FIRST TERM EXAMINATION:2025
PHYSICS- Answer Key

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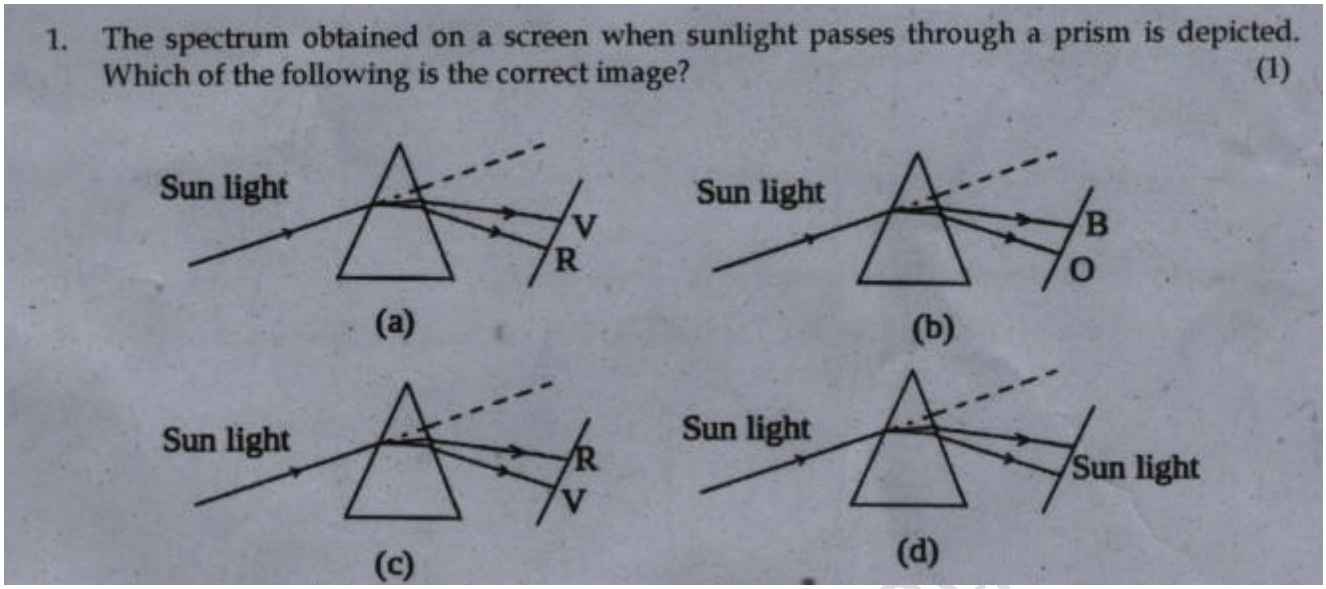
1.

1. The spectrum obtained on a screen when sunlight passes through a prism is depicted. Which of the following is the correct image? (1)



Ans. Figure.c

2.

2. **Statement :** The speed of a wave through a medium depends on the characteristics of the medium. (1)

Reason : When speed is constant, frequency of the wave is inversely proportional to the wavelength

a) Statement and reason are correct; the reason explains the statement.
b) Statement and reason are correct; however, the reason does not explain the statement.
c) both the statement and the reason are incorrect.
d) Statement is incorrect; reason is correct

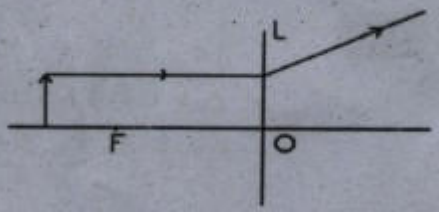
Ans.b. Statement and reason are correct; however, the reason does not explain the statement.

3.

3. In the figure L denotes a lens. (1)

What type of lens is indicated in the picture?

a) Concave b) Convex
c) Plano convex d) None of These



Ans.a.Concave

4. 4. A convex lens forms real, inverted, and magnified image, based on this some statements are given. (1)

i. A convex lens is a diverging lens.

ii. The object is placed between the focus and the lens.

iii. The object is placed between the focus and 2F.

iv. The object is placed at the focus.

