#CRESTInnovator

CREST Science Olympiad (CSO)
Worksheet for
Class 8

Topic

Light

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Worksheet on Light

1. **Lisa is standing in front of a large mirror on the wall. She notices that her image is 2 m away from her. If Lisa steps 0.5 m closer to the mirror, what will be the new distance between Lisa and her image?**

   a. 1.5 m
   b. 2.5 m
   c. 3.0 m
   d. 3.5 m

2. **In a classroom experiment, students are asked to use a concave mirror to create a real and magnified image of a small object. What distance should the object be placed from the mirror?**

   a. Between the focus and the mirror
   b. At the focus of the mirror
   c. Beyond the centre of curvature
   d. At the centre of curvature

3. **A beam of light passes from the air (n=1) into a medium with a refractive index of 1.5. What is the speed of light in the medium? (Speed of light in vacuum = 3.0×10^8 m/s)**

   a. 1.5×10^8 m/s
   b. 2.0×10^8 m/s
   c. 2.5×10^8 m/s
   d. 3.0×10^8 m/s

4. **Consider the following statements and choose the correct option:**

   Statement I: Dispersion is the splitting of white light into its component colours due to different refractive indices for different colours.
   Statement II: Dispersion can lead to the creation of spectral rainbows in other transparent media, such as glass or acrylic when white light is incident at certain angles.

   a. Statement I is correct and statement II is incorrect.
   b. Statement I is incorrect and statement II is correct.
   c. Both statements are correct.
   d. Both statements are incorrect.

5. **Imagine you're performing an experiment to demonstrate the refraction of light. You have a glass block and a light source. If you place the glass block in a way that the incident ray is perpendicular to one of its faces, what will be the path of the refracted ray as it emerges from the other side of the block?**

   a. It will be parallel to the incident ray.
   b. It will be perpendicular to the incident ray.
   c. It will be at an angle of 45 degrees to the incident ray.
   d. It will follow a zigzag pattern.

Answer Key

1. a - When an object is observed in a plane mirror, the distance between the object and its image is twice the distance of the object from the mirror. This is a property of plane mirrors. Given that initially, the distance between Lisa and her image is 2 meters, and she steps 0.5 meters closer to the mirror, the new distance between Lisa and her image would be:
   New distance = Initial distance - Distance moved towards the mirror
   New distance = 2 m - 0.5 m = 1.5 m
   So, the correct answer is when Lisa steps 0.5 meters closer to the mirror, the distance between her and her image decreases by the same amount, resulting in a new distance of 1.5 meters.

2. c - For a concave mirror, placing the object beyond the centre of curvature (C) results in the formation of a real, inverted, and magnified image. This is because light rays converge to create the image, leading to these characteristics. Placing the object in other positions will produce different types of images, such as virtual, erect, or non-magnified.

3. b - To find the speed of light (v) in the medium with a refractive index of 1.5 when it passes from the air (n=1), we can use the formula:
   v = n/c

   Where:
   v is the speed of light in the medium
   c is the speed of light in a vacuum, approximately 3.0 × 108 m/s
   n is the refractive index of the medium
   Given that the refractive index of the medium is n = 1.5, we can calculate the speed of light in the medium:
   v = 1.5/ 3.0×108
   v = 2.0 × 108 m/s

4. c - Statement I is correct because dispersion occurs when different colours of light are refracted at different angles due to their varying refractive indices in a material, leading to the separation of colours.
   Statement II is also correct. Dispersion can indeed lead to the creation of spectral rainbows in other transparent media, such as glass or acrylic. When white light is incident at certain angles on these media, the different colours of light are refracted and dispersed, resulting in the formation of colourful spectral rainbows.

5. a - When light passes from one medium to another at a perpendicular angle (i.e., along the normal), there is no change in its direction. This phenomenon is known as normal incidence. Since the incident ray is perpendicular to one of the faces of the glass block, the refracted ray will also be perpendicular to that face. As a result, the refracted ray will continue its path parallel to the incident ray as it emerges from the other side of the block.

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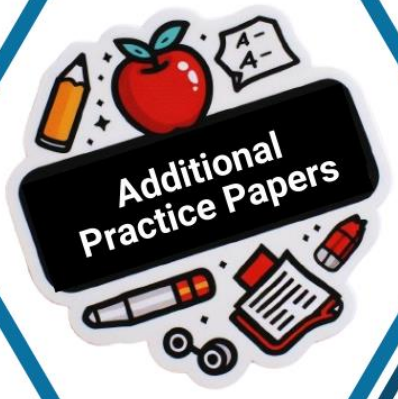

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