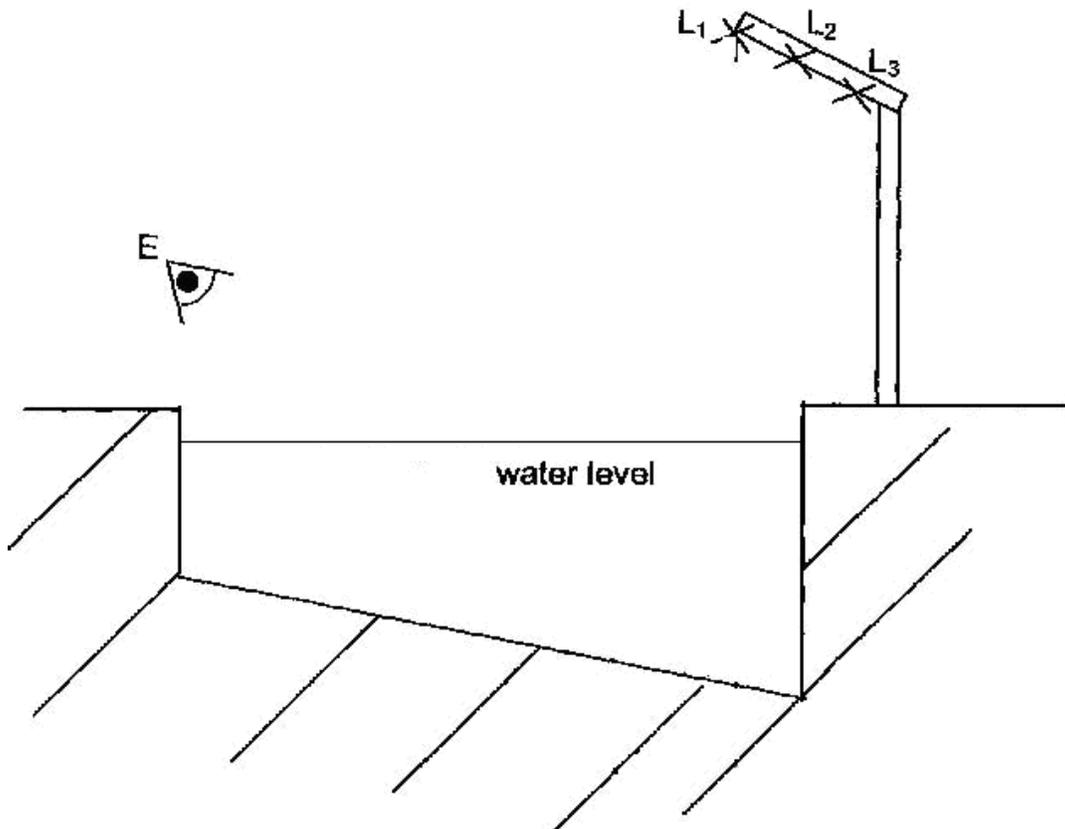


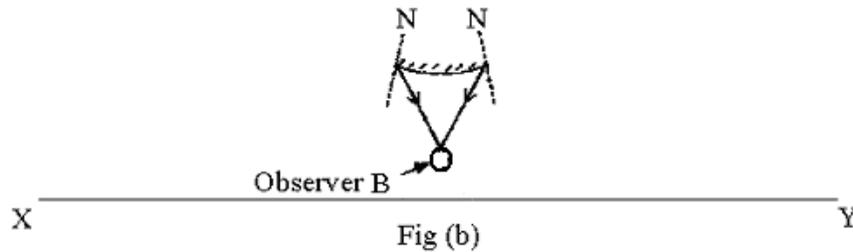
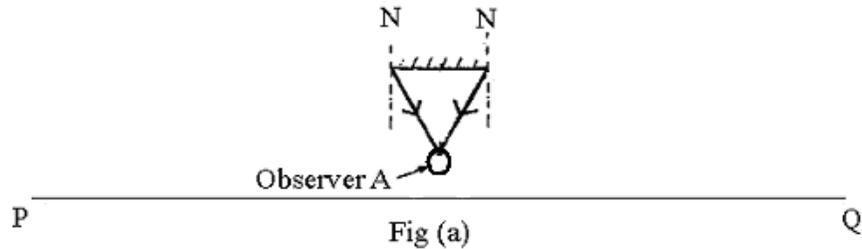
Quiz Topic: Light – Reflection
Possible Score: 24 Marks
Level of Difficulty: High

1. An observer E stands near the edge of a swimming pool. He could see the image of a lamp L_1 due to the reflection of light from the surface of the water, which acts like a mirror. L_2 and L_3 are two other lamps fixed as shown below.

