



PHYSICS

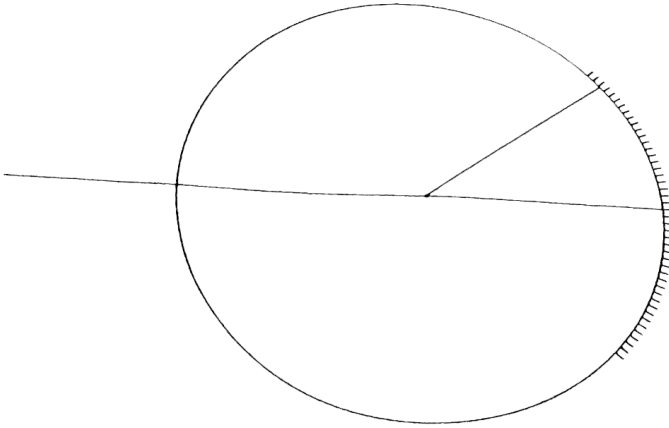
BOOKS - NAVNEET SCIENCE (HINGLISH)

LENSES

Can You Recall

1. Indicate the following terms related to spherical mirrors in figure : pole, centre of

curvature , radius of curvature , principal focus.



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2. How are concave and convex mirrors constructed ?



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3. What are real and virtual images ? How will you find out whether an image is real or virtual ? Can a virtual image be obtained on a screen ?



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4. What is the Cartesian sign convention used for spherical mirrors ?



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5. How do we perceive different colours ?



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6. Take a burning incense stick in your hand and rotate it fast along a circle.



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7. Draw a cage on one side of a cardboard and a bird on the other side. Hang the cardboard with the help of a thread. Twist the thread and leave it. What do you see and why ?



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8. Try this

Material: Convex lens, screen, metre scale, stand for the lens etc.

Method:

Keeping the screen fixed, obtain a clear image of a distant object like a tree or a building with the help of the lens on the screen. Measure the distance between the screen and the lens with the help of the metre scale. Now turn the other side of the lens towards the screen. Again obtain a clear image of the distant object on the screen by moving the lens forward or backward. Measure the distance between the screen and the lens again.

What is this distance between the lens and the screen called?



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9. Try this

Material: Convex lens, screen, metre scale, stand for the lens etc.

Method:

Keeping the screen fixed, obtain a clear image of a distant object like a tree or a building with the help of the lens on the screen.

Measure the distance between the screen and the lens with the help of the metre scale. Now turn the other side of the lens towards the

screen. Again obtain a clear image of the distant object on the screen by moving the lens forward or backward. Measure the distance between the screen and the lens again.

What will happen if you use a concave lens in this experiment?



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10. Why do we have to bring a small object near the eyes in order to see it clearly ?



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11. If we bring an object closer than 25 cm from the eyes, when can we not see it clearly even though it subtends a bigger angle at the eye



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Fill In The Blanks And Rewrite The Statements

1. The focal length of a lens is positive.



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2. The focal length of a..... lens is negative.

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3. The magnification produced by a lens is always positive.

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4. The power of a lens is positive



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5. The power of a lens is negative



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6. The focal length of a lens with power 2.5 D is

.....



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7. The power of a lens with focal length 20 cm is.....



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8. The minimum distance of distinct vision for a normal human eye is



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9. If two lenses with focal lengths 10 cm and 20 cm respectively are kept in contact with each other, the effective power of the combination is



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10. A Lens is used as a simple microscope .



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Fill In The Blanks For A Convex Lens

1. Fill in the blanks

f (m)	0.2	0.1
P (D)	2



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2. Fill in the blanks

h_1 (cm)	5	10
h_2 (cm)	-30	-20
M	-2	-0.5



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Rewrite The Following Statement By Selecting The Correct Options

1. Inside water, an air bubble behaves

- A. like a flat plate
- B. like a concave lens
- C. like a convex lens
- D. like a concave mirror

Answer: B



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2. Represents the lens formula .

A. $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

B. $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

C. $\frac{1}{v} + \frac{1}{u} = \frac{2}{f}$

D. $\frac{1}{u} - \frac{1}{v} = \frac{1}{f}$

Answer: B



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3. The power of a convex lens of focal length 25 cm is

A. $+4.0D$

B. $0.25D$

C. $-4.0D$

D. $-0.4D$

Answer: A



4. A lens does not produce any deviation of a ray of light passing through

A. its centre of curvature

B. its optical centre

C. its principal focus

D. an axial point at a distance $2F$ from its centre.

Answer: B



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5. The image formed by a concave lens is always

- A. virtual and erect
- B. real and erect
- C. virtual and inverted
- D. real and inverted

Answer: A



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6. A convex lens forms a virtual image of an object placed

A. at infinity

B. at a distance $2F$ from the lens

C. at a distance F from the lens

D. between the principal focus and the optical centre of the lens

Answer: D



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7. When an object is placed at $2F_1$ of a convex lens, its image is formed

A. at f_1

B. at $2F_2$

C. beyond $2F_2$

D. on the same side as the object

Answer: B



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8. To obtain an image of the same size as that of an object with the help of a convex lens, the object should be placed

A. at infinity

B. beyond F_1

C. between F_1 and $2F_1$

D. at $2F_1$

Answer: D



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9. When an object is placed between O and F_1 in front of a convex lens, the image formed

- A. enlarged and erect
- B. diminished and erect
- C. real and enlarged
- D. diminished and inverted

Answer: A



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10. When an object is placed at any finite distance from a concave lens, the image is formed..... .

A. between F_1 and $2F_1$

B. beyond $2F_1$

C. at F_1

D. between F_1 and O on the same side as the object.

Answer: D



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11. A student obtained a clear image of window grills on the screen . But the teacher told him to get the image of a tree far away, instead of the window . To get a clear image, the lens must be

A. moved towards the screen

B. moved away from the screen

C. moved behind the screen

D. moved far away the screen

Answer: A



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12. The image obtained while finding the focal length of a convex lens is

A. real and erect

B. virtual and erect

C. real and inverted

D. virtual and inverted

Answer: C



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13. The focal length of a converging lens are f_v and f_r for violet and red lights, respectively. Which of the following is correct?

A. $f_1 = f_2$

B. $f_1 \geq f_2$

C. $f_1 < f_2$

D. $f_1 \neq f_2$

Answer: A



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True And False

1. Power of a lens , $P = \frac{1}{f}$



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2. If the power of a lens is 2 D, its focal length =0.5 m.



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3. A concave lens is a converging lens.



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4. A convex lens is a diverging lens.



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5. A concave lens always forms a virtual image.

True/False



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6. A concave lens always forms a virtual image.

True/False



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7. Due to the light sensitive cells in the eye, we get information about the brightness or dimness of the object and the colour of the object .

True/False



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8. The focal length of a concave lens is negative.

True/False



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9. The magnification produced by a convex lens is positive or negative depending on the object distance.

True/False



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10. The magnification produced by a convex lens is positive or negative depending on the

object distance.

True/False



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11. A concave lens is used as a magnifying glass.



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12. A convex lens is used as a simple microscope .

True/False



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13. A concave lens is used to correct myopia.

True/False



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14. A convex lens is used to correct hypermetropia.

True/False



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15. When red light falls on the eyes , the cells responding to red light get excited more than those responding to other colours and we get the sensation of red colour .



