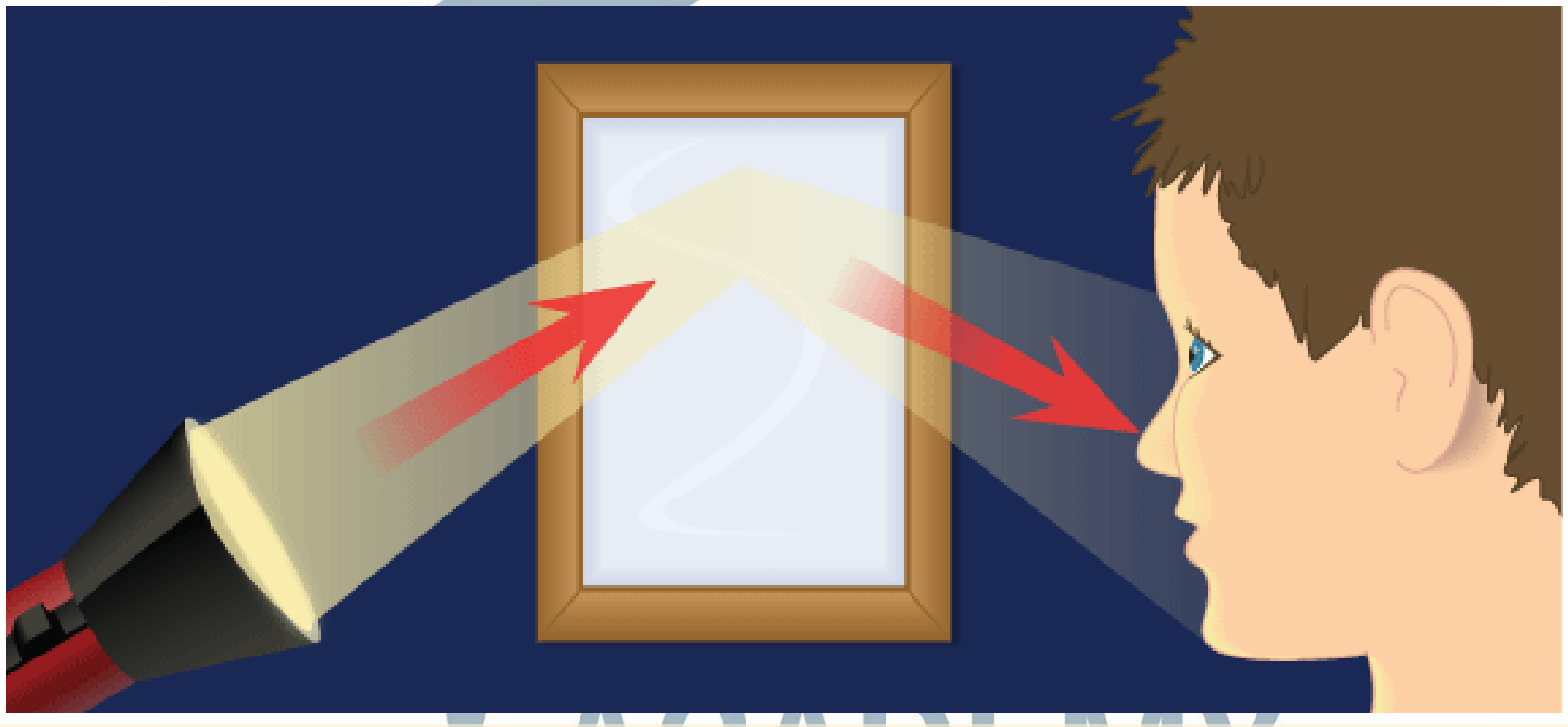
Physics – Grade 10

Unit Three – Optics



Chapter 10 – Reflection of Light

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Think then Solve

Exercise 1

Choose the correct answer

1) **The phenomenon by which the incident light falling on a surface is sent back into the same medium is known as:**

a) **Polarization.**
b) **Refraction of light**
c) **Absorption of light**
d) **Reflection of light**

2) **When light is incident on a polished surface …….. reflection takes place.**

a) **Regular.**
b) **Irregular**
c) **Normal**
d) **None of the above**

Exercise 1

3) According to the laws of reflection :

a) $i < r$.

b) $i > r$

c) $i = r$

d) None of the above

4) The image formed by a plane mirror is always

a) Real.

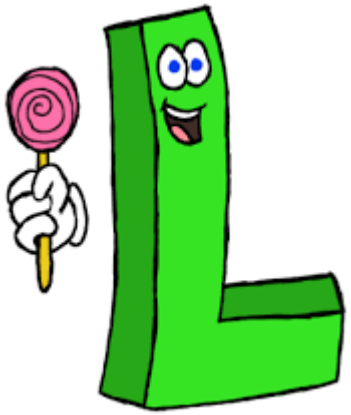
b) Virtual

c) Undefined

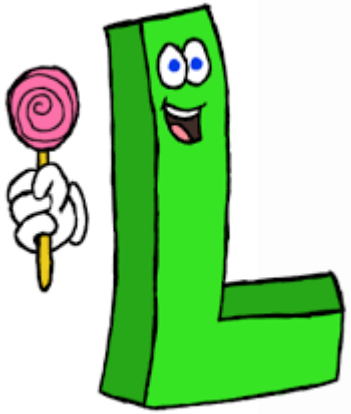
d) At the pole

Exercise 1

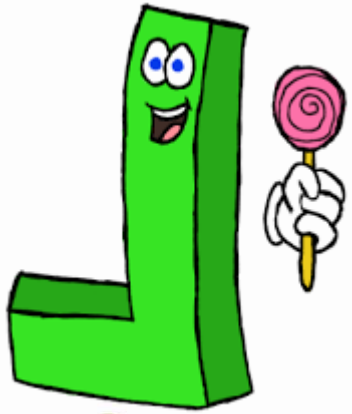
5) The letter L in the adjacent figure is facing a plane mirror, the image of this letter is:



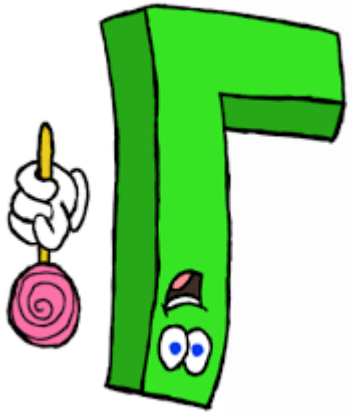
a) .



b) .



c) .



d) None of the above

Exercise 1

6) A girl stands 60 cm away from a plane mirror, the girl moves 15 cm towards the mirror, then the distance between the girl and its image is:

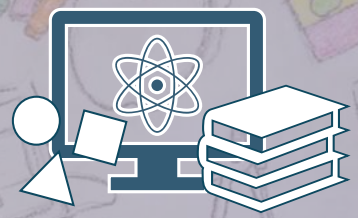
a) 150cm.

