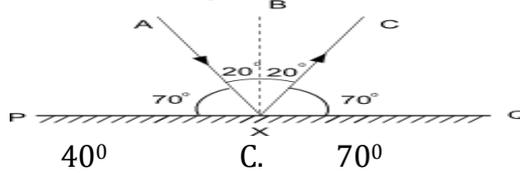


Name:

Stream.....

GAYAZA HIGH SCHOOL
S.2 PHYSICS TOPICAL TEST TWO
LIGHT AND HEAT

1. From the diagram below, what is the angle of reflection?



- A. 20° B. 40° C. 70° D. 90°

2. Which of the following are the properties of a plane mirror image?

- (i) The image is the same size as the object.
(ii) The image is virtual.
(iii) The image is inverted.
- A. (i) only B. (i) and (ii) only
C. (i) and (iii) only D. (i), (ii) and (iii)

3. An incident ray strikes a plane mirror at an angle of incidence of 40°. What is the decrease in the angle of reflection if the incident ray moves to an angle of incidence of 30°?

- A. 10° B. 20° C. 30° D. 40°

4. The brightness of the image formed by a pinhole camera depends on

- A. the size of the object B. the shape of the object
 C. the size of the pinhole D. the shape of the pinhole

5. The boiling point of water on a kelvin scale is.

- A. 273 K B. 373 K C. 100 K D. 0 K

6. Which one of the following is not a property of the image of an object placed 12cm in front of a plane mirror?

- A. it is behind the mirror B. it is 12cm from the mirror
C. it is laterally inverted D. it is real

7. A person stands 5 m away from the mirror. Find the distance that the person must move in order to be 2 m away from the image in the mirror.

- A. 1 m B. 3 m C. 4 m D. 7 m

8. Two girls S and M are standing along a straight line in front of a plane mirror in their dormitory. If S is 1m from the mirror and the image of M is 4 m from M, find how far apart from each other.

- A. 2.0 m B. 4.0 m C. 1.0 m D. 3.0m

9. To make a liquid-in-glass thermometer sensitive to a small change of temperature we must have;

- A. A bulb with a thin glass wall. B. A strong liquid in the bulb.
 C. A very narrow bore. D. A stem with a thick glass wall.

10. Linear magnification is defined as the ratio of

- A. Object distance to image distance B. Object height to image height
C. Image distance to focal length D. Image height to object height

11. In a solar heating system, black layers are used because they are:

- A. Bad emitters of heat B. bad absorbers of heat
 C. Good absorbers of heat D. good reflectors of heat.

12. The hands of an image of an unnumbered clock face in a plane mirror indicate 6:20. The actual time is
 A. 5:40 B. 6:20 C. 6:40 D. 7:40
13. An object is placed 30 cm in front of a plane mirror. If the mirror is moved through a distance of 6 cm towards the object, find the distance between its image and its object.
 A. 24 cm B. 36 cm C. 48 cm D. 60 cm
14. Diffuse reflection occurs when
 A. parallel beam of light is reflected in all directions
 B. a parallel beam light falls on a highly polished surface.
 C. a parallel beam of light is reflected as a parallel beam of light.
 D. the angles of incidence of rays the beams are equal to the angles of reflection.
15. An object 6 cm high is placed 24 cm from a tiny hole in a pin-hole camera. If the distance from the hole to the screen is 8 cm, find the size of the image on the screen.
 A. 0.2 cm B. 2.0 cm C. 18.0 cm D. 32.0 cm
16. When a pin-hole camera is moved nearer to an object, the size of the image
 A. remains the same B. becomes smaller
 C. becomes larger D. becomes diminished
17. The eclipse of the sun takes place when the shadow of the
 A. earth falls on the moon B. sun falls on the moon
 C. moon falls on the sun D. moon falls on the earth
18. A sensitive thermometer is one which
 A. is sensitive to heat
 B. has large bore
 C. can record big changes in temperature
 D. can record small changes in temperature
19. Which of the following is a false?
 A. Pinhole camera produces an erect image.
 B. Pinhole Camera produces a shadow
 C. Pinhole Camera produces an image
 D. Pinhole Camera produces an inverted image
20. Light can travel in
 A. air only B. vacuum only
 C. both air and vacuum D. none of the mediums

SECTION B

21. Distinguish between heat and temperature. (2 marks)
 Heat is a form of energy that flows from body to another due to a temperature difference between them.
 Or
 Heat is a form of energy that passes from a body of high temperature to a body of low temperature.
 Whereas
 temperature is the number expressing the degree of hotness or coldness of a substance on some scale.