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16. When an object is placed in front of a concave lens , its image is obtained on the

opposite side of the object .



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17. The image formed by a concave lens is always virtual.



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18. The principal focus of a convex lens is virtual.



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19. An object of height 2 cm forms an image of height 3 cm when placed in front of a concave lens. True/False.



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20. Absence of rod like cells results in colour blindness. True/False



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21. Nearsightedness can be corrected using spectacles having convex lenses. True/False



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22. Farsightedness can be corrected using spectacles having lenses of suitable focal length. True/False



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23. As one grows old, ciliary muscles become weak. True/false



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24. In a simple microscope, the object is placed within the focal length of the convex lens.



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25. A compound microscope forms an erect and real image of a small object.



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26. In a compound microscope, a real image acts as an object for the eyepiece.



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27. In television, we see a continuous picture due to persistence of vision. True/false



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28. The conical cells can respond differently to red, green and blue colours. True/false



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29. The rod like cells respond to colours, and communicate the presence of colours in the retinal image of the brain. True/false



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30. The conical cells respond to the intensity of light and communicate the degree of brightness and darkness to the brain. True/false



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31. Generally, using the same objective lens, but different eyepieces, different magnification can be obtained. True/false



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Odd One Out

1. Simple microscope, Compound microscope, Telescope, Myopia.

Find the Odd one out.



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2. Myopia, presbyopia, Hypermetropia,
Spectrometer.

Find the Odd one out.



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3. Presbyopia, Retina, Nearsightedness, Far-
sightedness.

Find the Odd one out.





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4. Compound Microscope , Kaleidoscope,
Simple microscope, Astronomical telescope.



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5. TV, Motion picture, Complete circle formed
by a revolving burning incense stick, Colour-
blindnes.

Find the Odd one out.



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6. Planets, Stars, Satellites , Rainbow.

Find the Odd one out.



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**Considering The Correlation Between The Words
Of The First Pair Pair The Thid Word Accordingly
With Proper Answer**

1. Nearsightedness : Elongated eyeball ::

Farsightedness :



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2. Convex lens: Converging :: Concave lens :

.....



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3. Object at $2F_1$ of a convex lens : Image at

$2F_2$:: Object at F_1 :



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4. Magnification positive : Erect image ::

Magnification negative :



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5. Convex lens : Positive power of the lens ::

Concave lens :



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6. $\frac{1}{f(\text{in meter})}$: Power of the lens (in diopetre)
:: $\frac{\text{Image distance}}{\text{Object distance}}$:.....



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7. Focal length :Metre :: Power of a lens :



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8. Iris : Pupil :: Ciliary muscles :



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9. Nearsightedness : Concave lens ::

Farsightedness :



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10. Nearsightedness : Image in front of the
retina :: Farsightedness :



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11. Observation of stars and planets :

Telescope :: Repairing a watch :



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12. Cinema : Persistence of vision :: Rainbow :

.....



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Match The Columns

1. Match columns

Column 1	Column 2	Column 3
Farsightedness	Nearby object can be seen clearly	Bifocal lens
Presbyopia	Faraway object can be seen clearly	Concave lens
Nearsightedness	Problem of old age	Convex lens

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2. Match columns

(1) Column A	Column B
(1) Conical cells	(a) Intensity of light
(2) Rod like cells	(b) Colour of an image
(3) Pupil	(c) Iris
(4) Cornea	(d) Aperture
	(e) Transparent



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3. Match columns

(2) Column A	Column B
(1) Magnification	(a) $\frac{1}{f}$
(2) Power of a lens	(b) $\frac{h_2}{h_1}$
(3) Focal length	(c) f
(4) Distance of an object from a lens	(d) u
	(e) $\frac{h_1}{h_2}$



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4.

Match

columns

(3) Column A	Column B
(1) Lens : $\frac{1}{f}$	(a) $\frac{1}{v} + \frac{1}{u}$
(2) Magnification	(b) $\frac{\sin i}{\sin r}$
(3) Refractive index	(c) $\frac{1}{v} - \frac{1}{u}$
	(d) $\frac{h_2}{h_1}$



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5.

Match

columns

(4) Column A	Column B
(Convex lens)	(a) Image virtual, erect and enlarged
(1) Object at $2F_1$	(b) Image real, inverted and of the same size
(2) Object between F_1 and $2F_1$	(c) Image real, inverted and highly diminished
(3) Object between O and F_1	(d) Image real, inverted and highly enlarged
(4) Object at infinity	(e) Image real, inverted and enlarged



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6. Match the columns

(5) Column A	Column B
(1) Nearsightedness	(a) Ciliary muscles become weak
(2) Farsightedness	(b) Image in front of the retina
(3) Presbyopia	(c) Colour-blindness
	(d) Image behind the retina



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7. Match the columns

(6) Column A	Column B
(1) Convex lens	(a) To see small objects clearly
(2) Astronomical telescope	(b) To observe minute objects
(3) Compound microscope	(c) To observe astronomical objects such as stars, planets, etc.
(4) Simple microscope	(d) Presbyopia
	(e) Power of a lens



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8. Match the columns

(7) Column A	Column B
(1) Persistence of vision	(a) Lenses and mirrors are used
(2) Reflecting telescope	(b) To see objects far away from us
(3) Telescope	(c) Motion picture
(4) Compound microscope	(d) To observe blood corpuscles
	(e) Convex lens



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Name The Following

1. Name the lens which forms a real image or a virtual image depending on the position of the object .



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2. Name the lens which produces magnification always less than 1.



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3. Name the lens which always forms an image virtual and smaller than the object.



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4. Name the lens used to obtain the image on a screen.



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5. Name the lens for which the image always lies between the object and the lens



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6. Name the instrument used to observe bacteria.



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7. Name the instrument used to observe planets.



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Answer The Following Questions In One Sentence Each

1. An object is placed at 60 cm from a convex lens of focal length 20 cm . State the nature and size of the image relative to that of the object.



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2. If an object is placed at 50 cm from a convex lens of focal length 25 cm , what will be the image distance ?



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3. An object is placed at 40 cm from a convex lens of focal length 20 cm. State the nature

and the size of the image relative to that of the object.



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4. An object is placed at 30 cm from a convex lens of focal length 20 cm. State the nature and the size of the image relative to that of the object.



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5. An object is placed at 15 cm from a convex lens of focal length 25 cm. State the nature and size of the image relative to that of the object.



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6. State the type of lens that can be used to burn paper in sunlight at noon.



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7. The lens used for correcting myopia is.



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8. State the type of lens used to correct hypermetropia .



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9. If two lenses with focal lengths 10 cm and -20 cm respectively are kept in contact with each

other, what will be the effective power of the combination of the lenses ?



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10. If two lenses with focal lengths -10 cm and 40 cm respectively are kept in contact with each other, what can you say about the behaviour of the combination of the lenses ?



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Answer The Following Questions

1. What is a lens ?



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2. In which instruments have you seen a lens ?



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3. How is a lens different from a mirror ?





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4. Make a list of optical devices you know.



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5. Do you know which is the natural optical device ?



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6. What is a convex lens ?



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7. What is a concave lens ?



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8. Draw neat labelled diagrams : Type of lenses.