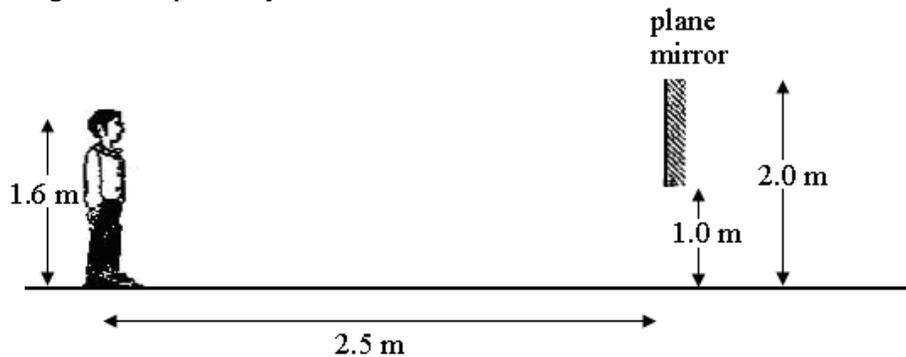


- (a) On the diagram, mark the position of the image of L_1 . (1)
- (b) Draw two rays to show how E is able to see the image of L_1 . (2)
- (c) State whether this image is real or virtual. (1)
- (d) How would the position of the image of L_1 seen by E be affected if the water level in the pool were lowered? (2)
- (e) Can observer E see the image of lamp L_3 ? (1)

2. Fig (a) and (b) show light rays reflected to an observer from the surface of each of two mirrors, one plane and the other curved. The normal, N, at each point of incidence has been drawn.

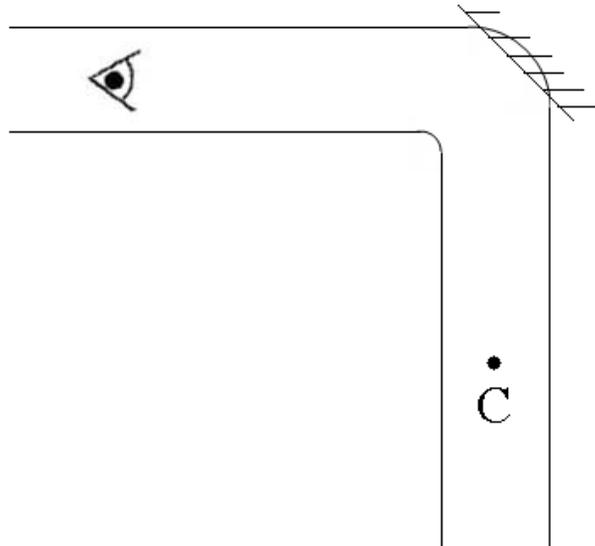


- (a) Complete both diagrams above by drawing accurately the incident rays that would produce the reflected rays shown. The incident rays should start from the lines PQ and XY. (3)
- (b) Write down the lengths of the portion of PQ and XY which observers A and B can see in the two mirrors respectively. (2)
- (c) Give one reason why the side mirrors of most cars are curved. (1)
3. The diagram shows a person whose eyes are 1.6 m above the ground. He looks at his reflection in a vertical plane mirror 2.5 m away. The top and bottom of the mirror are 2.0 m and 1.0 m above the ground respectively.



- (a) How far behind the mirror is the image of the person's head? (1)
- (b) The person holds the letters 'WHY' in front of the mirror. Write down the image of these letters as seen by the man. (2)
- (c) By drawing light rays, indicate on the above diagram which part of his body the person could not see in the mirror. (3)

4. The diagram below is a scale drawing of a narrow road with a plane mirror mounted across the corner of a 90° bend. The point C represents a car.



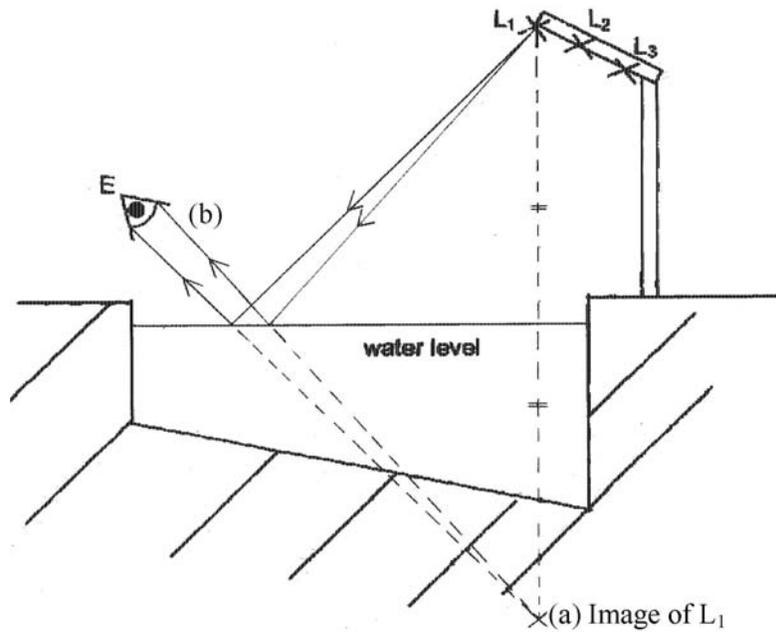
- (a) Mark the position of the car image, formed by reflection at the mirror by a point I. (1)
- (b) Draw the paths of two rays of light from C by which a man sees this image with his eye positioned as shown in the diagram. (2)

The car travels towards the bend, along the centre line of the road, a distance represented by 10 mm on the diagram.

