The Indian Academy
Nehrugram DEHRADUN
Question Bank - 2013-14
Subject - Physics
Class - X

Section –A

A- One mark questions:-

Q1. Chair , Table are the example of which object?

Q2. In which medium does the ray of light travelled the path?

Q3. Any ray of light falling on a reflecting surface is called which ray of light?

Q4. What is the symbol to denote refractive Index?

Q5. Name a mirror that can give an erect and magnified image of an object?

Q6. What is the unit of power of lens?

Q7. What is the nature of the image formed at the retina of human eye?

Q8. Name the part of human eye which acts as a screen to obtain the image of an object?

Q9. Name the type of a lens used to correct hypermetropic eye.

Q10. Name the phenomenon occurring in nature due to the dispersion of light.

Q11. Name the part responsible for the power of accommodation of the human eye.

Q12.
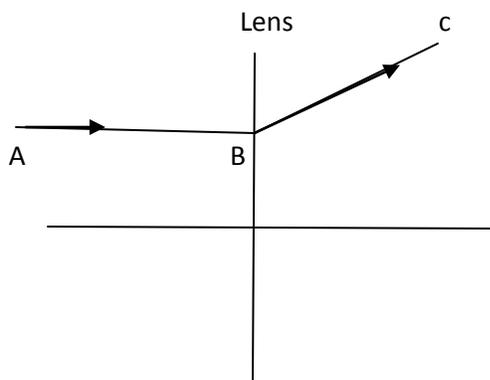
Incident ray AB falls on a lens. The reflected ray BC is shown in figure. Name the lens.

Q13.   State the relation between the height of an object (h) , height of image (h) object distance (u) and image distance (v) in case of a spherical mirror.

Q14.   Write down the relation between the focal length (f) and radius of curvature (R) of a spherical mirror.

Q15. The change in focal length of an eye lens is caused by the action of which muscles?

Q16. Out of blue and red light , which is scattered most by the atmosphere of the earth?

Q17. Human eye can focus objects at different distances by adjusting the focal length of the eye lens. This is due to what?

Q18. Human eye forms the image of an object at its which part?

Q19. The least distance of distinct vision for a young adult with normal vision is about how many centimeters?

Q20. The image formed by a concave mirror is observed to be virtual , erect and larger than the object. Where should be the position of the object?

B- Two mark questions-

Q1. What are the values of angle of incident < i and angle of reflection <r for normal incident of light on a plane mirror?

Q2. An object of size 2cm is placed at 25cm in front of a concave mirror. If the magnification produced by the mirror is 4, what is the size of the image?

Q3. An object 5 cm high is placed in front of a concave mirror of linear magnification 2. What is the height of the image formed by the mirror?

Q4. Name the mirror which acts as (i) a convergent mirror and (ii) divergent mirror.

Q5. Why is the refractive Index of a medium always greater than one?

Q6. The refractive Index of glass is 1.5. What is the meaning of this statement in relation to speed of light?

Q7. Copy the figure in your answer book and show the direction of light after reflection. Also write the angle of reflection.
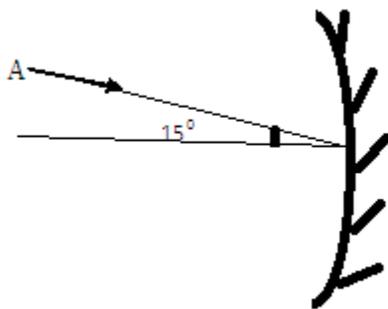

Q8. Define refractive Index and express it mathematically.

Q9. Parallel rays of light incident on a concave mirror and a convex mirror as shown in figure

   i)   Redraw the reflected rays in both the cases
   ii)   Name the points where the reflected rays meet or appear to meet on the principal axis.
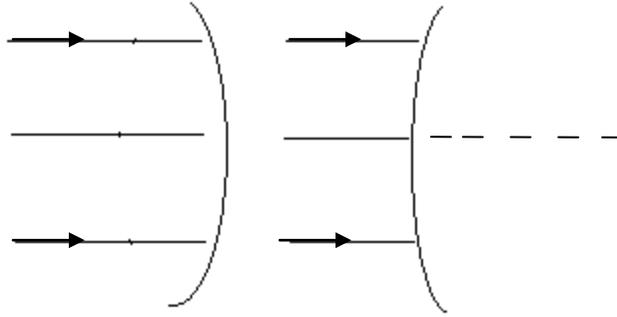
Q10.   A ray of light AB parallel to the principal axis incident a convex lens as shown in figure
    i)   Draw the refracted ray and
    ii)   Name the point through which the refracted ray passes the principal axis.
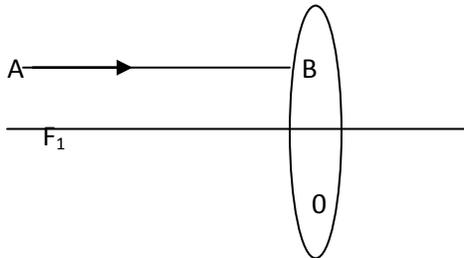
Q11.   Mention two characteristics of image formed by a convex mirror.

Q12.   Name the common defects of vision.

Q13.   A short sighted person cannot see clearly beyond 4m. Calculate the power of lens required to correct his vision.

Q14.   Name the component of white light that deviated
    i)   the least and
    ii)   the most while passing through a glass prism

Q15.   Which phenomenon is responsible for blue colour of the sky?