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9. In general, when a ray of light passes through a lens, there occurs a change in its direction of propagation . Why ?



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10. With reference to spherical lenses, state the meaning of the following terms or define the following terms and draw the diagrams to illustrate the same : (1) centre of curvature (C) (2) radii of curvature (R_1, R_2) (3) principal

axis (4) optical centre (O) (5) principal focus (F)

(6) focal length (f)



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11. State the rules used for drawing ray diagrams for the formation of an image by a convex lens .



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12. In the case of a convex lens, show the path of the refraction ray when the incident ray of light (1) is parallel to the principal axis of the lens (2) passes through the focus of the lens (3) passes through the optical centre of the lens.



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13. Draw neat and well labelled ray diagrams for image formation by a convex lens when an

object is at infinity.

Also state the position , nature and size of the image relative to that of the object.



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14. Draw neat and well labelled ray diagrams for image formation by a convex lens when an object is beyond $2F_1$

Also state the position , nature and size of the image relative to that of the object.



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15. Draw neat and well labelled ray diagrams for image formation by a convex lens when an object is at $2F_1$.

Also state the position , nature and size of the image relative to that of the object.



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16. Draw neat and well labelled ray diagrams for image formation by a convex lens when an object is between F_1 and $2F_1$

Also state the position , nature and size of the image relative to that of the object.



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17. Draw neat and well labelled ray diagrams for image formation by a convex lens when an object is at focus F_1

Also state the position , nature and size of the image relative to that of the object.



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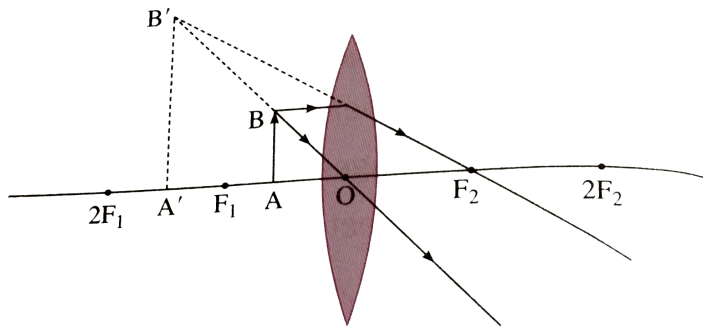
18. Draw neat and well labelled ray diagrams for image formation by a convex lens when an object is between focus F_1 and optical centre O.

Also state the position , nature and size of the image relative to that of the object.



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19. Observe the following figure and complete the table :



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20. At which position will you keep an object in front of a convex lens to get a real image smaller than the object ? Draw a figure.



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21. At which position will you keep an object in front of a convex lens to get a real image of the same size as the object ? Draw a figure .



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22. State the rules used for drawing ray diagrams for the formation of an image by a concave lens.



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23. State the characteristics of an image formed by a concave lens.



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24. In the case of image formation by a concave lens, what can you say about the position, nature and size of the image relative to the size of the object?



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25. Draw a ray diagram to show image formation by a concave lens.



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26. State the Cartesian sign convention for refraction of light (image formation) by a lens.



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27. What is a lens formula ? State it.



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28. What is meant by the magnification produced by a lens State the formulae for it.



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29. Express the magnification produced by a lens in terms of the focal length of the lens and (1) the object distance (2) The image distance.



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30. An object is kept in front of a lens of focal length $+10$ cm. Describe the nature of the image in the object distance is 25 cm.



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31. An object is kept in front of a lens of focal length $+10$ cm. Describe the nature of the image in the object distance is 5 cm.



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32. Annu and Anand have concave and convex lenses respectively. They took lenses in sunlight and tried to burn two pieces of paper of equal areas and temperature . State which lens will burn the paper. Give the reason. Explain with the help of a diagram, why the other paper did not burn.



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33. To obtain a magnified real image of a small film strip, which type of lens is used ? Where is the film strip placed to obtain the image on the screen ?



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34. When an object of height 2 cm is placed in front of a convex lens, the height of the image is found to be 3 cm. State the nature and position of the image giving reason.





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35. You are given a lens which gives a virtual , erect and enlarged image. What type of lens is it ?



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36. When an object of height 3 cm is placed in front of a concave lens, the height of the image is found to be 6 cm, State , giving the

reason, whether the given statement is true and false.



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37. State used of a convex lens.



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38. State used of a convex lens.



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39. An object is kept in front of a lens of focal length-20 cm . Describe the nature of the image when the object distance is 25 cm.



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40. An object is placed in front of a convex lens of focal length 20 cm . If the object distance is changed from 60 cm to 40 cm , what can you say about the size of the image relative to that of the object ?





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41. What is the power of a lens ?



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42. What is the unit of power of a lens ?

Define it .



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43. What is the sign of the power of (i) a convex lens (ii) a concave lens ?



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44. If there is an increase or decrease in the focal length of a lens, what will be the effect on the power of the lens ?



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45. If two lenses of focal lengths f_1 and f_2 are kept in contact with each other, state the formula for the focal length of the combination . If P_1 and P_2 are the powers of these lenses, state the formula for the power of the combination.



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46. Draw a neat labelled diagram to show the structure of the human eye.





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47. What is cornea ?



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48. What is iris ?



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49. What is pupil ?





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50. What is the function of the lens in the human eye ?



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51. With reference to the functioning of the pupil in the human eye, what is adaptation ?



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52. What is the shape and the size of the human eyeball ?



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53. Name the part of the human eye that forms a transparent bulge on the surface of the eyeball.



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54. Which part of the human eye is located just behind the pupil ?



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55. What is retina ?



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56. What is the nature of the eye lens and what does the eye lens do ?



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57. What happens when light falls on the retina ?



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58. What are ciliary muscles ?



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59. What is the focal length of the eye lens of a normal eye in relaxed position of eye muscles ?



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60. Where does the second focal point of the eye lens of a normal eye in relaxed position of eye muscles lie ?



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61. What is meant by the power of accommodation of the eye ?



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62. Define the term "power of accommodation" of human eye.



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63. What is meant by the power of accommodation of the eye ?



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64. What is meant by power of accommodation ? How is it brought about ?



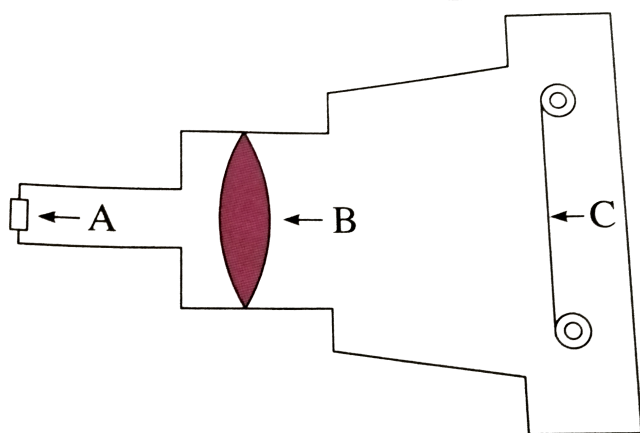
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65. What is the function of the iris and the muscles connected to the lens in the human eye ?



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66. The human eye is very similar to a photographic camera. The figure given shows the main parts of a photographic camera ,
Now answer the question.