b) 60cm

c) 15cm

d) 90cm

The End

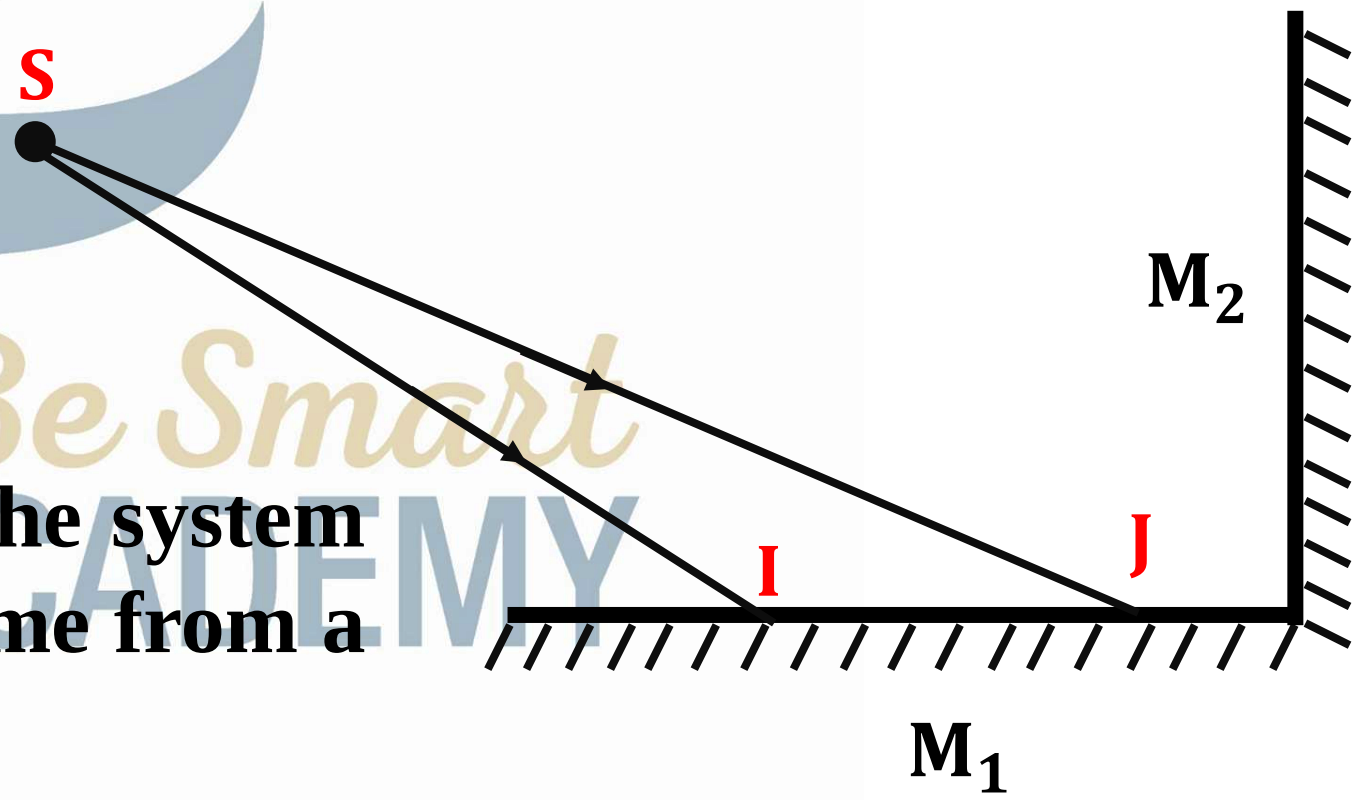


Think then Solve

Exercise 2:

Consider two perpendicular plane mirrors (M_1) and (M_2) as shown in the figure below.

A point source S emits towards (M_1) two rays SI and SJ.

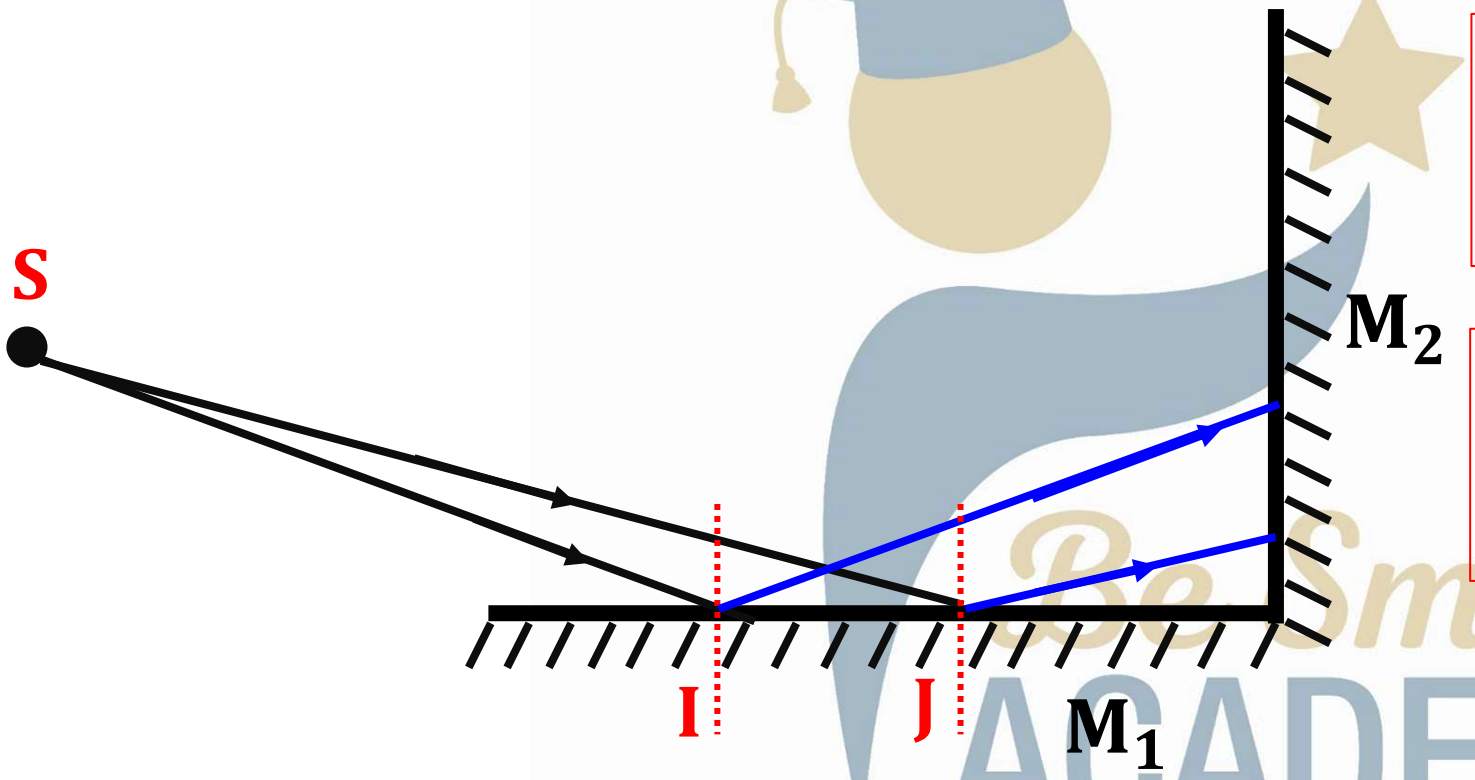


1) **Complete the path of the two rays SI and SJ relative to M_1.**

2) **The rays emerged from the system of the mirrors seem to come from a point S'. Construct S'.**

Exercise 2:

1) Complete the path of the two rays SI and SJ.