Q16.   Give two examples where Tyndall effect is seen.

Q17.   Why do we have two eye instead of one eye?

Q18. An old person is unable to see clearly nearby object as well as distant objects.

i)   What defect of vision is he suffering from?
ii)   What kind of lens will be required to see clearly the nearby as well as distant objects? Give reasons?

Q19.   What would have been the colour of sky if the earth has no atmosphere? Give reason for your answer.

Q20. A person needs a lens of power-5.5 diopters for correcting distance vision. For correcting his near vision, he needs a lens of power + 1.5 diopter: What is the focal length of the lens required for correcting

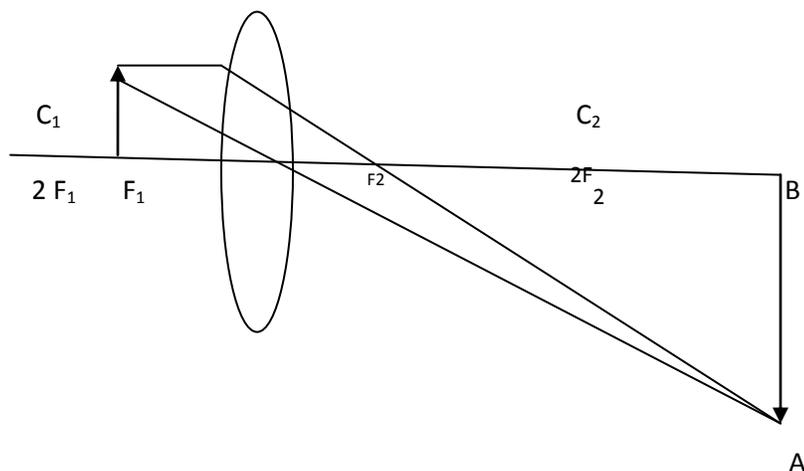(i) distant vision and (ii) near vision?

QC- Three mark questions-

Q1. Name the phenomenon of light responsible for the formation of rainbow in the sky.
Q2. Copy the following diagram on your answer sheet showing the different colors on the white screen.

PIN HOLE   GLASS PRISM
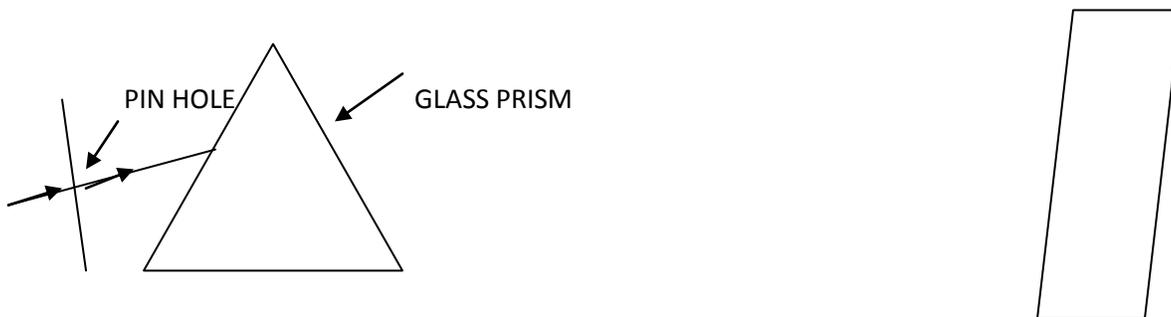
Q3. Study the ray of diagram given below and answer the following questions-

C_1 C_2

$2 F_1$ F_1 F2   2F
   2   B '

A'

i)   State the type of lens used in the figure.
ii)   List two properties of the image formed.
iii)   In which position of the object will the magnification be-1?

Q4. The radius of curvature of a convex mirror used on a moving automobile is 4.0 m. A truck is coming behind it at a distance of 5.5m. Calculate
   i) the position and
   ii) the size of the image relative to the size of the truck. What will be the nature of the image?

Q5. A convex mirror used in a bus has radius of curvature 3.5 m. If the driver of the bus behind the bus, find the position nature and size of the image of the car?

Q6. An object 5cm tall was placed in front of a spherical mirror at 20cm distance from the mirror. If a virtual image of 10cm tall was formed behind the mirror , find the focal length of the mirror and the position of the image. Name the type of mirror used.

Q7. An object 5cm high is held 25 cm away from a converging lens of focal length 10cm.

   i) Draw ray diagram.
   ii) Calculate the position and size of image formed
   iii) What is the nature of the image.

Q8. Write any three characteristics of the image of an object formed by a plane mirror?

Q9. A concave lens of focal length 15cm forms an image 10 cm from the lens. Calculate (i) distance of the object from the lens

   ii) magnification of image formed

   iii) nature of image formed

Q10. What is dispersion of white light? Draw a diagram to show dispersion of white light by a glass prism? What is the cause of dispersion of white light?

Q11. What is a rainbow? Explain the formation of rainbow with a neat diagram. What are the conditions for observing a rainbow?

Q12. The far point of a myopic person is 150cm. in front of the eye. What is the nature and power of the lens required to correct this problem?

Q13. (a) Define "accommodation of eye.

   (b) Define "Near point" and "far point" of a Normal human eye.

   (c) Define "power of accommodation" of a human eye".

Q14. Explain with the help of a labeled diagram, why a pencil partly immensed in water appears to be bent at the water surface.

Q15. Define Refractive Index. If the Refractive Index of two material medium X and Y are 1.3 and 1.5 respectively. In which of the two, the light would travel faster?