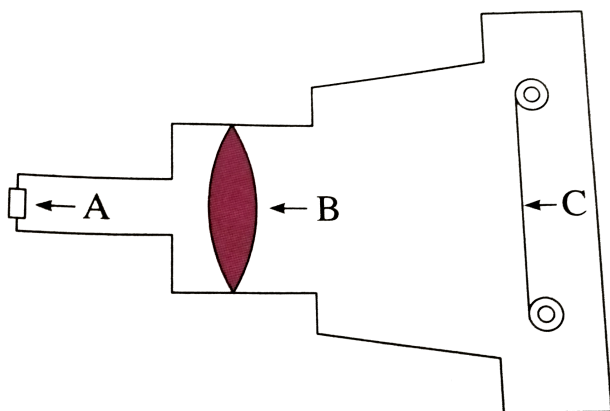
Name the parts of the human eye similar to the following parts of the photographic camera:

(a) Photographic film (b) Aperture.



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67. The human eye is very similar to a photographic camera. The figure given shows the main parts of a photographic camera ,
Now answer the question.

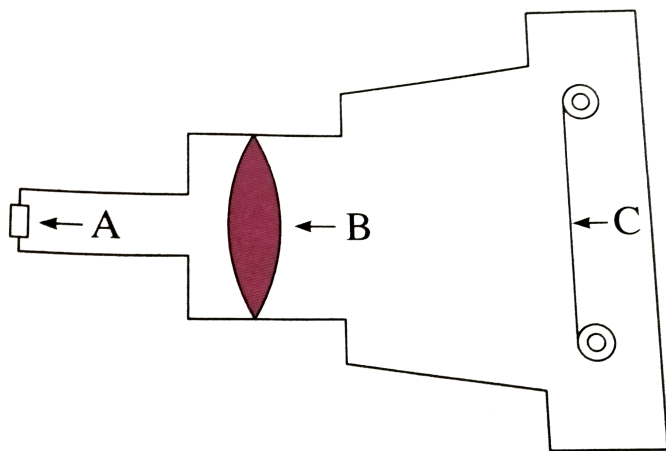


State one difference between the human eye lens and camera lens



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68. The human eye is very similar to a photographic camera. The figure given shows the main parts of a photographic camera ,
Now answer the question.

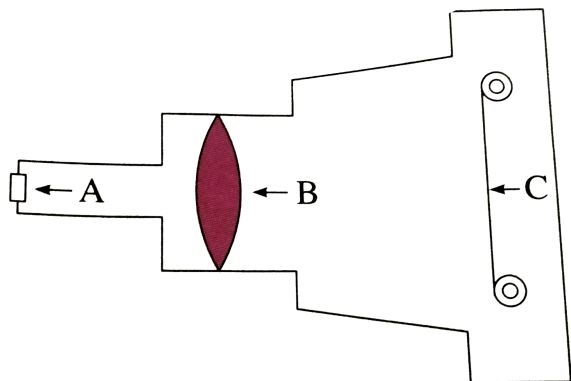


Name the muscles which adjust the curvature of the eye lens.



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69. The human eye is very similar to a photographic camera. The figure given shows the main parts of a photographic camera ,
Now answer the question.



Which phenomenon of light is responsible for the working of the eye ?



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70. Have you seen a photographic camera in which a film is used ? Compare the human eye with it. State similarities between them. State the points of difference between them.



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71. What is meant by the minimum distance of distinct vision ?



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72. Explain the term minimum distance of distinct vision.



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73. Write a short note on distance of distinct vision.



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74. State four reasons related to problems of vision.



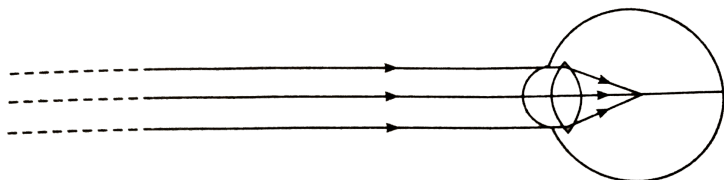
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75. What is myopia or nearsightedness? What are the possible reasons of myopia? How is myopia corrected ? Explain with diagrams.



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76. Observe the following diagram and answer the questions.

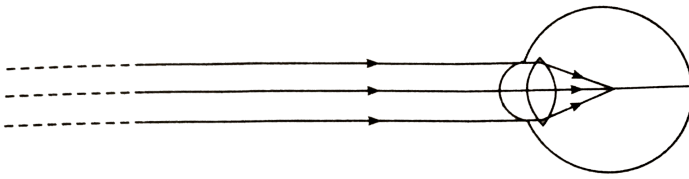


Which eye defect is shown in this diagram ?



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77. Observe the following diagram and answer the questions.

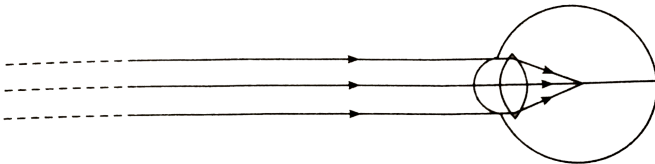


What are the possible reasons for this eye defect ?



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78. Observe the following diagram and answer the questions.



how is this defect corrected ?



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79. What is the sign of the power of the lens used to correct myopia ?



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80. In a Std. X class, out of 40 students, 10 students use spectacles, 2 students have positive power and 8 students have negative power and 8 students have negative power of

lenses in their spectacles .

What does the negative power indicate ?



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81. In a Std. X class, out of 40 students, 10 students use spectacles, 2 students have positive power and 8 students have negative power and 8 students have negative power of lenses in their spectacles .

What does the positive power indicate ?



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82. In a Std. X class, out of 40 students, 10 students use spectacles, 2 students have positive power and 8 students have negative power and 8 students have negative power of lenses in their spectacles .

Generally which type of spectacles do most of the students use ?



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83. In a Std. X class, out of 40 students, 10 students use spectacles, 2 students have positive power and 8 students have negative power and 8 students have negative power of lenses in their spectacles .

What defect of eyesight do most of the students suffer from ?



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84. In a Std. X class, out of 40 students, 10 students use spectacles, 2 students have positive power and 8 students have negative power and 8 students have negative power of lenses in their spectacles .

Give two possible reasons for the above defect

.



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85. What is hypermetropia or farsightedness ?

What are the possible reasons of hypermetropia ? How is hypermetropia corrected ? Explain with figures .



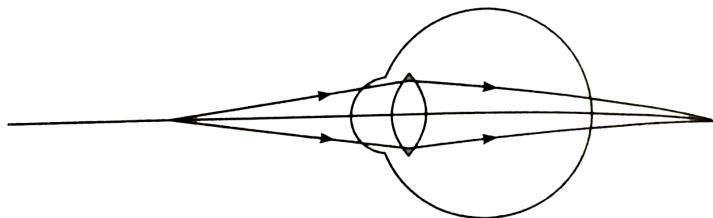
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86. What is the sign of the power of the lens used to correct hypermetropia ?



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87. Given below is a diagram showing defect of human eye .