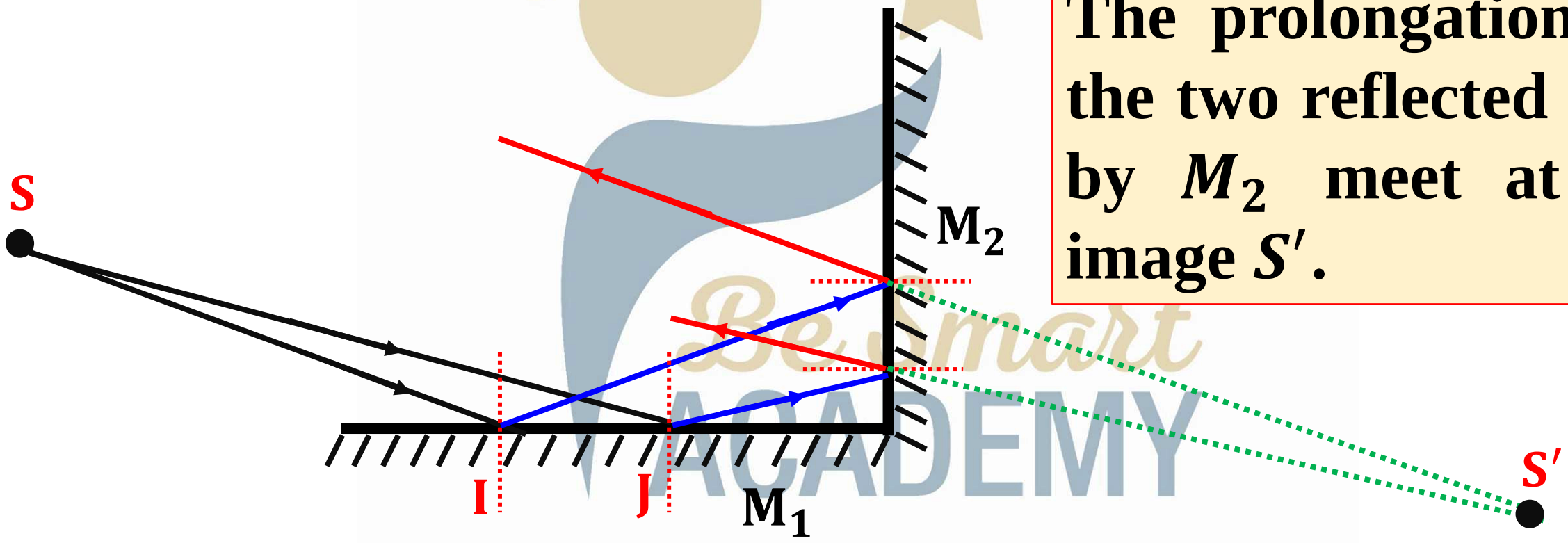


The ray SI reflected by the mirror M_1

The ray SJ reflected by the mirror M_1

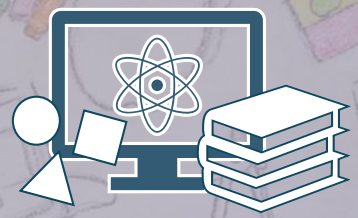
Exercise 2:

1) The rays emerged from the system of the mirrors seem to come from a point S'. Construct S'.



The prolongations of the two reflected rays by M_2 meet at the image S'.

The End



Be Smart Academy

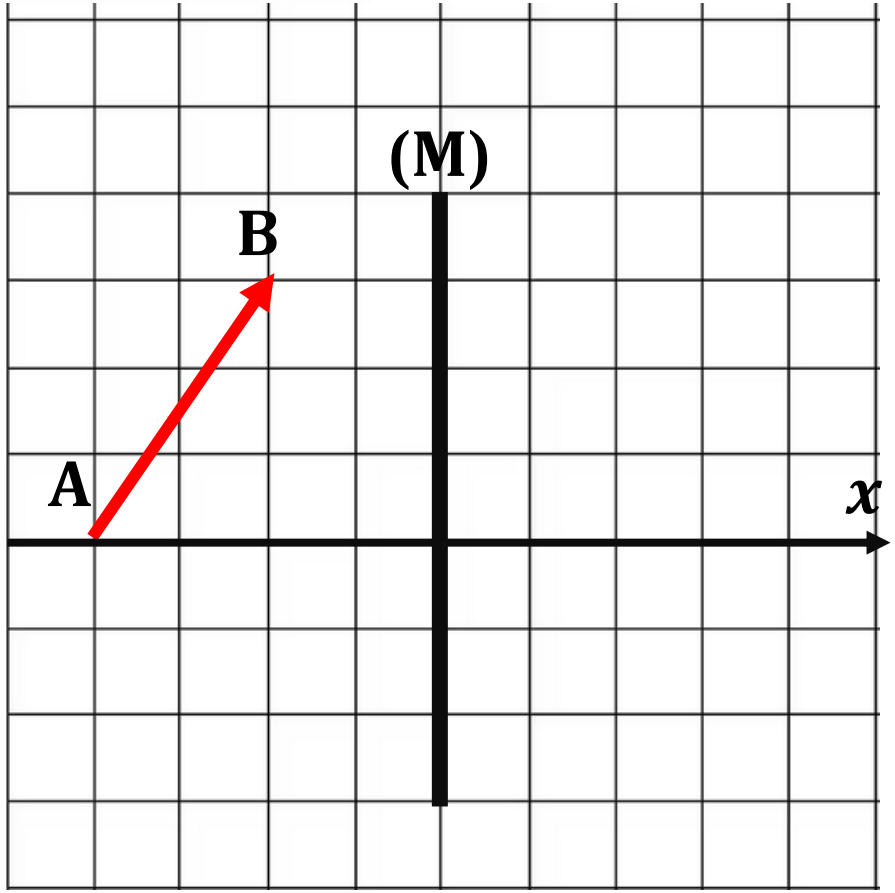
Think then Solve

Exercise 3:

An object AB is placed in front of a vertical mirror (M).