Q16. Define convex lens. A convex lens forms a real and highly magnified image. What should be the position of the object on the Principal axis?

Q17. Name the type of mirror used in head lights of buses and cars .Which kind of mirrors are used in the head lights of a motor car and why?

Q18.   A doctor has prescribed a corrective lens of power +1.5 D. Find the focal length of the lens. Is the prescribed lens diverging or converging?

Q19.   Define 1 Dioptre of a lens. Find the power of a concave lens of focal length 2m.

Q20.   A convex lens forms a real and inverted image of a needle at a distance of 50cm from it. Where should the needle placed in front of a convex lens if the image is equal to the size of the object? Also find the power of the lens.

Q21. Study the diagram given below and answer the questions that follow-
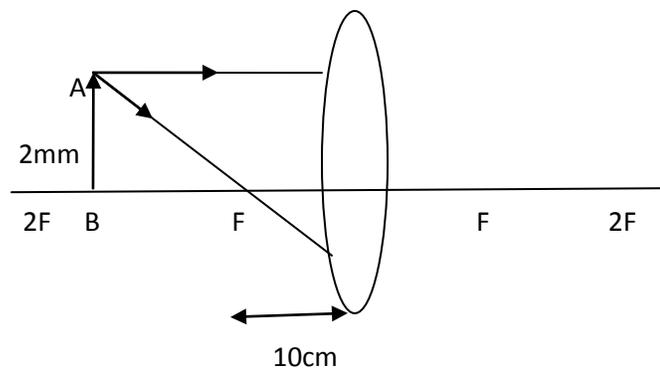
Complete the above ray diagram to show the image formation.

(a) In the diagram
u = _____cm
Object size= _____cm.
(b) Will the magnification (numerically) equal to less than or greater than 1?

Q22.   A lens produces an erect image of size 6mm, when an object of size 3mm is placed 20cm from its optical centre."

(i)   Identify the nature of the lens.
(ii)   What is the magnification produced?
(iii)   What is the power of this lens?

Q23. State any three applications of lenses.

Q24. State three rules of sign conventions for a spherical lenses.

Q25. Draw the ray diagram and also tell the position and nature of the image formed by convex lens when

(i)   Object is at infinity
(ii)   Object At $2 F_1$
(iii)   Between F_1 and F_2

Q26. Define-
(i)   Principal axis
(ii)   Optical centre
(iii)   Principal focus of a lens

Q27. (i) Light enters from air to glass having refracting index 1.50.What is the speed of light in the glass? The speed of light in vacuum is 3×10^8 ms^{-1}.

(ii)   The refractive Index of diamond is 2.42. What is the meaning of this statement?
(iii)   What is the symbol for Refractive Index?

Q28. The path of a light ray from air to three different media A , B and C for a given angle of Incidence is shown below. Study the diagrams and answer the following questions.

Air   Air

60⁰   60⁰   60⁰   Air

Medium   Medium   Medium

A   50⁰   B   45⁰   C   40⁰
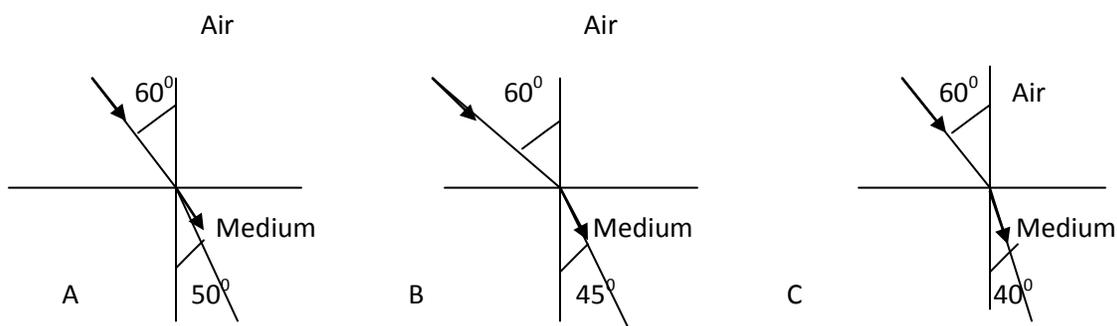
(a) Which of the three media A, B or C has maximum optical density?
(b) Through which of the three media, will the speed of light be maximum ?
(c) Will the refractive index of B relative to C be more than unity or less than unity?

Q29.   Draw the diagram for

(a) Correction of long sightedness
(b) Correction of short-sight eye
(c) Dispersion of light

Q30.   What is a scatterer? Name the scatterers present in the Atmosphere? Name the colour of light, which is scattered the least.

Q1.   Write laws of refraction. Explain the same with the help of ray diagram, when a ray of light passes through a rectangular glass slab?

Q2.   What is lens formula? Give its sign conventions and assumptions.

Q3.   Study the diagram below and answer the following questions-
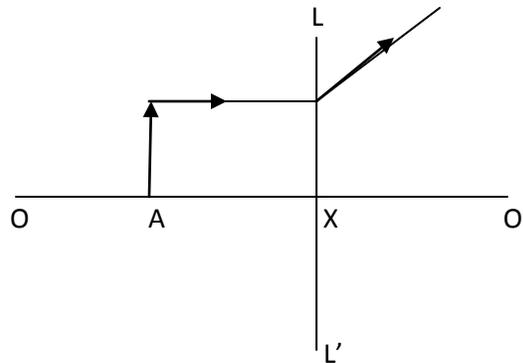
(i)   Name the lens LL'
(ii)   What are the position O and O' called?
(iii)   Between which points will the image of object AB be formed?
(iv)   What is the nature of the image?