Pick out the correct option from the following.

a) i Only b) i and iii c) ii Only d) iii and iv

Ans.iii and iv.

5A. 5. A. Focal length of a lens is +20 cm.

a) What type of lens is this ? (1)

b) What is the power of this lens? (1)

Ans.a. convex

b. f = +20 cm = +20/100 m

P = 1/f = 100/20 = 5 dioptre

5B. 5. B. A lens forms an erect and magnified image of an object.

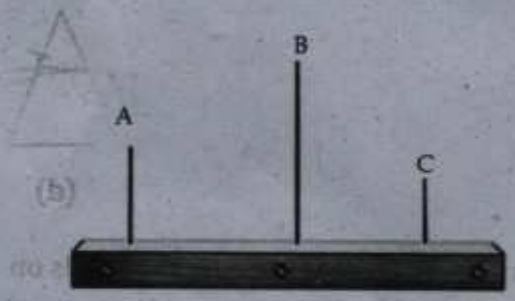
a) What type of lens is this? (1)

b) What are the characteristics of the image formed? (1)

Ans.a. Convex

b. virtual, magnified and erect

6. 6. The figure shows three wires (A, B, C) of different lengths fixed to a wooden block.



When the wooden block was vibrated, all the wires underwent forced vibration.

a) Which wire piece vibrates with a higher frequency? What is the reason? (1)

b) If wire B takes 1 s for 100 vibrations, what will be its period? (1)

Ans.a. All wires vibrates with the same frequency. Because the wires are in forced vibration. Therefore all of the wires vibrate with the natural frequency of wooden block.

b. period = t/n = 1/100 = 0.01 s

7.

7. When volcanic eruptions and earthquakes occur, some times large-scale displacement of ocean water results in disasters.
   a) By what name are the resulting ocean waves known? (1)
   b) What measures can be taken to escape from this disaster? (1)

Ans.a. tsunami
b. i.Keep away from the sea shore
ii. Obey the warnings issued by the authorities.
Iii. Move quickly to higher ground or safer places.

8.

8. A bat produces sound waves and receives the reflected wave from an insect 0.1 s later. If the speed of sound in air is 350 m/s, how far away is the insect? (2).

Ans.Distance to the insect = speed x time for one side = 350x0.05 = 17.5 m

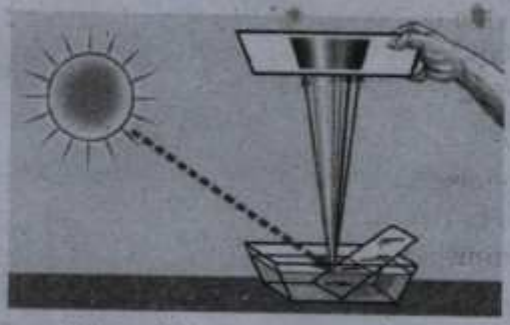
9.

9. What type of mechanical wave is sound wave? What is the characteristics of motion of particles in a medium when this wave passes through it? (2)

Ans.Longitudinal wave.
Characteristics: i.Particles of the medium vibrates parallel to the direction of propagation of the wave.
ii. It creates pressure variations in the medium through which it travels.

10.

10. The figure shows a plane mirror kept inclined in a trough of water. A spectrum is made by making sunlight fall on the mirror.



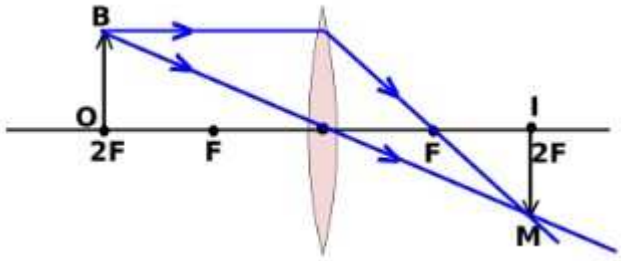
   a) What is the reason for sunlight splitting up into component colours? (1)
   b) Which are the phenomena of light that the ray of light falling undergoes? (1)

Ans.a. Because of the difference in the wavelengths of the component colours.
b. refraction and dispersion

11A.