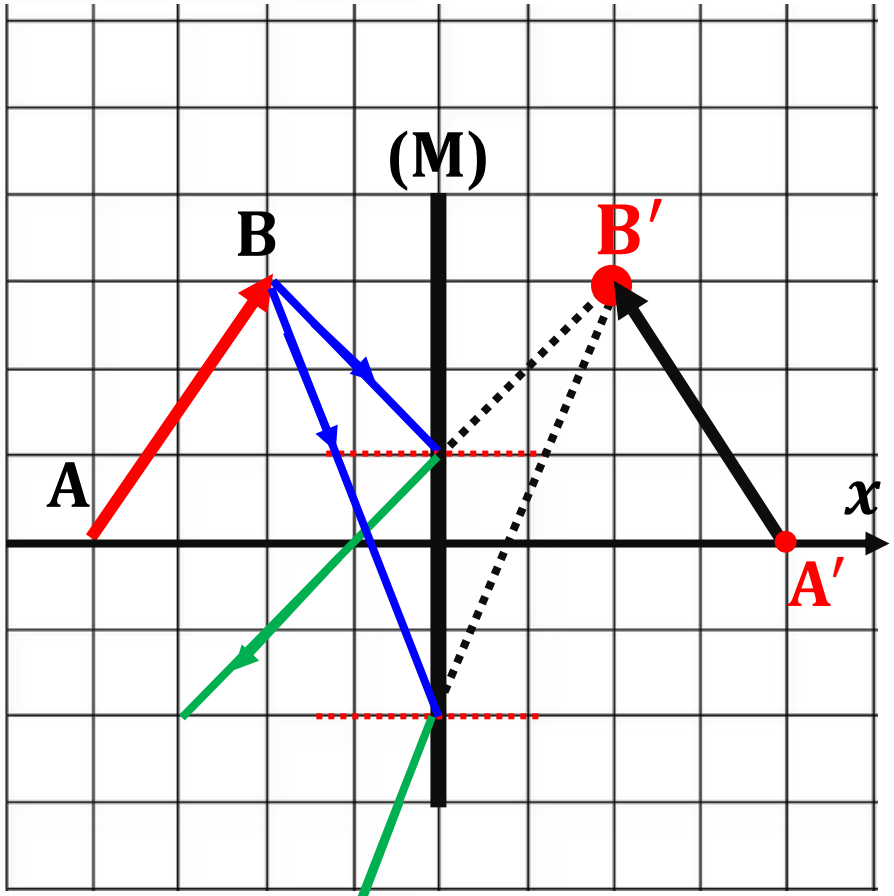
1) **Draw a ray diagram to show the image $A'B'$ of AB formed by (M).**

2) **Deduce the nature of the image and compare its size to that of AB.**



Exercise 3:

1) Draw a ray diagram to show the image $A'B'$ of AB formed by (M).



Draw two rays issued from B to the mirror.

Draw the rays reflected the mirror.

The prolongation of the reflected rays meets at B'.

A' is on the x-axis at the same distance from the mirror as A.

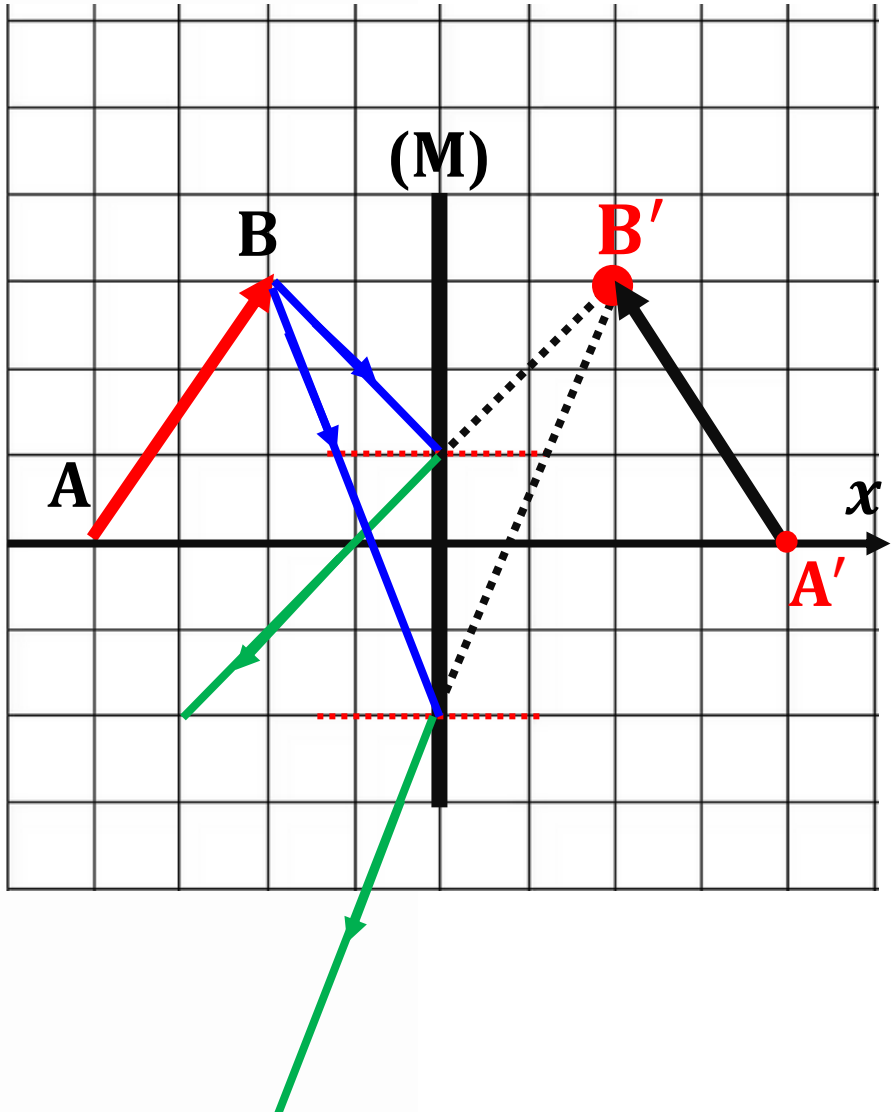
Exercise 3:

2) Deduce the nature of the image and compare its size to that of AB

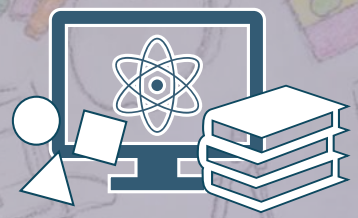
The image $A'B'$ is virtual, since it doesn't really exist).