Q4.   Figure below shows a lens as a combination of a glass block and two prisms. Copy the diagram and answer the following questions.
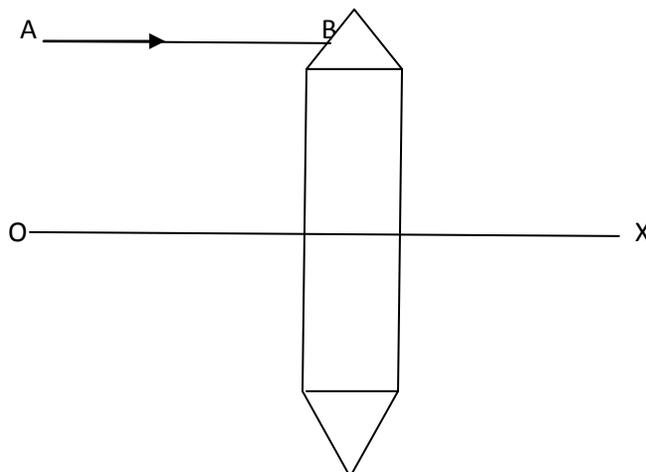
(i) Name the lens formed by the combination.
(ii) What is OX called?
(iii) Complete the ray diagram.
(iv) The final emergent ray will either meet at OX at a point or appear to come from a point on OX. What is this point called?

Q5. How is the refractive Index of a medium related to the speed of light obtain an expression for refractive Index of a medium within respect to another in terms of speed of light in these two media?

Q6. What is a prism? What is its action? Write down the relation between angle of Incidence, angle of emergence, angle of prism and angle of deviation.

Q7. What is meant by scattering of light? Explain Tyndall effect. Give a few illustrations of scattering of light.

Q8. Why do stars twinkle and also explain why the planets do not twinkle.

Q9. Draw ray diagram each showing –

(i) Myopic eye
(ii) Hypermetropic eye.

Q10. (i) What is Range of vision?

(ii) Why is red colour selected for danger signals?
(iii) White light is a combination of how many colour?
(iv) Name all the colour formed on the screen during dispersion of light.

Q11. Why we are able to see the sun for few minutes even after it has actually set? Explain with the help of diagram.

Q12. What is presbyopia? What are the causes of Presbyopia and what is the correction of Presbyopia?

Q13. Explain the function of
(a) Cornea
(b) Iris
(c) Lens
(d) Retina
(e) Optic nerve

Q14. Draw and labeled the diagram of an eye.

Q15. An object is kept at a distance of 100 cm from each of above lenses. Calculate
(i) Image distance
(ii) Magnification
    When
(a) Focal length f= 50cm
(b) Focal length f = 25 cm

Q16. A concave lens of focal length 20cm forms an image at a distance of 10cm from the lens. What is the distance of the object from the lens? Also draw the ray diagram.

Q17. Draw the diagram of-
(i)   Bi-convex lens
(ii)   Bi-convex lens
(iii)   Bi- Concave lens
(iv)   Plano- concave lens
(v)   Concave-convex lens

Q18. Define- (i) Incident ray
(ii) Reflected Ray
(iii)   Angle of reflection
(iv)   Angle of Incidence
(v)   Angle of emergence

Q19. Define
i)   Dual nature of light
ii)   Beam of light
iii)   Ray of light
iv)   Luminuous objects
v)   Non-luminuous objects

Q20. Show in a ray diagram
i)   Focus
ii)   Principal axis
iii)   Pole
iv)   Aperture
v)   Incident ray
        [of a Convex /Concave Mirror]

Q1. A sharp image of a distant objects is obtained on a screen using a convex lens. In order to convex lens. In order to determine the focal length of a lens, you need to measure the distance between the
   (a) Lens and the object
   (b) Lens and Screen
   (c) Object and the screen and also object and the screen

Q2. A student obtains a blurred image of an object on a screen by using a concave mirror. In order to obtain a sharp image on the screen, he will have to shift the mirror
   (a) towards the screen
   (b) away from the screen
   (c) either towards or away from the screen depending upon the position of the object
   (d) to a position very far away from the screen

Q3. The image of a distant object is obtained on a screen by using a Concave Mirror. The focal length of the mirror can be determined by measuring the distance between-
   (a) the object and the mirror
   (b) the object and the screen
   (c) the mirror and the screen
   (d) the mirror and the between the object and the screen

Q4. A student obtained a sharp image of the grill of a window on a screen, using a convex lens. For getting better results, the teacher suggested focusing of a distant tree instead of the grill. In which direction should the lens be moved for this purpose?
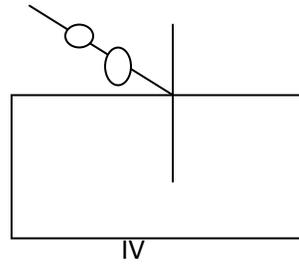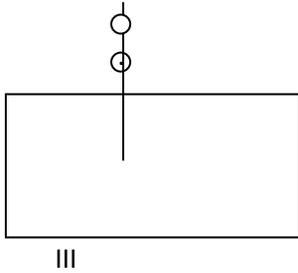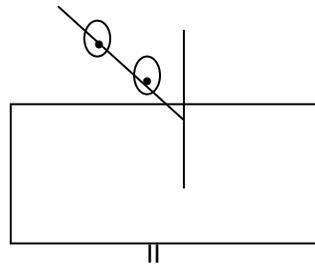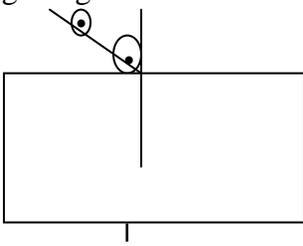   (a) Away from the screen
   (b) Very far away from the screen
   (c) Behind the screen
   (d) Towards the screen