11. A. An object is placed at 2F of a convex lens.
   Draw the ray diagram showing the image formation. Write down the characteristics of the image? (2)

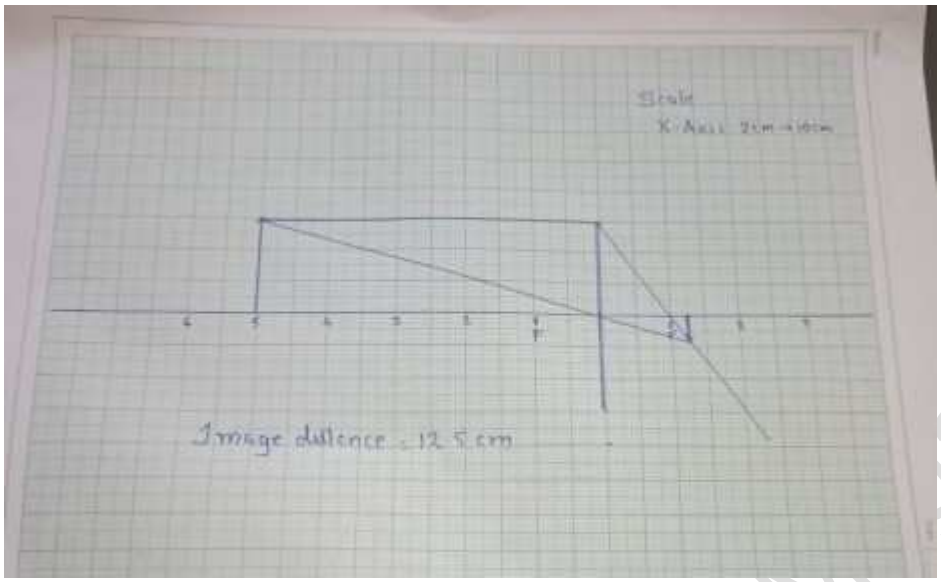
Ans.



Characteristics: Same size, inverted and real

11B. 11. B. The focal length of a camera lens is 10 cm. We have to take the photograph of the object 50 cm away from the lens of the camera. With the help of the ray diagram drawn find out what distance from the lens should the film be placed (Use suitable scale). (2)

Ans.



Distance to the film = 12.5 cm

12. 12. The electromagnetic spectrum is the orderly distribution of solar radiations.

a) Arrange the following radiations in the ascending order of wavelength. (1)

(X-rays, Gamma rays, Visible light, Ultraviolet rays, Infrared rays)

b) Which solar radiation is helpful in burning paper by passing solar radiation through a convex lens? (1)

c) Write one use of ultraviolet radiation. (1)

Ans.a.Gamma rays – X Rays – Ultraviolet – visible light – Infrared rays

b. Infrared rays

c. It produces vitamin D in our body

13A. 13. A. In a physics class, while doing an experiment using the apparatus shown in the figure

a) When a longer wire is made to vibrate, some students opined that all wires vibrate. What is your opinion? Justify your answer. (1)

b) When a shorter wire is made to vibrate, it is observed that only the shorter ones vibrate with a large amplitude. Why? Explain. (1)

c) If a small wire takes 0.5 s to vibrate 100 times, what will be its frequency? (1)

Ans.a. I agree to their opinion. Because they are in forced vibration.

b. They come into resonance because the natural frequencies of the shorter wires are equal.

c. frequency = n/t = 100/0.5 = 200 Hz

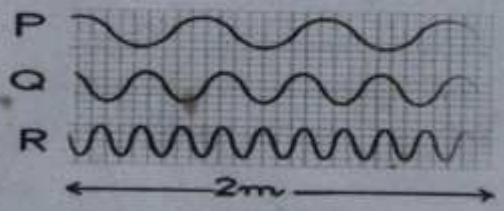
13B.