$A'B'$ have the same size as AB then:

$$A'B' = AB$$



The End




Quiz
Time
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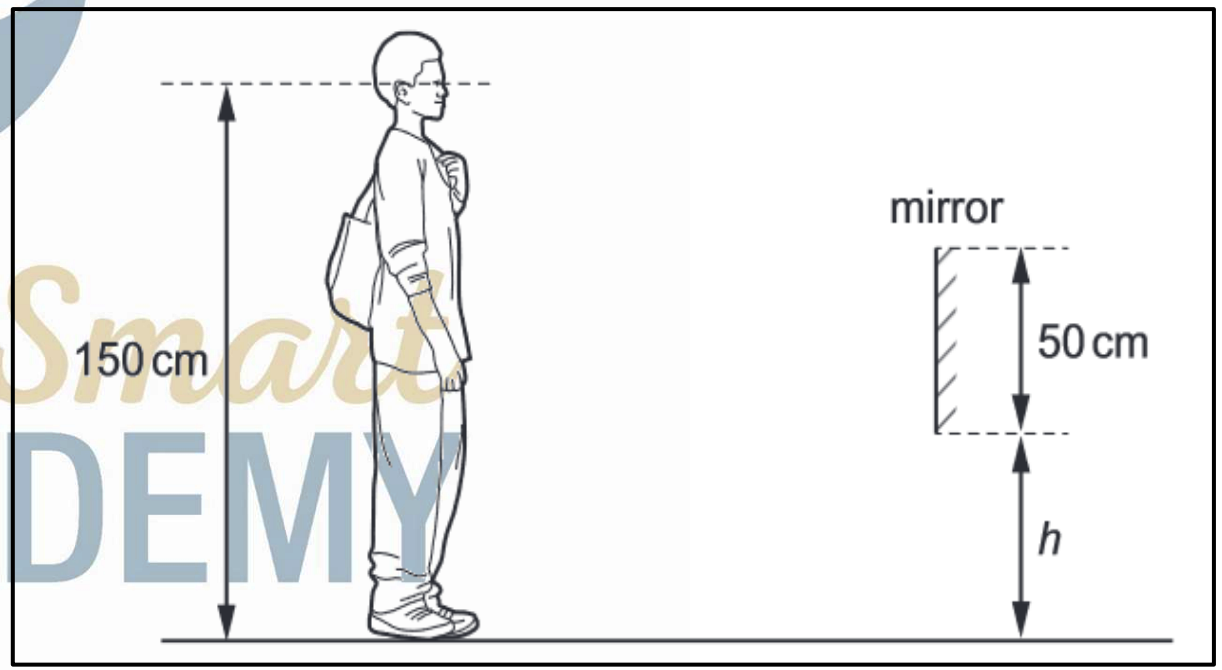
Quiz 1 reflection of light 10 min

A shoe shop puts a mirror on the wall so that customers can look at their shoes.

The length of the mirror is 50 cm. A customer has eyes 150 cm above ground level.

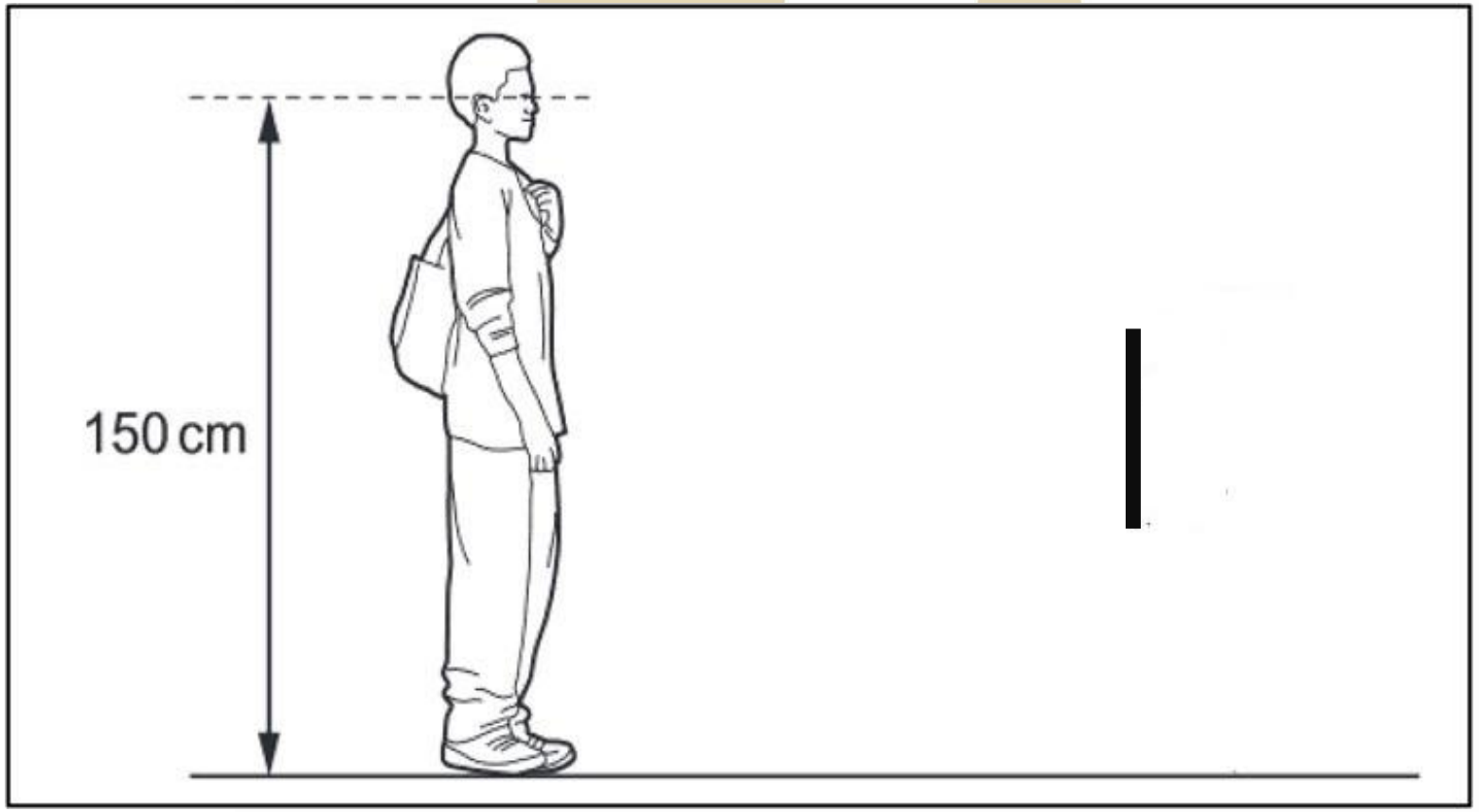
The bottom of the mirror is at height h above the ground.

What is the smallest value of h that allows the customer to see an image of his shoes in the mirror?