Q5. Two dots P_1 and P_2 shown in each of the following diagram I , II , III and IV denote the positions of two points in respect of distance and direction for performing an experiment on tracing the path of a ray of light passing through a rectangular glass slab. In which one of the four cases, one is likely to get best results?

•P_1
   •P_2

I

•P_1
      •P_2

II

•P_1

   •P_2

III

•P_2

   •P_1

IV
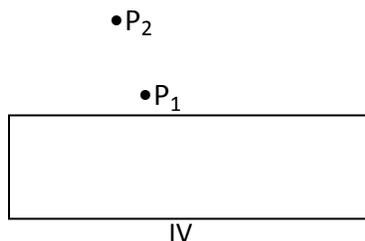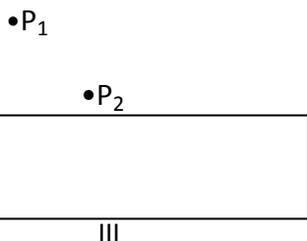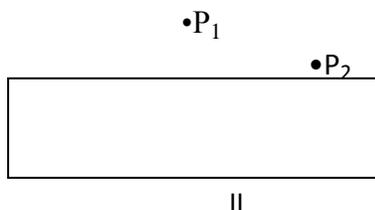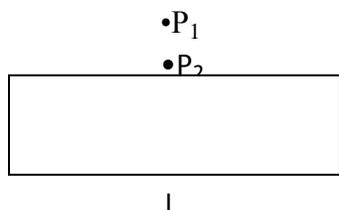
(a) I   (c) III
(b) II   (d) IV

•Q6. Which one of the following is the best set-up for tracing the path of a ray of light through a rectangular glass slab?

I

II

III

IV

(a) I   (c) III
(b) II   (d) IV

Q7. The path of ray of light passing through a rectangular glass slab was traced and angle measured. Which one out of the following is correct representation of an angle of incident i, angle of refraction r, and angle of emergence e as shown in the diagram.

i

E

(I)

i

r

e

(II)

III

IV

Q8. Out of the following, the best way to do the experiment on finding the focal length of a concave mirror by obtaining the image of a distant object, is to –
    (a) hold the mirror in hand and keep the screen in a stand kept behind the mirror.
    (b) hold the mirror in a stand and hold the screen in hand with the screen in front of the mirror.
    (c) keep both the mirror and screen in suitable stands with the screen put in front of the mirror.
    (d) Keep both the mirror and the screen in suitable stands with the screen put behind the mirror.

Q9. Given below are few steps (not in proper sequence) following in the determination of focal length of a given convex lens by obtaining a sharp image of a distant object.
    (a) Measures the distance between the lens and screen
    (b) Adjust the position of the lens to form a sharp image.
    (c) Selected a suitable distant object.
    (d) Hold the lens between the object and the screen with its face parallel to the screen

i)	a , b , c , d	iii) c , d , b , a
ii)	c , a , d , b	iv) c , a , b , d

Q10. Four students A , B, C and D did their experiment on finding the focal length of a convex lens by obtaining the image of a distant object as follows-

Student A:- Use the window grille in the laboratory as the object , and a white paper sheet held in hands, as the screen

Student B:- Used a distant tree in the shade as the object, and a white thick board, held in stand, as the screen.

Student C :- Used a well illuminated laboratory window grille as the object and a white paper sheet held in a stand as the screen.

Student D:- Used a well illuminated distant tree as the object and a white thick board , held in a stand as the screen.
Which one of the four sequences of above set ups represents the decreasing order of preference for performing the experiment?
    (a) D , B , C ,A   (c) D , C, A , B
    (b) C , D , A , B   (d) B , D , C , A

Q11. In the glass slab experiment , the correct placement of the protractor (or 'dee') for measuring the angle of incident and emergence, is shown in which figure?

(a) A   (b) B

(c) C   (d) D

Q12. A student carries out the experiment of tracing the path of a ray of light through a rectangular glass slab, for two different values of angle of incidence < i=30° and < i= 45°. The set of values of the angle of refraction (<r) and angle of emergence (<e) , she is likely to observe in the two cases are-

(a) [< r = 30°, <e= 20°] and
    [<r=45° , <e=28°]

(b) [< r = 20°, <e= 30°] and
    [<r=45° , <e=28°]

(c) [< r = 20°, <e= 30°] and
    [<r=28° , <e=45°]

(d) [< r = 30°, <e= 20°] and
    [<r=28° , <e=45°]

Q13. An experiment to trace the path of a ray of light through a glass slab was performed by four students I , II , III and IV. They reported the following measurements of angle of incidence i, angle of refraction r and angle of emergence e. Which one of the students has performed the experiment correctly-

Student	Angle i	Angler	Angle e
I	60°	35°	59°
II	45°	40°	40°
III	35°	30°	40°
IV	50°	55°	50°