13. B. Observe the waveforms P, Q and R given in the figure and answer the questions below.

a) i. Which wave has a higher frequency?

ii. Which wave has a longer wavelength? (1)

b) The waves indicated in the figure take 0.1 s to travel a distance of 2 m. If the wavelength of wave Q is 0.2 m, what is its frequency? (2)



Ans.a.i. Wave R ii. Wave P

b. λ = 0.2 m Speed = distance/time = 2/0.1 = 20 m/s

frequency = v/λ = 20/0.2 = 100 Hz

Note: There is some mistake in the given data.

If we use the relation, f = n/t = 5/0.1 = 50 Hz

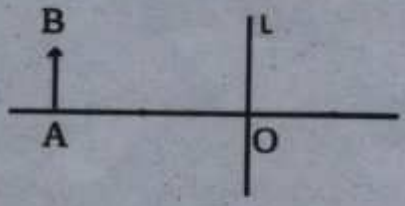
That is, we get different frequency.

14A.

14. A. In the figure AB is an object placed on the principal axis of lens L. The image formed by the lens is erect, diminished, and virtual.

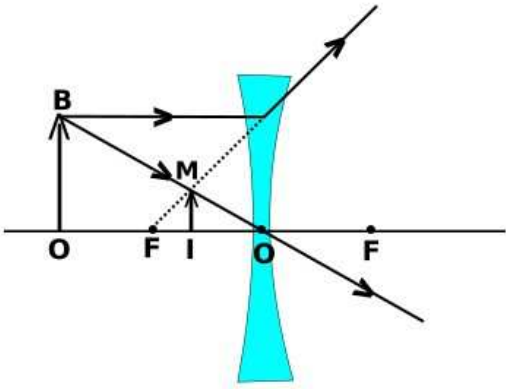
a) Identify the lens indicated in the figure and draw its shape. (1)

b) Draw the ray diagram of the image formation. (2)



Ans.a. It is a concave lens.

b.



14B.

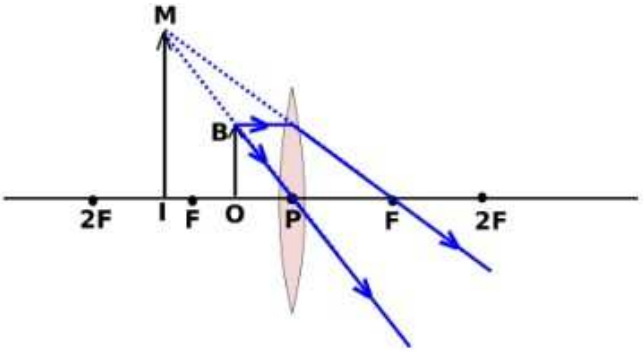
14. B. You can see objects magnified using a magnifying lens, right?

a) Where should an object be placed in front of a lens used as a magnifier to see an enlarged, erect image? (1)

b) Draw the ray diagram of the image formation. (2)

Ans.a. between optic centre and principal focus

b.

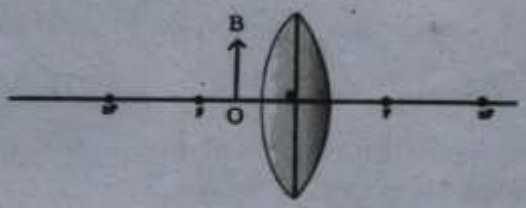


15.

15. An object OB is placed between focus and convex lens.

(a) If height of the object is 3 cm and height of the image formed is 9 cm, find magnification of the image. (2)

(b) Can you project the image on a screen? Justify your answer. (1)



Ans.a. magnification = 9/3 = +3

b. No. Because it is a virtual image

16.