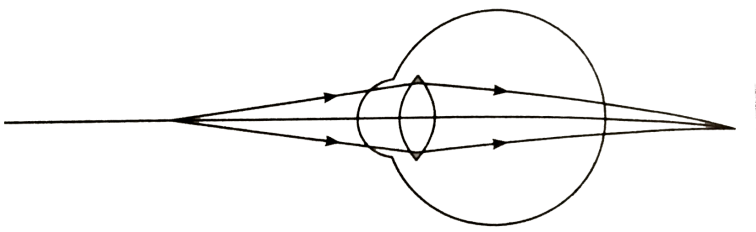


Give two possible reasons for this defect of eye in human beings .



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88. Given below is a diagram showing defect of human eye .

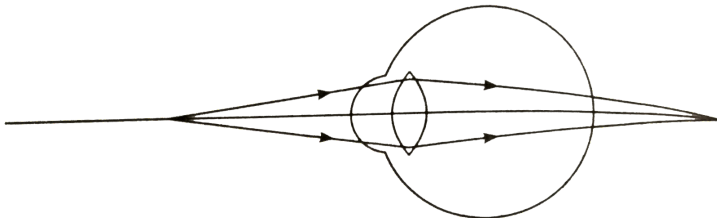


Give two possible reasons for this defect eye defect .



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89. Given below is a diagram showing defect of human eye .

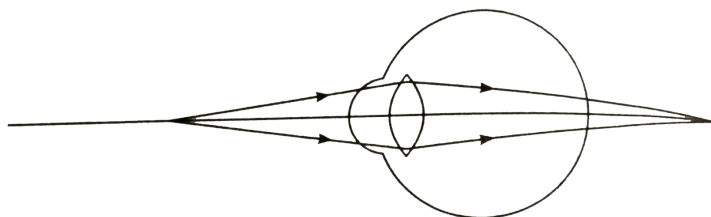


Name the type of lens used to correct the eye defect.



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90. Given below is a diagram showing defect of human eye .



Draw a labelled diagram to show how the defect is rectified by using the lens.



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91. Observe the following figures and complete the table .



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92. What is presbyopia ? State the reason for this defect . How is presbyopia corrected ?



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93. What is a bifocal lens ?



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94. Anil cannot see the blackboard writing clearly, but he can see nearby objects clearly.

What is the eye defect he is suffering from?



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95. Anil cannot see the blackboard writing clearly, but he can see nearby objects clearly.

How is it corrected?



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96. Anil's uncle cannot see nearby objects clearly, but he can see distant objects clearly.

What is the eye defect he is suffering from ?



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97. Anil's uncle cannot see nearby objects clearly, but he can see distant objects clearly.

How is it corrected ?



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98. When are bifocal lenses used in spectacles?



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99. Aniket from Std. X uses spectacles. The power of the lenses in his spectacles is -0.5 D .

State the type of lenses used in his spectacles.



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100. Aniket from Std. X uses spectacles. The power of the lenses in his spectacles is -0.5 D .

name the defect of vision Aniket is suffering from.



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101. Aniket from Std. X uses spectacles. The power of the lenses in his spectacles is -0.5 D .

Find the focal length of the lenses used in his spectacles.



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102. Sunita from std. X uses spectacles . Her spectacle number is -1.5 D .

Name the defect of eye from which she is suffering .



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103. Sunita from std. X uses spectacles . Her spectacle number is -1.5 D .

What type of lens is she using ?



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104. Sunita from std. X uses spectacles . Her spectacle number is -1.5 D .

Find the focal length of the lens.





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105. Surabhi from Std. X uses spectacles. The power of the lenses in her spectacles is 0.5 D . Identify the type of lenses used in her spectacles.



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106. Surabhi from Std. X uses spectacles. The power of the lenses in her spectacles is 0.5 D .

Identify the defect of vision Surabhi is suffering from.



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107. Surabhi from Std. X uses spectacles. The power of the lenses in her spectacles is 0.5 D . Find the focal length of the lenses used in her spectacles.



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108. My grandfather uses a bifocal lens in his spectacles. Explain why.



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109. State use of a concave lens.



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110. State use of a convex lens.



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111. What is meant by the apparent size of an object ? With a neat and labelled diagram, explain the relation between the apparent size of an object and the angle subtended by the object at the eye.



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112. With a neat labelled diagram, explain the working of a simple microscope. State uses of a

simple microscope .



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113. What does a simple microscope consist of ? What is the order of magnification obtained by a simple microscope ? What is a simple microscope used for ?



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114. With a neat labelled diagram, explain the construction and working of a compound microscope.



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115. State two uses of a compound microscope

.



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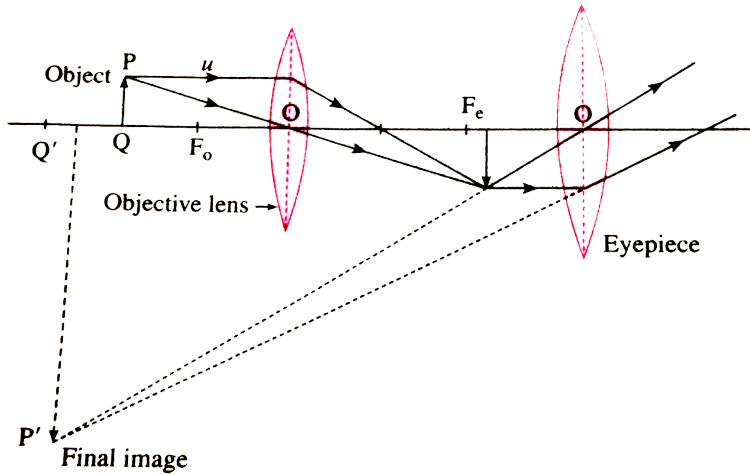
116. What will happen if in a compound microscope , the objective lens is large in size and has a focal length ?



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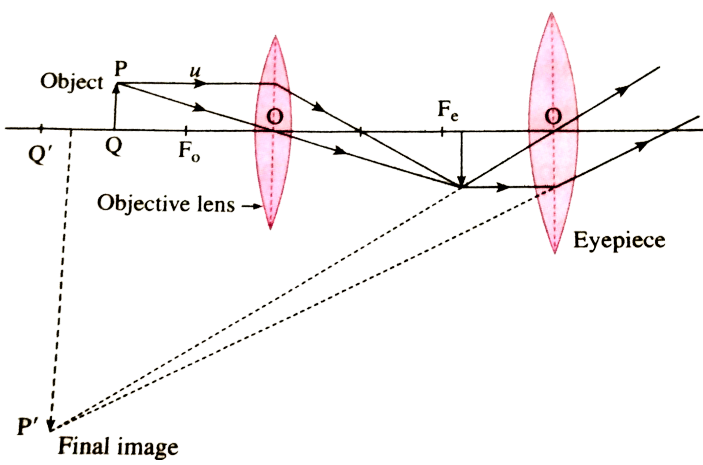
117. In which type of microscope do you find the lens arrangement as shown in the

following diagram ?