Q14. The focal length of the concave mirror in the experimental set up shown below equals.
    a) 10.3cm   c) 11.7 cm
    b) 11.0cm   d) 12.2cm

   5   15
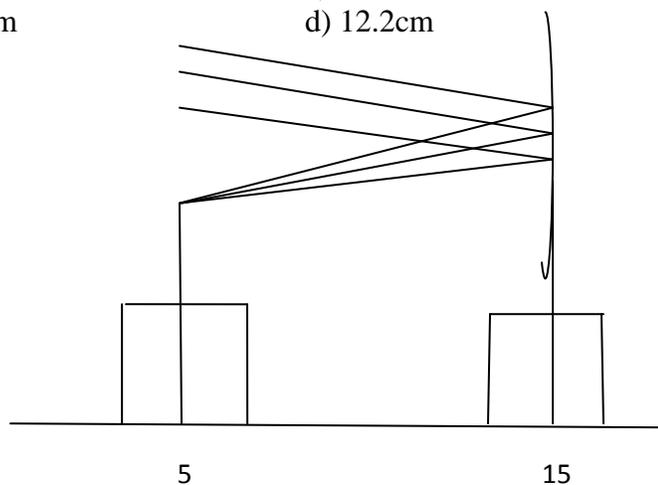
Q15. A student performs the experiment on tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. He measured the angle of incidence <i , angle of refraction <r, and angle of emergence <e for all his observations. He would find that in all cases.

(a) <i is more than <r but (nearly) equal to <e

(b) <i is less than <r but (nearly) equal to <e
(c) <i is more than <e but (nearly) equal to <r
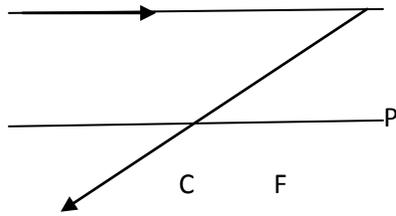(d) <i is less than <e but (nearly) equal to <r

Q16. The path of a ray of light coming from air passing through a rectangular slab traced by four students are shown by figures A, B, C and D. Which one of them is correct?
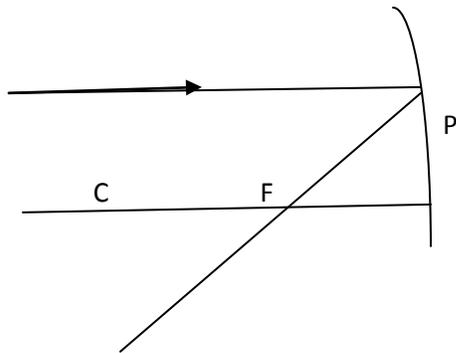

(A)

(B)

(C)

(D)
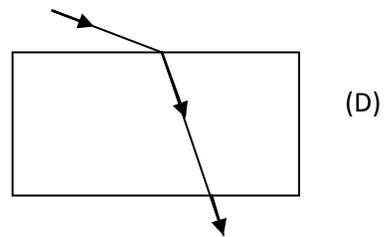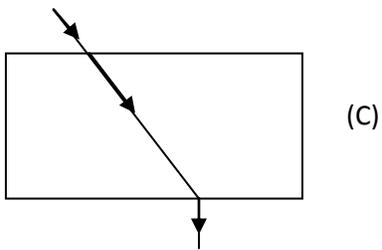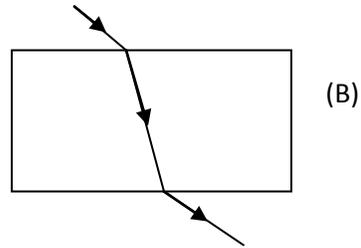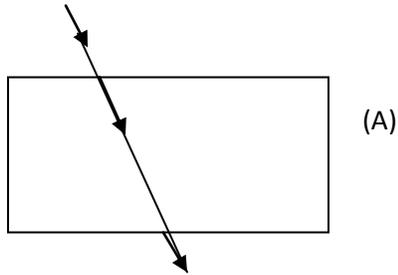
Q17. A ray of light incident on a concave mirror as shown in figure, four students traced the ray of light as shown in figure A, B, C and D. Which one is correct?
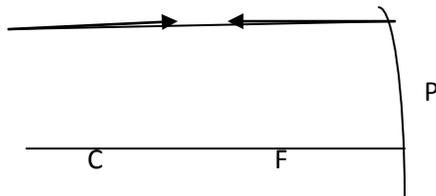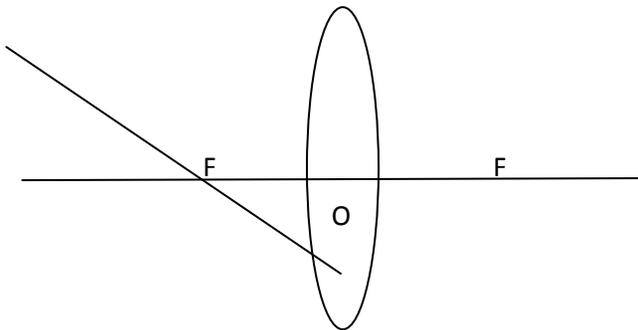

(A)

(B)

(C)

(D)