16. You know that telescopes are used to observe very distant objects.

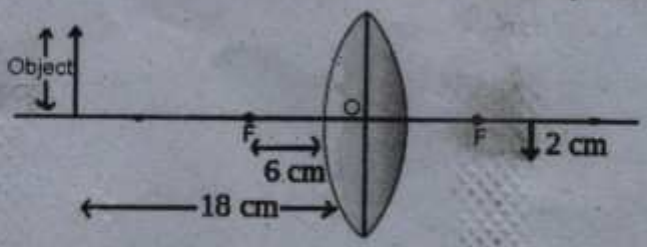
a) If your science lab has two convex lenses with focal lengths of 5 cm and 50 cm respectively, which lens would be used as the eyepiece to construct a telescope? (1)

b) Explain how a telescope forms the image of a very distant object. (2)

Ans.a. lens with focal length of 5 cm

b. The objective lens of the telescope forms a real, inverted, and diminished image of the distant object at its focus. The position of the eyepiece is adjusted so that this image lies between the optic centre and the principal focus of the eyepiece. This image acts as the object for the eyepiece, which then forms a magnified virtual image.

17. 17. The figure shows the formation of an image of an object placed beyond 2F of a convex lens. (Using the Cartesian sign convention, find the answers to the questions given below)



a) How far from the lens is the image formed? (2)

b) What is the height of the object? (1)

Ans.u = -18 cm f = 6 cm

v = uf/(u+f) = -18x6/(-18 + 6) = -18x6/-12 = 9 cm

hi/ho = v/u

-2/ho = 9/-18

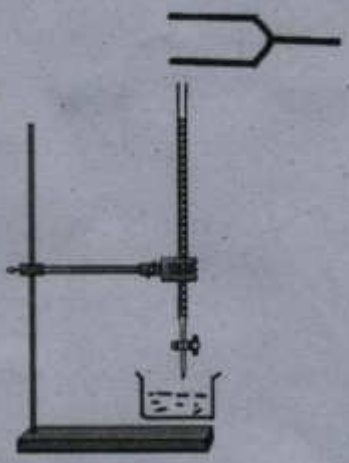
ho = -18x-2/9 = 4 cm

18A. 18. A. A burette full of water is fixed vertically on a stand. After opening the burette's tap, a tuning fork with a frequency of 512 Hz was excited and held at the top.

a) The loudness of the sound heard seemed to increase. What could be the reason for this? (1)

b) After some time, the sound was heard much louder, and then it decreased. What would be the vibration frequency of the air column inside when the sound was heard much louder? (1)

c) Some students opined that to hear the sound loudly again, a tuning fork with a lower frequency than the first one should be used, while other students suggested a tuning fork with a higher frequency. What is your opinion? Justify your answer. (1)



d. When the sound was heard much louder from inside the burette, another object nearby was seen to vibrate with a high amplitude. What would be the natural frequency of that object? (1)

Ans.a. Because of forced vibration, the air column also vibrates along with the tuning fork. The sound from both the sources are the reason for the increase of loudness.

b. 512 Hz

c. They have to use tuning fork of lower frequency. Because when the length of air column increases, its natural frequency decreases. To make resonance with this air column of lower frequency, the tuning fork with lower frequency is to be used.

d. The natural frequency of the object would be the frequency of the tuning fork.

18B

OR

18. B. A police officer working at a busy traffic signal point hears sounds of various frequencies. Some frequencies of the sound reaching him are given below:

28000 Hz, 5 Hz, 150 Hz, 1200 Hz, 500 Hz, 16000 Hz

a) Which frequencies of sound can the police officer hear? (1)

b) What is the range of sound audible to humans (audible range)? (1)

c) By what name is sound with a frequency lower than the human audible lower limit known? (1)

d) Write two uses of sound with a frequency higher than the human audible upper limit. (1)

Ans.a.150 Hz, 1200 Hz, 500 Hz, 16000 Hz

b. 20 Hz to 20000 Hz

c. Infrasonic sound

d. i. It is used in SONAR ii. To crush small stones in the kidneys.