Quiz 1 reflection of light 10 min

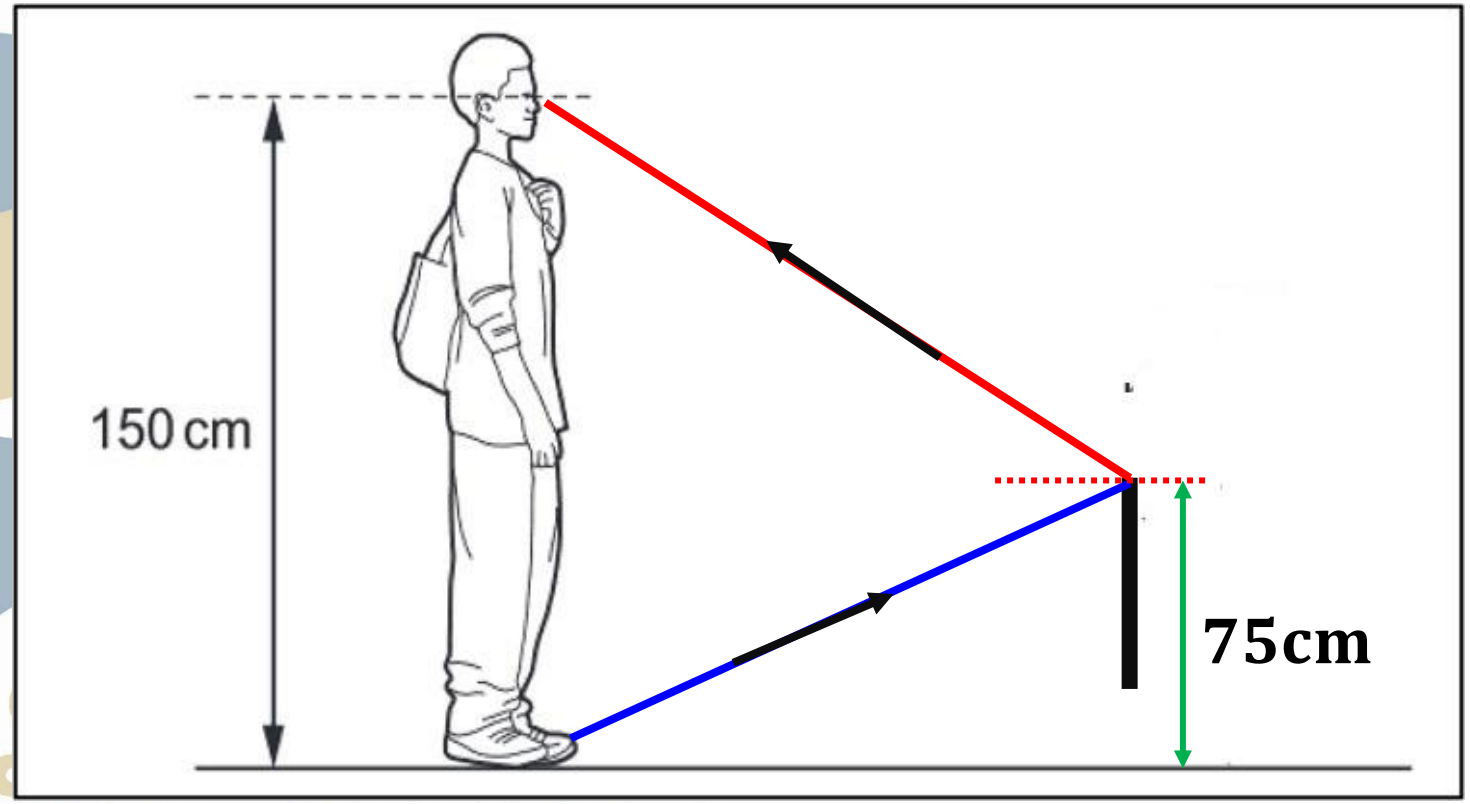
The mirror must be shifted down, such that the distance between the top of the mirror and the ground is (150cm÷2)



Quiz 1 reflection of light 10 min

The distance between the top of the mirror and the ground is 75cm

Draw a ray issued from the shoe to the top of the mirror.

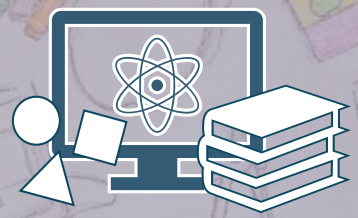


The ray reflected to the eye of the customer.

$75cm = h +$ length of mirror

$75cm = h + 50\text{cm}$ ⇒ $h = 25cm$

The End




Quiz
Time
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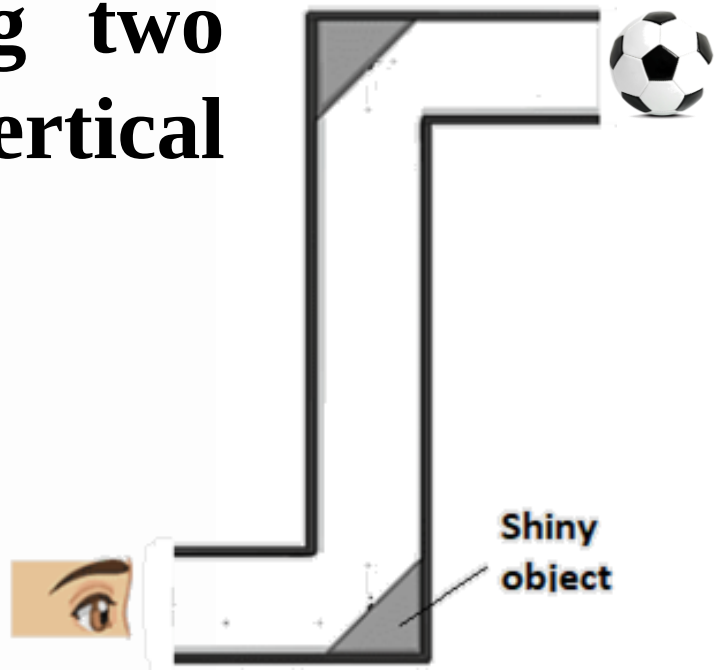
Quiz 2 image by periscope 20 min

A periscope is an optical instrument used for viewing objects that are not on the same level of direct sight.

The periscope consists of a tube holding two parallel plane mirrors separated by a vertical distance of 7.5 m



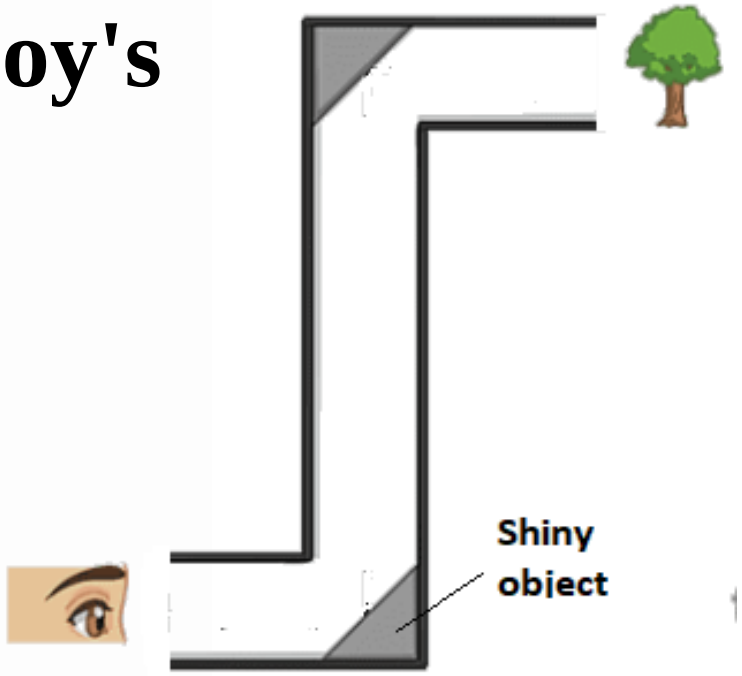
A boy is looking through the eyepiece at a ball on the other side. The ball is at a horizontal distance of 25m from the upper mirror.