(a) A   (c) C
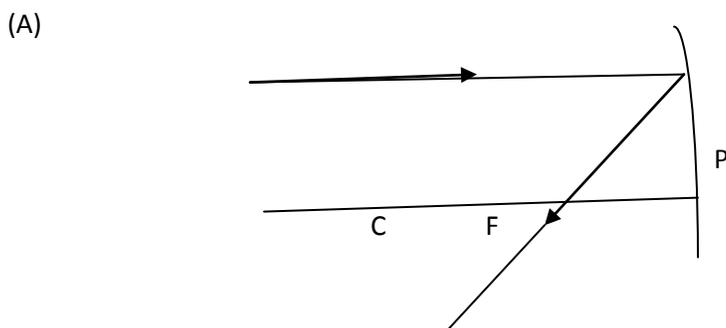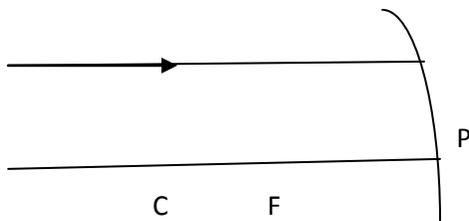
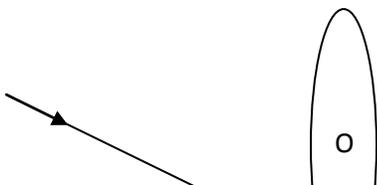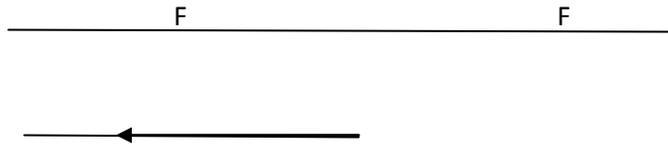(b) B   (d) D

Q18. A ray of light falls on a convex lens as shown in figure

(A)

F   F
_____

←————————————

(B)
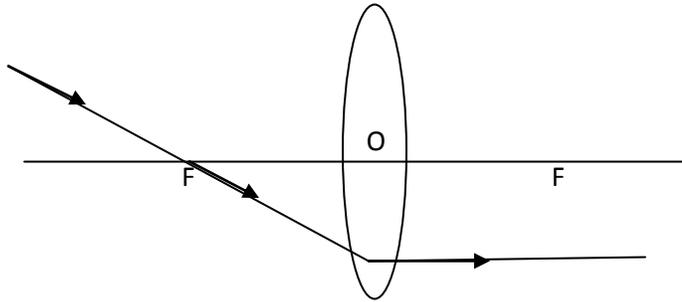
(C)

(D)

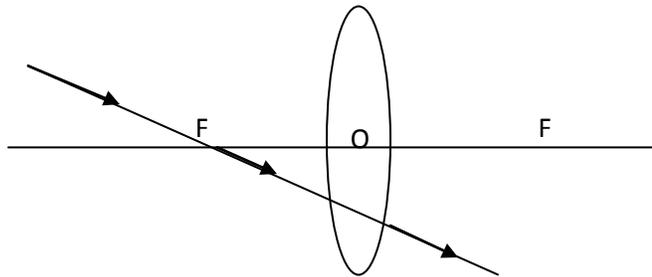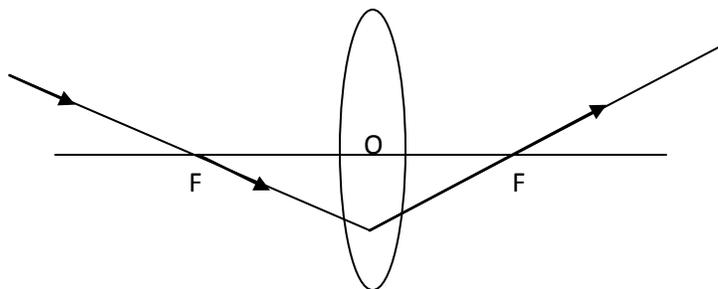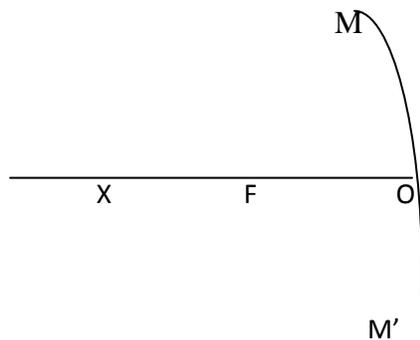Q19. Name the type of mirror we can generally use to demonstrate reflection of light
   (a) Convex Mirror
   (b) Concave Mirror
   (c) Plane Mirror
   (d) None of the above

Q20. A lens converges ray of light. The lens is
   (a) Plane glass slab
   (b) Prism
   (c) Concave lens
   (d) Convex lens

Q21. In the following figure (i) OF=FX=f (focal length). The point X on the principal axis is called

Q22.A ray of light PQ parallel to the Principal axis of the mirror, is incident at the point Q. On the mirror as as shown in Fig (ii). The ray after suffering reflection from the mirror passes through the point.
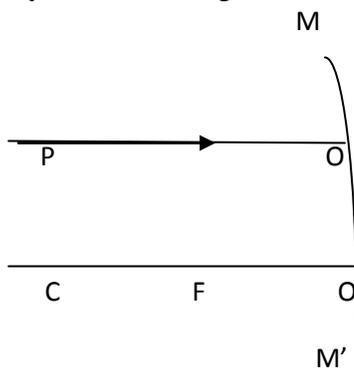
Q23. For doing the experiment it is advisable to use a piece of wood or hard cardboard in place of paper. It is because
    (a) Paper is costlier
    (b) White sheet of paper is not easily available
    (c) When sun rays from a distant object are focused on a sheet of paper, it may start burning
    (d) None of these

