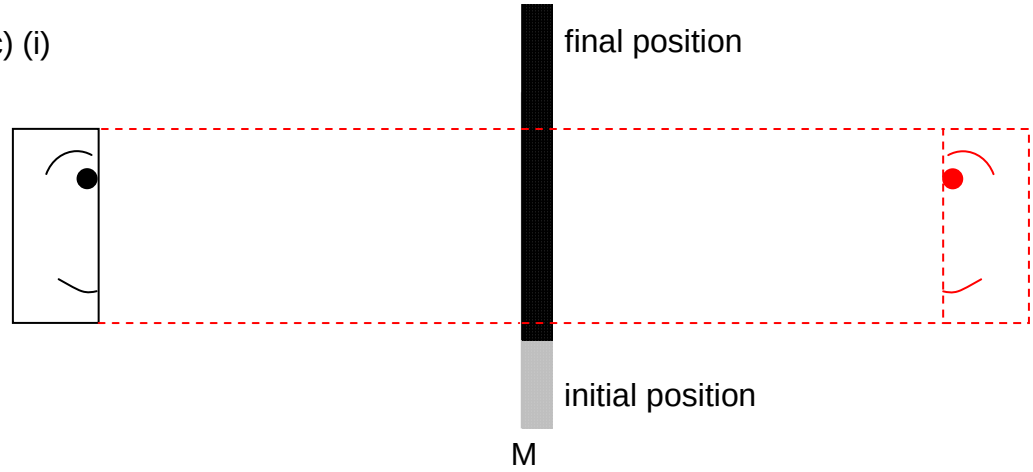

A
C
A'
2.5 m
2.0 m
max. distance
B
D
B'
d / (d + 2.5 m) = 0.50 m / 2.0 m
4d = d + 2.5 m
3d = 2.5 m
d = 0.83 m

6. (a)



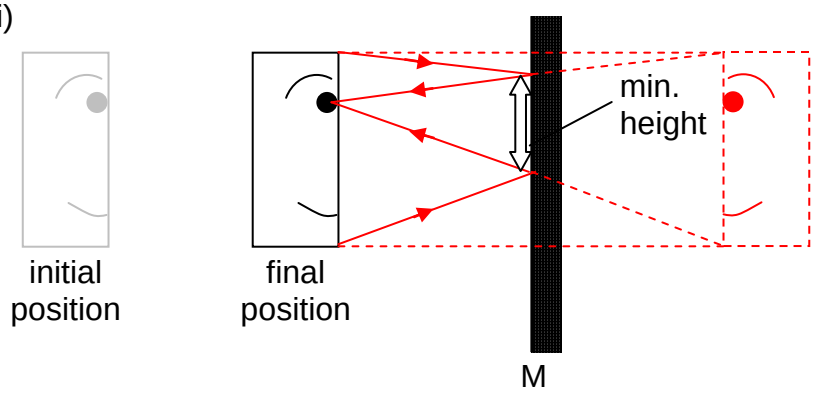
(b) m = ½ h where the base of the mirror is placed half-way between the bottom of his face and his eye.

(c) (i)