The boy's eye is at a horizontal distance of 10cm from the lower mirror.

Quiz 2 image by periscope 20 min

1) Draw the ray diagram to see the ball.

2) Determine the distance between the boy's eye and the formed image of the ball.



3) Is the final image real or virtual?

4) Is it upright or inverted?

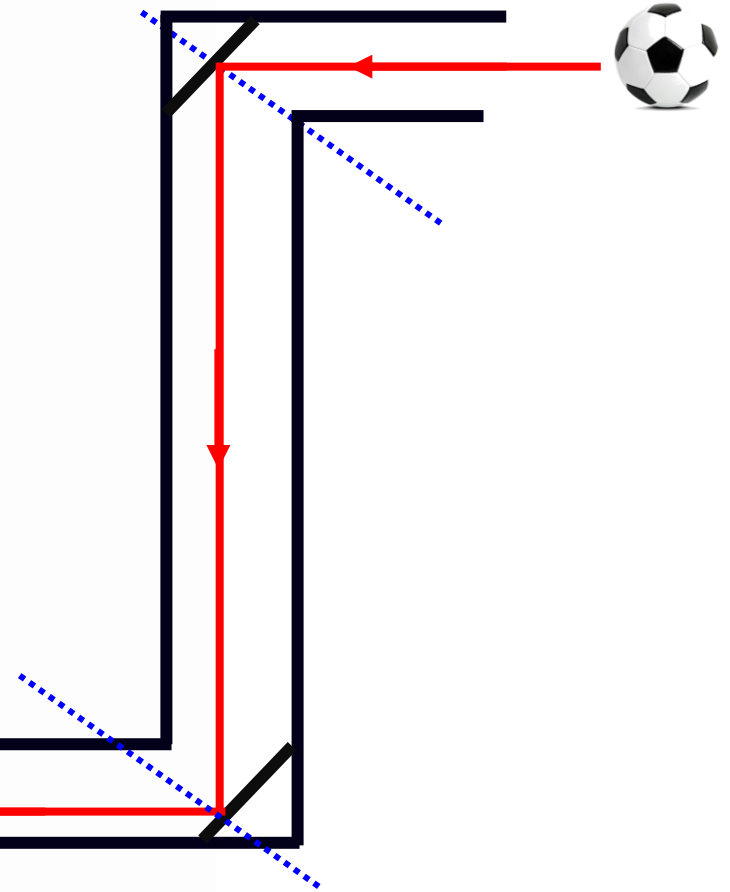
5) Does it appear to be left-right reversed?

1) Draw the ray diagram to see the tree.

A ray issued from the ball towards the upper mirror.

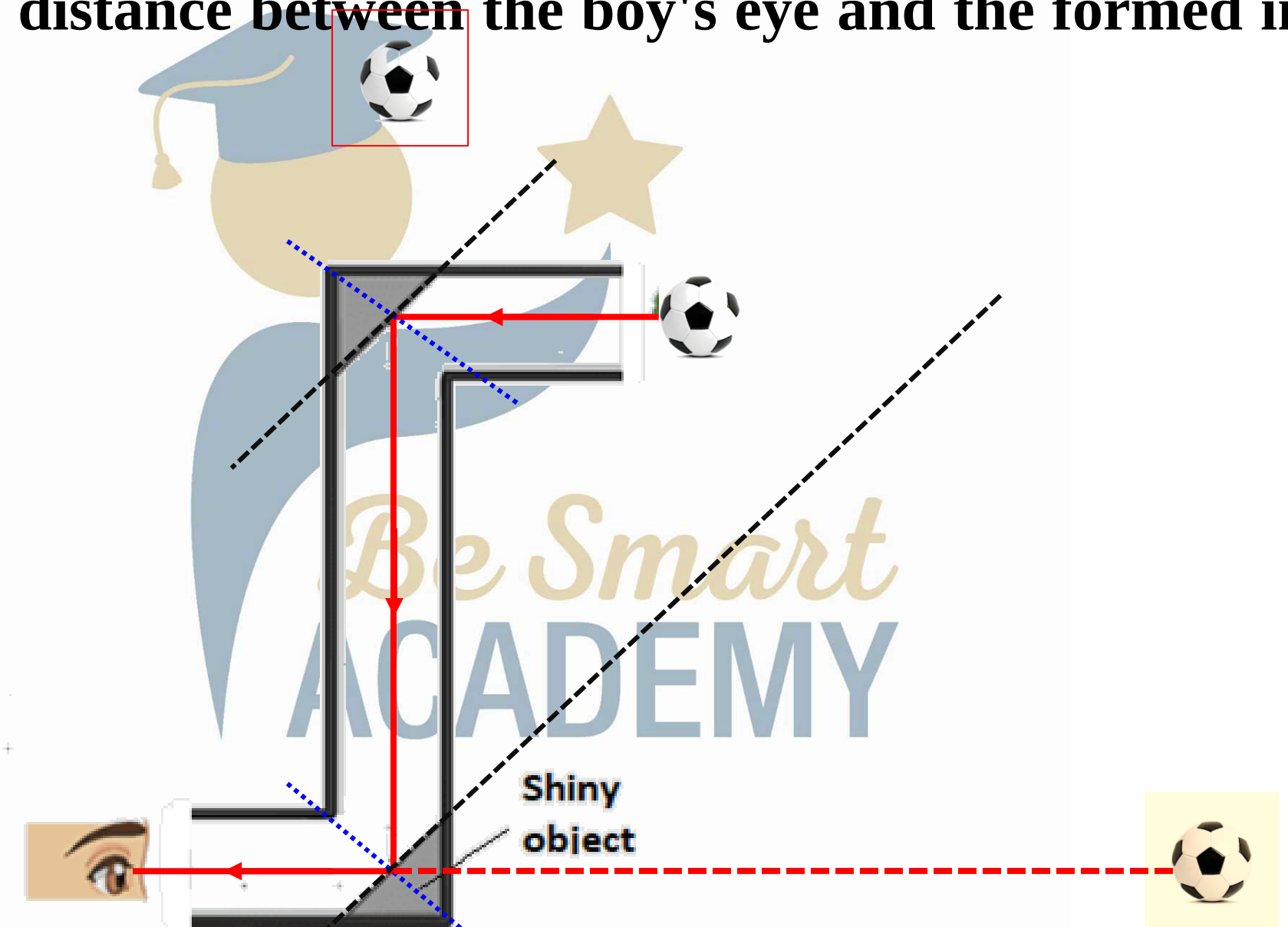
A ray is reflected by the upper mirror inside the tube of the periscope.