22. (a) What is a thermometer? (1 mark)
A thermometer is an instrument used for measuring temperature.
- (b) Name three types of thermometers. (1½ marks)
- Liquid in glass thermometer is most common one.
 - Electrical thermometer
 - Digital thermometer
 - Gas thermometer
23. (a) Define the term thermometric substance. (1 mark)
A thermometric substance is a substance whose temperature changes uniformly with change in temperature.
- (b) State three characteristics of a good thermometric substance. (3 marks)
- Should be opaque for easy reading.
 - Good conductor of heat.
 - High and uniform expansivity.
 - High boiling point.
 - Low freezing point and
 - Should not wet glass.
24. Use particle behavior of matter to explain conduction. (3 marks)
The molecules of metal near the heat source receive heat energy and begin to vibrate. These molecules collide against the neighboring molecules and agitate them. The agitated molecules, in turn, agitate the molecules in the next layer and so on until the molecules at the other end are agitated. Therefore, the heat is passed from one end to another till the other end becomes hot. Hence, in conduction, energy transfer takes place by vibration of the molecules. There is no actual movement of the heated particles.
25. What are the three modes of heat transfer? (1½ marks)
- Conduction
 - Convection
 - Radiation
26. State and explain four factors which affect heat transfer in metals. (4 marks)
- **Temperature difference between the ends.**
The higher the temperature difference the higher the heat transfer.
 - **The nature of the materials (thermal conductivity of the material)**
Some materials are good conductors of heat while others are poor conductors of heat.
 - **The cross-section of the material (thickness of the material)**
More heat is transferred through thick materials than in thin ones at the same time. A thick material has more number of electrons per unit cross-section area than in a thin material. This increases the rate of conduction of a thick material.
 - **The length of the conductor**
Heat energy transferred through a material of smaller length is higher than heat through a longer material at the same time.
27. (a) State four characteristics of images formed by a plane mirror. (4 marks)
- the same size as the object
 - the same distance behind the mirror as the object is in front
 - laterally inverted
 - virtual (it cannot be formed on a screen)
- (b) Explain the meaning of the following terms as applied in light.

(i) Lateral inversion. (1 mark)
 This is when the left hand side of the object becomes the right hand side of the image as viewed in the mirror.

(ii) Virtual image (1 mark)
 This is the image formed by the apparent intersection of the light rays and it cannot be formed on the screen.

28. (a) State the laws of reflections. (2 marks)
The incident ray, reflected ray and the normal to the mirror at the point of incidence all lie **in** the same plane. (Note: Order of the words matters)

The **angle** of incidence is equal to the **angle** of reflection

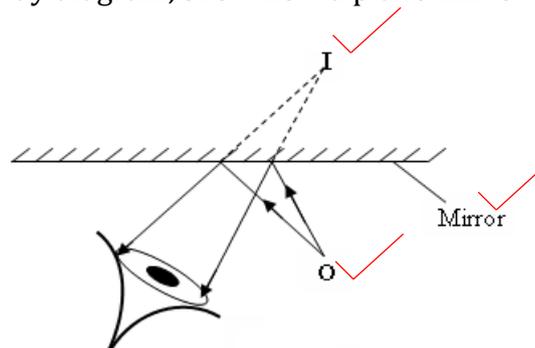
(b) Define the terms:

(i) Angle of incidence (1 mark)
 This is the angle between the incident ray and the normal at the point of incidence.

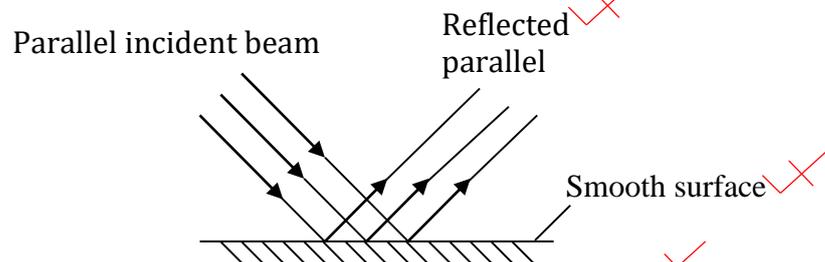
(ii) Angle of reflection (1 mark)
 This is the angle between the reflected ray and the normal at the point of incidence.

(iii) The normal (1 mark)
 This is the perpendicular drawn to the surface at the point of incidence.

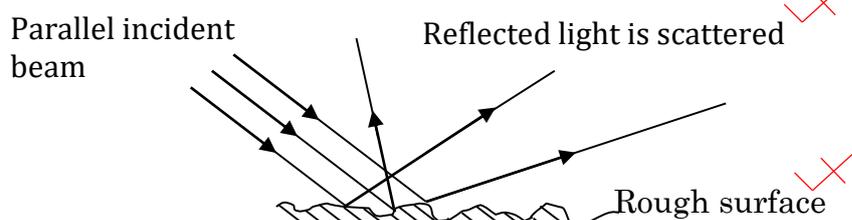
(c) With the help of a ray diagram, show how a plane mirror forms an image of a point object. (3 marks)



27. (a) With the help of a diagram distinguish between regular reflection and diffuse reflection. (4 marks)



In regular reflection a parallel beam of light is reflected parallel. This occurs on a smooth polished surface.



In diffuse reflection a parallel incident beam of light is dispersed in different directions. This occurs on a rough surface.

(b) Give an example of each of the type of the reflection in 27 (a) above. (2 marks)

Regular reflection: Reflection at the plane mirror

Diffuse reflection: Reflection at the surface of a wall

28. (a) State the principle of reversibility (1 mark)

This states that if any point on the path of light became a source, then light from it traces the same path back to the original source.

Or

It states the paths of light rays are reversible.

Or

It states that light will follow exactly the same path if its direction of travel is reversed.

(b) Describe an experiment to verify the principle of reversibility (5 marks)

The principle of reversibility of light using a plane mirror.

An object O is viewed in a plane mirror. The position of the object, O and observer, E are marked.

The image, I of O is located using the laws of reflection of light. The point E is joined to I cutting the mirror line at point N .

The experiment is repeated with the position of the object and observer interchanged.

It is observed that the ray of light flows the same path when the object and observer interchange positions, hence the principle of reversibility of light.

END.