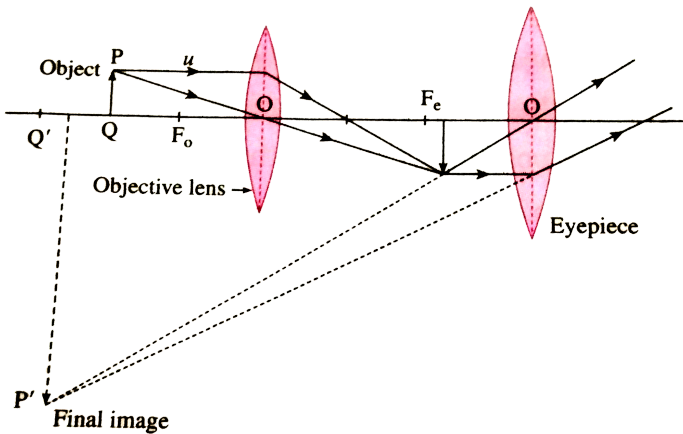
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118. Write in brief , the working of this microscope.



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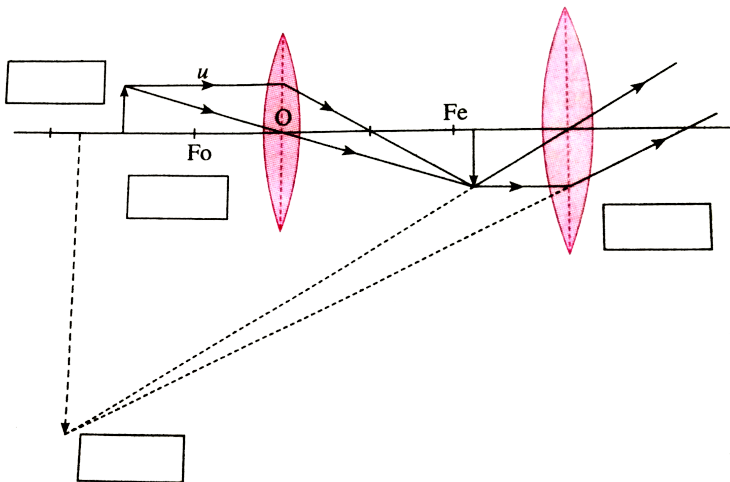
119. Where is this microscope used ?





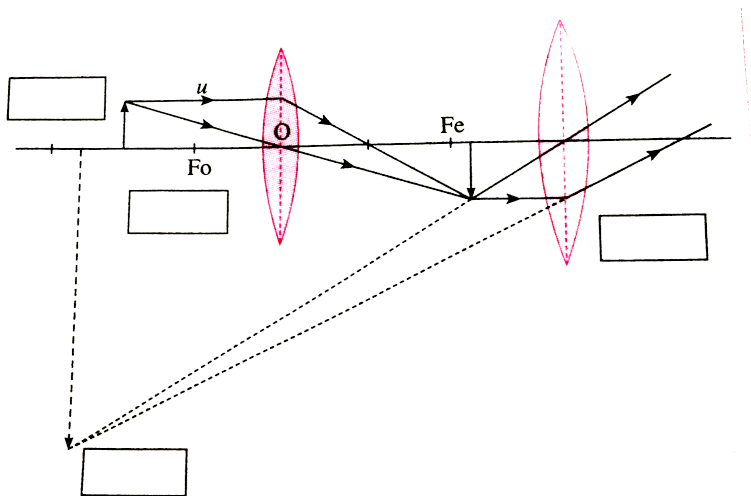
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120. Which type of microscope has the arrangement of lenses shown in the following figure ?



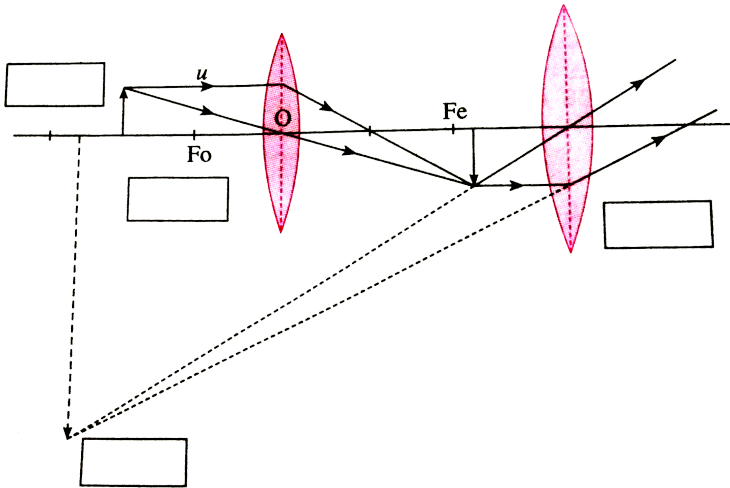
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121. Label the figure correctly .



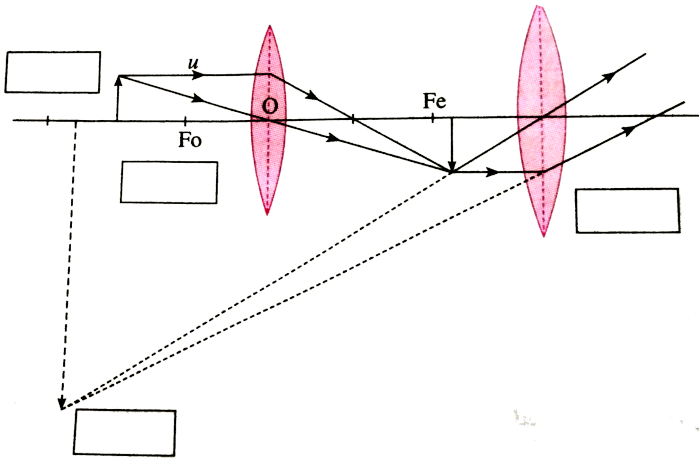
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122. Write the working of this microscope .



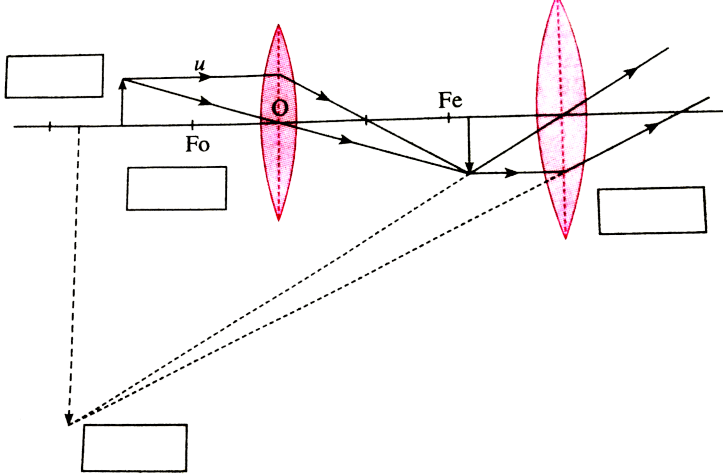
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123. Where is this microscope used ?



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124. Suggest a way to increase the efficiency of this microscope.



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125. With a neat labelled diagram, explain the working of a refracting telescope.

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126. Explain the working of an astronomical telescope using refraction of light.



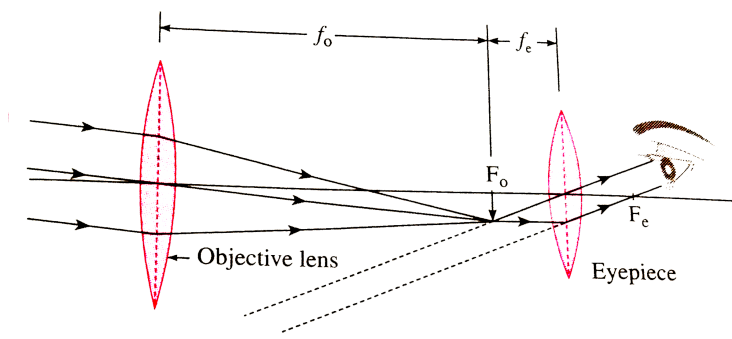
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127. State the used of a telescope.



