

Answer on Question #51683-Physics-Optics

1 The human eye employs a ----- lens to ----- images.

- a. converging real
- b. converging virtual
- c. diverging real
- d. diverging virtual

Solution

The human eye employs a converging lens to real images.

An eye has a lens to focus the light and create an image. The image is real and inverted.

Real images can be produced by converging lenses if the object is placed further away from the lens than the focal point and this real image is inverted.

Answer: a. converging real.

2 A camera obscura used by a portrait painter is located 6 m from a child who stands 1 m tall. How tall is her image if the back of the camera obscura is 2 m away?

- a. $\frac{1}{3}$ m
- b. $\frac{1}{2}$ m
- c. 1 m
- d. 3 m

Solution

Assume for simplicity that a light ray from the child's feet goes through the pinhole horizontally and strikes the back of the camera. Then consider a light ray from the top of the child's head as it works its way to the back of the camera. You get two similar triangles, one outside the camera and one inside the camera. The ratio of the distances, child to pinhole divided by pinhole to back, is $\frac{6}{2} = 3$. Hence, the ratio of child's height to image on back of camera is also 3, so the image must be $\frac{1}{3}m$ (which multiplied by 3 gives 1m for the child's actual height).

Answer: a. $\frac{1}{3}$ m.

3 The law of reflection states that

- a. light travels in a straight line
- b. light must be reflected into our eyes to be seen
- c. the angle of reflection is equal to the angle of incidence

d. light striking a rough surface is scattered in all directions

Solution

The angle of reflection is equal to the angle of incidence. The law of reflection states that when light falls upon a plane surface it is so reflected that the angle of reflection is equal to the angle of incidence. This happens when the incident ray, reflected ray and normal ray all lie in the plane of incidence.

Answer: c. the angle of reflection is equal to the angle of incidence.

4 If you stand 2 m in front of a plane mirror, how far from you is your image?

a. 1 m

b. 2 m

c. 3 m

d. 4 m

Solution

Since the mirror reflects the image in front of it, the apparent distance of oneself standing in the mirror will be twice as far as the distance from you to the mirror.

If you are standing 2 m from the mirror, the image will appear as 4 m away.

Answer: d. 4 m.

5 If a 4-m-tall child stands 2 m in front of a vertical plane mirror, the image of the child will be ----- m tall

a. 1

b. 2

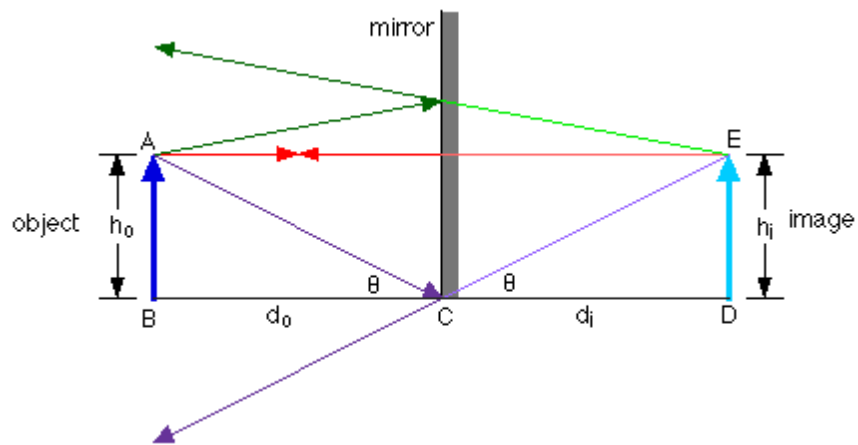
c. 3

d. 4

Solution

Consider an object placed a certain distance in front of a mirror, as shown in the diagram.

In a ray diagram, rays of light are drawn from the object to the mirror, along with the rays that reflect off the mirror. The image will be found where the reflected rays intersect.



Analyzing this a little further, it's easy to see that the height of the image is the same as the height of the object.

Answer: d. 4.