The new ray arrives to the lower mirror then reflected to the boy's eye.



Quiz pinhole camera 20 min

2) Determine the distance between the boy's eye and the formed image of the ball.

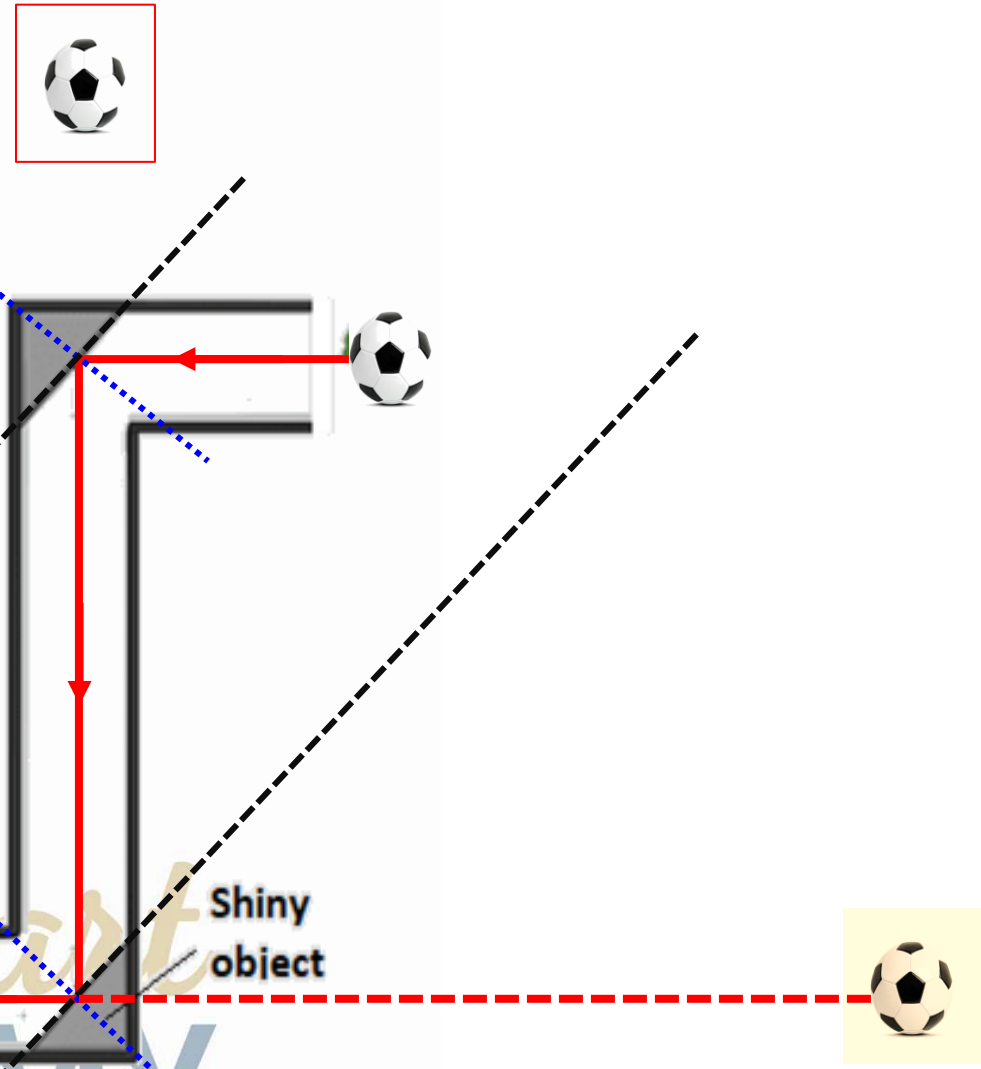


The distance between the image and the upper mirror is 25m.

The distance between the two mirrors is 7.5m.

The distance between the lower mirror and the boy's eye is 10cm.

Then the distance (eye-image) is:



$$d = 25m + 7.5m + 0.1m = 32.6m$$

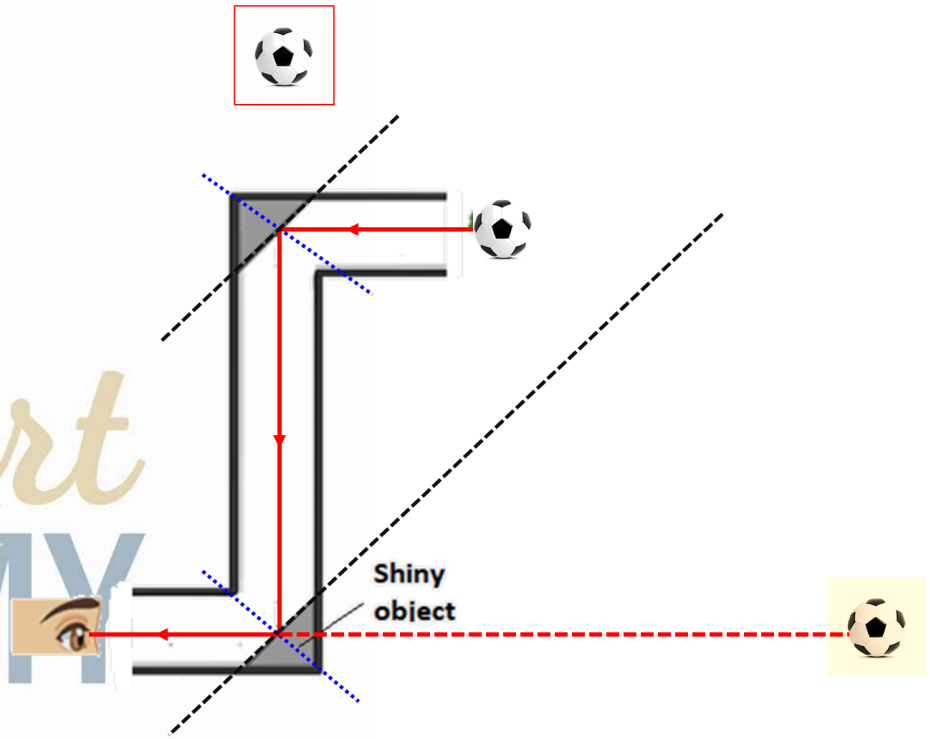
Quiz pinhole camera 20 min

3) Is the final image real or virtual?

The image formed by a mirror is always virtual, since its not really exist.

4) Is it upright or inverted?

The image is upright.



5) Does it appear to be left-right reversed?

The image formed by the upper mirror is reversed (left-right)

When the image reflected by the lower mirror it is reversed (left-right) another time

Therefore, the image returned to its initial shape

The End