Q24. The change in focal length of eye-lens to focus the image of objects at varying distances is done by the action of-
    (a) Pupil   (c) Ciliary Muscles
    (b) Retina   (d) Blind spot

Q25. Where should an object be placed so that a real and inverted image of same size is obtained using a convex lens?
    (a) Between the lens and its focus
    (b) At the focus
    (c) At twice of the focal length
    (d) At infinity

Q26. The focal length of a lens whose power is -2.OD is
    (a) -50.0 cm   (c) + 2.0m
    (b) + 50.0 cm   (d) -2.0m

Q27. Two thin lenses of focal length 20cm and 25 cm are placed in contact. The effective power of combination is
   (a) ½ dioptre
   (b) 1/45 dioptre
   (c) 9 dioptre
   (d) 45 dioptre

Q28. A lens of power +2 dioptres is placed in contact with a lens of power-1 dioptre. The combination will behave like-
   (a) Convergent lens of focal length 50cm
   (b) Convergent lens of focal length 100cm
   (c) Divergent lens of focal length 50cm
   (d) Divergent lens of focal length 100cm.

Q29. At sunrise or sunset, the sun looks reddish because
   (a) the sun is the coldest at these times
   (b) of dispersion of light
   (c) the sun is hottest at these times
   (d) of the scattering of light-

Q30. SI unit of linear magnification is-
   a.   m
   b. m^{-2}
   (c) m^{-1}
   (d) no unit

Q31. What is the optical centre of a lens?
   a.   It is a point situated within the lens through which a ray of light cannot pass
   b.   It is a point situated within the lens through which a ray of light passes undeviated
   c.   Both of above
   d.   None of above

Q32. The image formed of distant object on the screen in your experiment is real or virtual reason
   (a) Virtual image can be formed on a screen
   (b) Real , because the image is formed on a screen, virtual image cannot be formed on a screen
   (c) Both above
   (d) None of above

Q33. The focal length of a convex lens is equal to
(a) The distance between the focus and pole of the convex lens
(b) The distance between the focus and twice of focus
(c) The distance between the focus and the optical centre of the convex lens
(d) All the above

Q34. If the object is nearer to the lens, then what method would you use to find out the focal length of the lens?
   (a) $\dfrac{1}{f} = \dfrac{1}{v} + \dfrac{1}{u}$
   (b) $\dfrac{1}{f} = \dfrac{1}{v} - \dfrac{1}{u}$
   (c) $\dfrac{1}{f} = \dfrac{1}{u} - \dfrac{1}{v}$
   (d) All above

Q35. The mirror which has a wider field of view is
   (a) Convex Mirror
   (b) Concave Mirror

(c) Plane Mirror
(d) All have equal field of view

Q36. When object is placed at focus of a convex lens, then what would be the position of image formed?
   (a) Image will be formed at infinity.
   (b) Image will be formed at focus on the other side
   (c) Image will be formed between twice of focus and infinity on the other side of lens
   (d) None of above

Q37. In sign convention to be followed, the mirror is kept with its reflecting face towards
   (a) Left   (c) Upward
   (b) Right   (d) Download

Q38. A ray of light is travelling from medium 1 to medium 2.On what factor n_{21} depends?
   (a) Wavelength   (c) both a & b
   (b) Nature of medium 1 and medium 2   (d) Nature of medium 1 and medium 2 only

 Q39. The emergent ray is always
   (a) inclined to the incident ray
   (b) along the same straight line as the incident ray
   (c) parallel to incident ray but laterally displaced
   (d) depends on the nature of the medium

Q40. What is the snell's law?
   (a) $\underline{Sin\ i}$ = constant
       Sin r

   (b) $\underline{Sin\ i}$ <1
       Sin r
   (c) $\underline{Sin\ i}$ >1
       Sin r
   (d) $\underline{Sin\ i}$ = 0
       Sin r

Q41. Why does bending of light takes place?
   (a) Because light travels with same velocity in with same velocity in different media
   (b) Because it travels with different velocity in different media
   (c) Both above
   (d) None of above

Q42. Refractive Index is the property of-
   (a) First medium
   (b) Pair of medium
   (c) Second medium
   (d) None of the above

Q43. For which incident ray, the refracted ray will not show any deviation?
   (a) Incident at acute angle

(b) At obtuse angle
(c) At normal
(d) None of the above

Q44. Give the example of total internal reflection
   (a) Mirage formation
   (b) Looming
   (c) Both a and b
   (d) None

Q45. Which of the following medium has the minimum refractive Index with respect to vacuum?
   (a) Glass   (c) Water
   (b) Air   (d) All a , b and c

Q46. A single straight line drawn from a point source, is called a
   (a) Ray of light   (c) beam of light
   (b) Pencil of light   (d) bunch of light

Q47. Which of the following capital English letter does not shoe lateral inversion?
   (a) N   (c) O
   (b) P   (d) Q

Q48. Name the type of mirror used as a backview mirror.
   (a) Plane mirror   (c) Concave mirror
   (b) Convex mirror   (d) Any of the above

Q49. Image formed by reflection from a plane mirror is
   (a) Real only   (c) Both a & b
   (b) Virtual only   (d) None

Q50. Many straight lines drawn from different point or a broad source, is called –
   (a) Ray   (c) Pencil
   (b) Beam   (d) Bunch