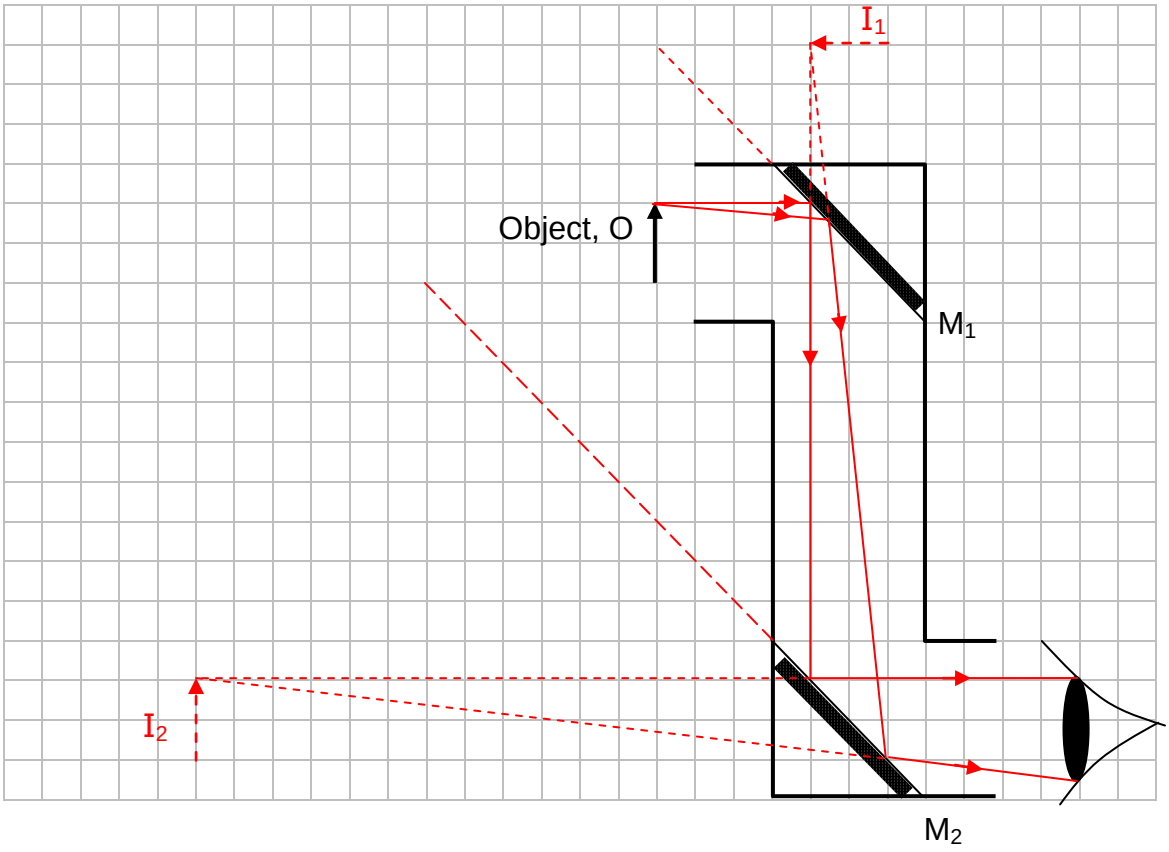
(ii) As seen by the man, the position of the image of his face remains at the same height and at the same distance from him.

(d) (i)



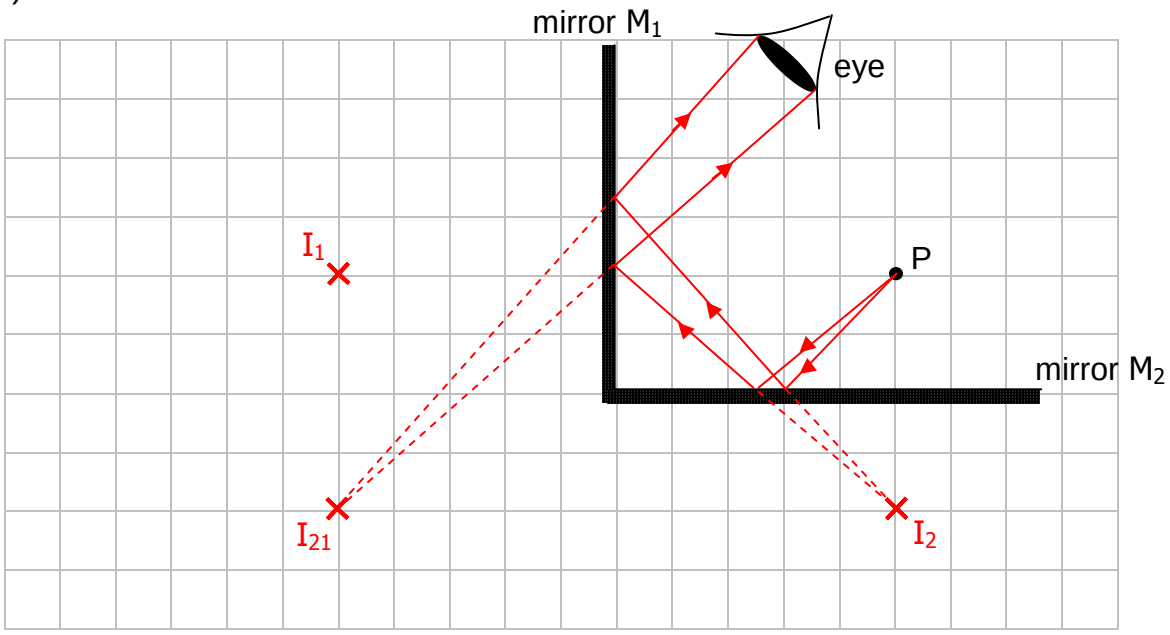
(ii) The minimum height required for the man to see his whole face remains the same. When the man moves closer to the mirror, the image will also move closer to the mirror. Therefore, the ratio will still remain the same.