- (c) Mark I' the position of the image of the car when it has travelled to this position. (1)
- (d) Draw an arrow on the diagram to show the direction in which the car appears to the man to be travelling. (1)

Answers:

1(a) & (b)



(c) Image is virtual.

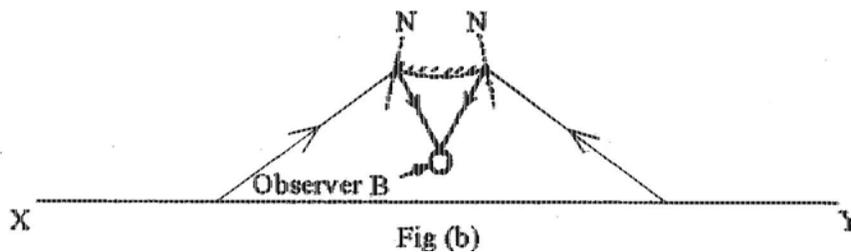
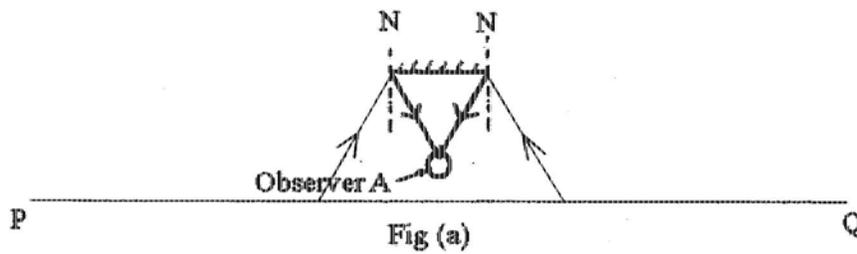
(d) The image will appear further than previously.

Comment:

✓ *The image appears further because the distance between the lamp and water surface (mirror) is now increased.*

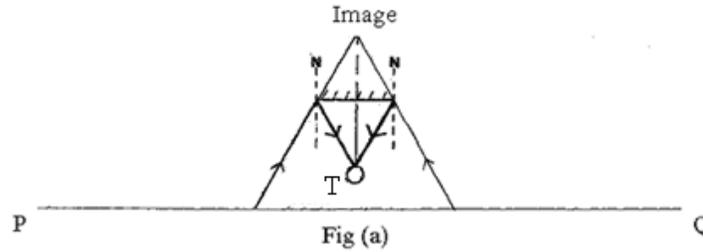
(e) Yes, the observer can see the image.

2(a)



Comments:

- √ To obtain the above diagram, first measure the angle of incidence using a protractor. Next, draw the reflected ray, with the angle of reflection equal to the angle of reflection.
- √ An alternative method is to make use of the images of points X and Y. The steps are as follows:
 - Draw a perpendicular line from point X to the mirror, and extend the line upwards to determine the image of point X.
 - Draw a line linking the image to the normal, and extend it further so that the line touches lines PQ & XY. (See diagram below)



(b) AB: 3.3 cm (approximate)

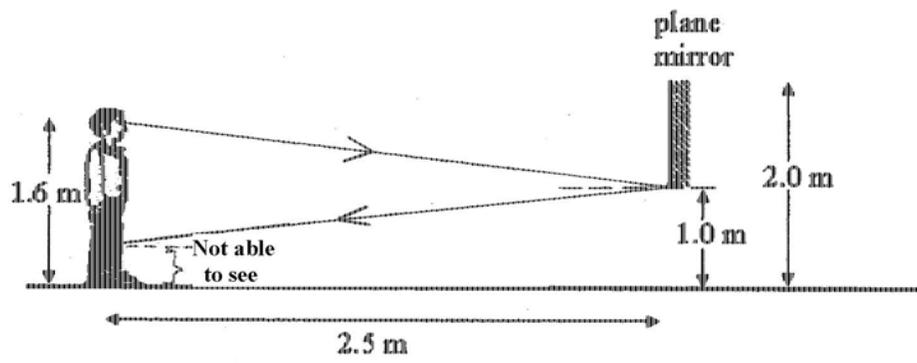
CD: 5.9 cm (approximate)

(c) Provide drivers with a wider field of vision.

3(a) 2.5 m

(b) YHW

(c)



4.