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128. Observe the figure and answer the question.

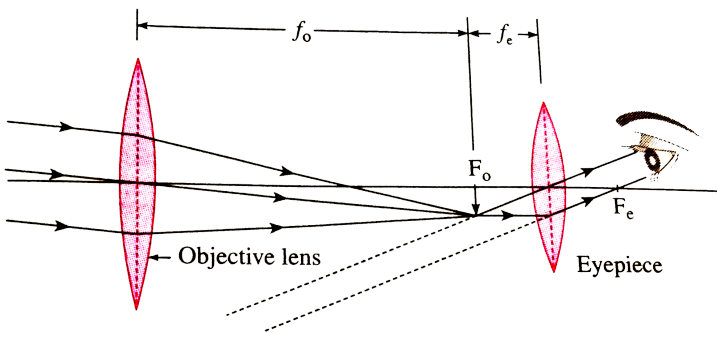


Which optical instrument shows arrangement of lenses as shown in the figure.



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129. Observe the figure and answer the question.

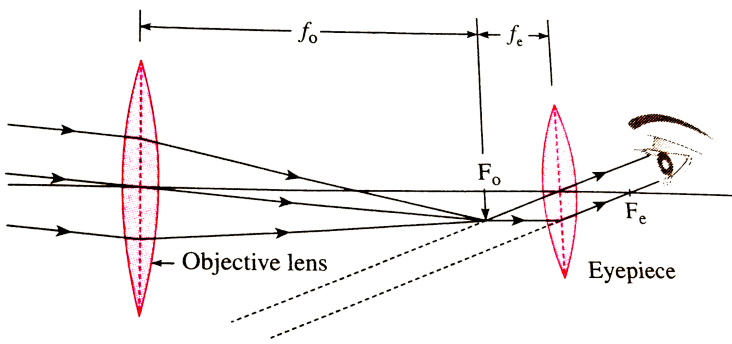


This optical instrument is?



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130. Observe the figure and answer the question.

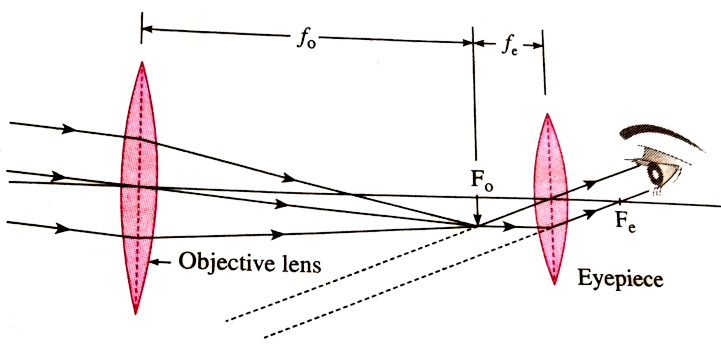


How can we get different magnifications in this optical instrument ?



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131. Observe the figure and answer the question.



Draw the figure again and labelled it properly.

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132. What is persistence of vision ? Give one example of persistence of vision.

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133. Name two devices whose working is based on the phenomenon of persistence of vision



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134. Name any two applications based on persistence of vision.



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135. How is the phenomenon of persistence of vision used in motion pictures ?



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136. Name the two types of light sensitive cells present in the retina of the human eye . What are their functions ?



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137. Why do you say that a person is colourblind ?



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138. Explain the perception of colour of the human eye .



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139. Explain in short perception of colour.



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140. Write a note on perception of colour.





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141. What is colour-blindness ?



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142. Why are some persons colour-blind ?

What is the cause of this defect ?



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143. What are the difficulties faced by a colour-blind person ?



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144. Draw a figure explaining various terms related to a lens



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145. When is the magnification produced by a lens (1) positive (2) negative ?



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Give Scientific Reasons

1. A convex lens is known as a converging lens. Is there any condition when it does not behave as converging lens?



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2. A concave lens is called a diverging lens.

Give Reason



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3. A simple microscope is used for watch repairs. Give reason



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4. Watch repairers use a magnifying glass. Give reason



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5. In old age a bifocal lens is necessary for some persons. Give reason



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6. A person suffering from myopia (nearsightedness) uses spectacles of concave lenses. Give reason



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7. A person suffering from hypermetropia (farsightedness) uses spectacles of convex lenses. Give reason



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8. You cannot enjoy watching a movie from a very short distance from the screen in a cinema hall. Give reason



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9. We cannot clearly see an object kept at a distance less than 25 cm from the eye.



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10. One can sense colours only in bright light.

Can you explain why?



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11. The rays of light travelling through the optical centre of a lens pass without changing their path. Is it true? justify



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12. A convex lens converges the rays of light falling on it.



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13. Explain why does a concave lens diverges the rays of light falling on it.



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14. When a burning stick of incense is moved fast in a circle, a circle of rod light is seen. Why does this happen? Explain.



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15. Why are colour-blind persons are unable to distinguish between different colours? Explain.



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16. Why is it risky to issue a driving license to a person suffering from colour-blindness?



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Distinguish Between

1. Real image and Virtual image



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2. Concave lens and convex lens



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3. Farsightedness (Hypermetropia) and Nearsightedness (Myopia).



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4. Explain Simple microscope and Compound microscope. Also differentiate between them.



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5. Simple microscope and Astronomical refracting telescope .



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6. Simple microscope and Astronomical refracting telescope .



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1. Construction of a compound microscope:

(1) A compound microscope consists of a metal tube fitted with two convex lenses at the two ends. These lenses are called the objective lens (the lens directed towards the object) and the eyepiece (the lens directed towards the eye). Both the lenses are small in size, but the cross section of the objective lens is less than that of the eyepiece. The objective lens has a short focal length. The

focal length of the eyepiece is more than that of the objective lens.

(2) The metal tube is mounted on a stand . The principal axes of the objective lens and the eyepiece are along the same line. The distance between the object and the objective lens can be changed with a screw.

use : This microscope is used to observe blood cells, microorganism , etc.

In a compound microscope, which lens has greater focal length?



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2. Construction of a compound microscope:

(1) A compound microscope consists of a metal tube fitted with two convex lenses at the two ends. These lenses are called the objective lens (the lens directed towards the object) and the eyepiece (the lens directed towards the eye). Both the lenses are small in size, but the cross section of the objective lens is less than that of the eyepiece. The objective lens has a short focal length. The focal length of the eyepiece is more than that

of the objective lens.

(2) The metal tube is mounted on a stand . The principal axes of the objective lens and the eyepiece are along the same line. The distance between the object and the objective lens can be changed with a screw.

use : This microscope is used to observe blood cells, microorganism , etc.

Where do you place the object to be observed

With a compound microscope?