7.

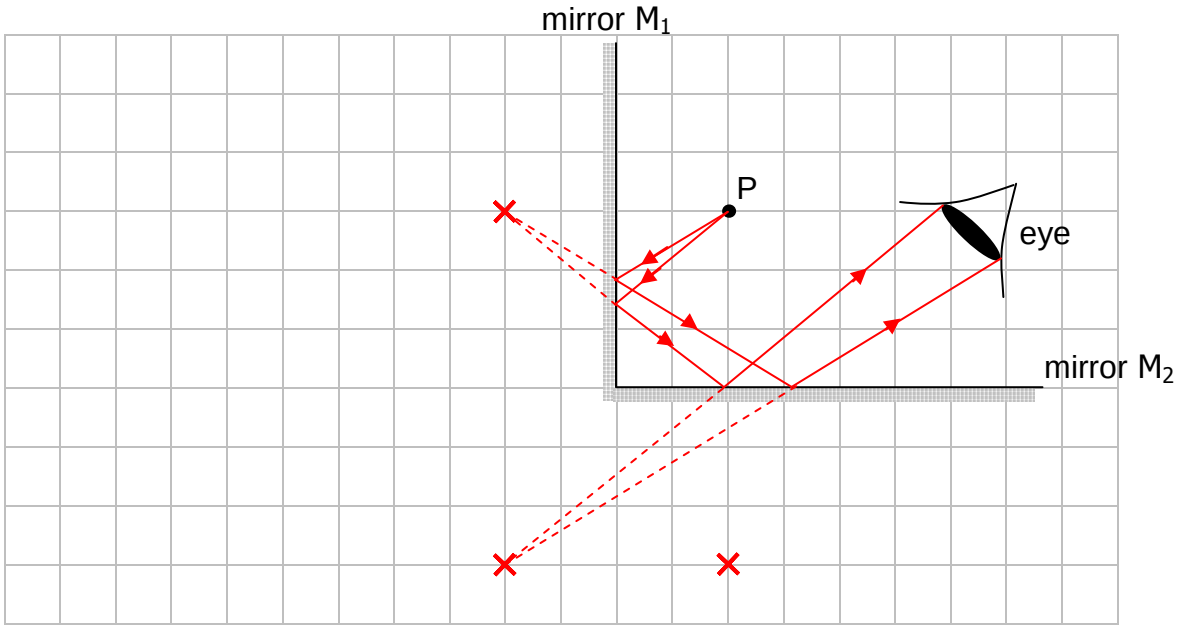


Enrichment

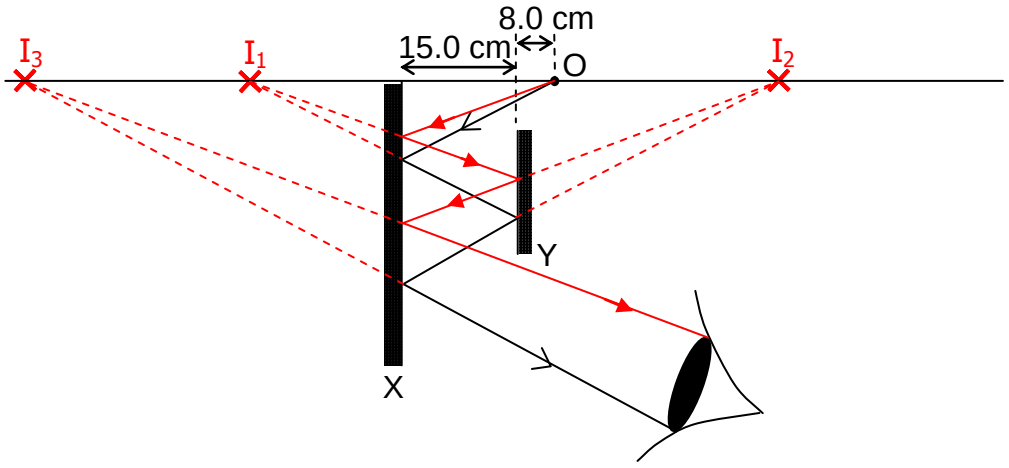
1. (a) & (b)



(c)



2.



(a) (iii) 8.0 cm + 15.0 cm + 15.0 cm + 15.0 cm = 53.0 cm

(b) Refer to the ray in red in the diagram above.

(c) Infinite