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3. Construction of a compound microscope:

(1) A compound microscope consists of a metal tube fitted with two convex lenses at the two ends. These lenses are called the objective lens (the lens directed towards the object) and the eyepiece (the lens directed towards the eye). Both the lenses are small in size, but the cross section of the objective lens is less than that of the eyepiece. The objective lens has a short focal length. The focal length of the eyepiece is more than that of the objective lens.

(2) The metal tube is mounted on a stand . The principal axes of the objective lens and the eyepiece are along the same line. The distance between the object and the objective lens can be changed with a screw.

use : This microscope is used to observe blood cells, microorganism , etc.

State which distance is adjusted to observe the object with a compound microscope.



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4. Construction of a compound microscope:

(1) A compound microscope consists of a metal tube fitted with two convex lenses at the two ends. These lenses are called the objective lens (the lens directed towards the object) and the eyepiece (the lens directed towards the eye). Both the lenses are small in size, but the cross section of the objective lens is less than that of the eyepiece. The objective lens has a short focal length. The focal length of the eyepiece is more than that of the objective lens.

(2) The metal tube is mounted on a stand. The

principal axes of the objective lens and the eyepiece are along the same line. The distance between the object and the objective lens can be changed with a screw.

use : This microscope is used to observe blood cells, microorganism , etc.

State the nature of the final image in a Compound microscope relative to the object.



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5. Construction of a compound microscope:

(1) A compound microscope consists of a metal tube fitted with two convex lenses at the two ends. These lenses are called the objective lens (the lens directed towards the object) and the eyepiece (the lens directed towards the eye). Both the lenses are small in size, but the cross section of the objective lens is less than that of the eyepiece. The objective lens has a short focal length. The focal length of the eyepiece is more than that of the objective lens.

(2) The metal tube is mounted on a stand . The principal axes of the objective lens and the eyepiece are along the same line. The distance between the object and the objective lens can be changed with a screw.

use : This microscope is used to observe blood cells, microorganism , etc.

State the use of a compound microscope



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1. An object is kept at 60 cm in front of a convex lens. Its real image is formed at 20 cm from the lens . Find the focal length and power of the lens.



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2. The focal length of a convex lens is 20 cm . If an object of height 4 cm is placed at 30 cm from the lens , find the position, nature and size of the image .



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3. The focal length of a convex lens is 20 cm . If an object of height 2 cm is placed at 30 cm from the lens , Find the magnification produced and height of the image



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4. The focal length of a convex lens is 20 cm . If an object of height 2 cm is placed at 30 cm

from the lens , find the magnification produced by the lens .



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5. When a pin of height 4 cm is fixed at 10 cm from a convex lens, the height of the virtual image formed is 16 cm . Find the focal length of the lens.



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6. At what distance from a convex lens of focal length 5 m should a boy stand so that his image is half his height ?



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7. A convex lens forms a real image of pencil at a distance of 50 cm from the lens . The image formed is of the same size as the object . Find the focal length and power of the lens. At

what distance is the pencil placed from the lens ?



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8. A spherical lens is used to obtain an image on a screen. The size of the image is four times and size of the object . What is the type of lens and at what distance is the screen placed from the lens ?



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9. An object of height 5 cm is held 20 cm away from a converging lens of focal length 10 cm . Find the position , nature and size of the image formed.



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10. An object is placed at 10 cm from a convex lens of focal length 12 cm. Find the position, nature and magnification of the image.



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11. 10 cm high object is placed at a distance of 25 cm from a converging lens of focal length of 10 cm . Determine the position, size and type of the image.



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12. Doctor has prescribed a lens having power $+2D$. What will be the focal length of the lens ? What is the type of the lens and what must be the defect of vision ?





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13. An object of height 1 cm is placed in front of a concave lens of focal length 40cm . If the object distance is 60 cm , find the position and height of the image .



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14. An object kept 60 cm from a lens gives a virtual image 20 cm in front of the lens . What

is the focal length and power of the lens ? Is it
is converging lens or diverging lens ?



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15. what is the power of a convex lens having
focal length 0.5 m ?



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16. The power of a concave lens is -2.5 dioptries.
Find its focal length.

Calculate the focal length of a corrective lens having power +2.5 D.



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17. Calculate the focal length of a corrective lens having power +2D.



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18. Three lenses of focal length 20 cm each are kept in contact with each other. Find

the power of their combination.



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19. Two convex lenses of equal focal lengths are kept in contact with each other. If the power of their combination is 20 D, find the focal length of each convex lens.



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20. If the convex lens of focal length 10 cm and a concave lens of focal length 50 cm are kept in contact with each other.

What will be the focal length of the combination ?



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21. If the convex lens of focal length 10 cm and a concave lens of focal length 50 cm are kept

in contact with each other.

What will be the power of combination ?



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22. If the convex lens of focal length 10 cm and a concave lens of focal length 50 cm are kept in contact with each other.

What will be the behaviour of the combination (behaviour as a convex lens/concave lens) ?



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Numerical Problems For Practice

1. Find the focal length of a convex lens which produces a real image at 60 cm from the lens when an object is placed at 40 cm in front of the lens.



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2. Find the focal length of a convex lens which produces a virtual image at 10 cm from the

lens when an object is placed at 5 cm from the lens.



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3. A real image is obtained at 30 cm from a convex lens of focal length 7.5 cm . Find the distance of the object from the lens .



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4. An object is kept at 20 cm in front of a convex lens and its real image is formed at 60 cm from the lens . Find The focal length and power of the lens .



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5. An object is kept at 20 cm in front of a convex lens and its real image is formed at 60 cm from the lens . Find the height of the image if the height of the object is 6 cm.





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6. An object is kept at 10 cm in front of a convex lens. Its image is formed on the screen at 15 cm from the lens. Calculate the focal length of the lens.



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7. An object is kept at 10 cm in front of a convex lens. Its image is formed on the screen

at 15 cm from the lens. Calculate the magnification produced by the lens.



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8. An object is kept at 60 cm in front of convex lens of focal length 15 cm. Find the image distance and the nature of the image . Also find the magnification produced by the lens .



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9. An object of height 2 cm is kept at 30 cm from a convex lens . Its real image is formed at 60 cm from the lens. Find the focal length of power of the lens.



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10. If the power of a lens is 4 dioptres , find its focal length.



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11. Find the power of a convex lens of focal length 40 cm.



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12. Find the power of a convex lens of focal length 12.5



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13. If for a lens, $F = -20$ cm, what is the power of the lens ?



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14. An object of height 4 cm in front of a concave lens of focal length 20 cm . If the object distance is 30 cm, find the position and the height of the image.



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15. If two convex lenses of focal lengths 10 cm and 5 cm are kept in contact with each other, what is their combined focal length ?



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16. If a convex lens of focal length 20 cm and a concave lens of focal length 30 cm are kept in contact with each other.

What will be the focal length of the combination ?



Watch Video Solution

17. If a convex lens of focal length 20 cm and a concave lens of focal length 30 cm are kept in contact with each other.

What will the power of the combination ?



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18. If a convex lens of focal length 20 cm and a concave lens of focal length 30 cm are kept in contact with each other.

What will be the behaviour of the combination
?



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19. A concave lens of focal length 12 cm and a convex lens of focal length 20 cm are kept in contact with each other .

Find the focal length of the combination .



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20. A concave lens of focal length 12 cm and a convex lens of focal length 20 cm are kept in contact with each other .

What will be the behaviour of the combination
/



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