

BOARD OF SECONDARY EDUCATION (TELANGANA)
SUMMATIVE ASSESSMENT – I
TENTH CLASS GENERAL SCIENCE
PHYSICAL SCIENCE MODEL PAPER
PAPER – I (ENGLISH VERSION)

Time: 2 hrs. 45 mins.

PART – A & B

Maximum Marks: 40

INSTRUCTIONS:

- i) In the time duration of 2 hrs. 45 mins., 15 minutes of time is allotted to read and understand the question paper.
- ii) Answer the questions under PART – A in separate answer book.
- iii) Write the answers to the questions under PART – B on the question paper itself and attach it to the answer book of PART – A.

Time: 2 hrs. 15 mins.

PART – A

Marks: 35

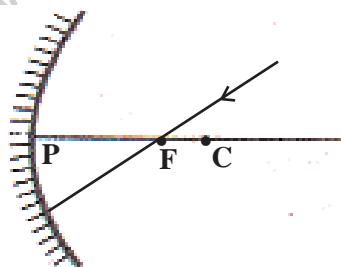
INSTRUCTIONS:

- i) PART – A comprises of three Sections I, II, III.
- ii) All the questions are compulsory.
- iii) There is no overall choice. However, there is an internal choice to the questions under Section – III.

SECTION – I

INSTRUCTIONS:

- i) Answer ALL the questions.
 - ii) Each question carries ONE Mark.
 - iii) Write the answers in 1 – 2 sentences. $7 \times 1 = 7$
1. If the radius of curvature of a spherical mirror is 28 cm. What is its focal length?
 2. $Cl_2 + NH_3 \longrightarrow N_2 + NH_4Cl$. Balance the chemical equation.
 3. The power of lens is +1.5 D. What kind of lens it is ?
 4. What is the change you observe in litmus paper with acid?
 5. Draw the structure of, NH_3 molecule?
 6. Draw the path of ray after reflection in diagram.



7. Which mirror has wider field of view?

SECTION – II

INSTRUCTIONS:

- i) Answer ALL the questions.
 ii) Each question carries TWO Marks.
 iii) Answer the questions in 4 – 5 sentences.

 $6 \times 2 = 12$

8. Compare the real and virtual images.
 9. What are the consequences occur when the spherical mirrors were not known to human beings?
 10. sigma (σ) bond is stronger than pi (π) bond. predict the reasons.
 11. Fill the following table with suitable answers.

Name of the element	Electron configuration	Group number	Name of the family of element	Block name	Period number

12. Draw a ray diagram shows a point sized image with Convex lens.
 13. What are the uses of Washing Soda?

SECTION – III

INSTRUCTIONS:

- i) Answer ALL the questions.
 ii) Each question carries FOUR Marks.
 iii) There is internal choice for each question, only one option from each question is to be attempted.
 iv) Answer each question in 8 to 10 sentences.

 $4 \times 4 = 16$

14. An object is placed at (i) 5 cm, (ii) 10 cm in front of a concave mirror of radius of curvature 15 cm. Find the position, nature and magnification of the image in each case.

(OR)

Write the common defects of vision and explain with diagrams. How can you correct these visual defects by using lens?

15. Explain the principles used to explain the electronic configuration with one example each.

(OR)

Write the formation of double bond and triple bond according to valence bond theory.

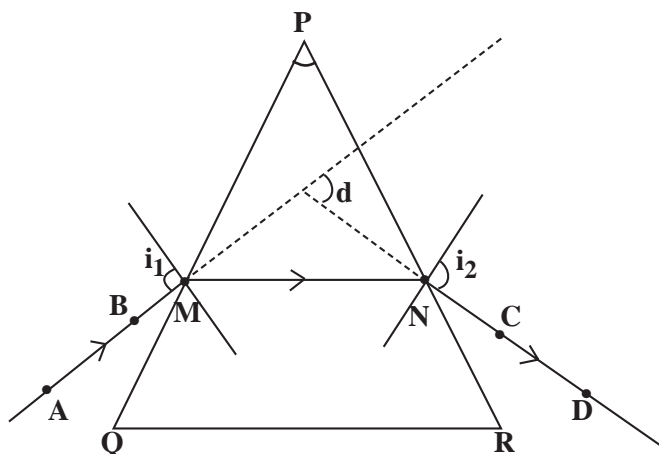
16. List out the apparatus required to find the focal length of a convex lens and describe the procedure to find the focal length?

(OR)

List out the materials used in an experiment to prove when acid reacts with metal evolves Hydrogen gas.

Describe the experimental process.

17.



The given above diagram shows that the light ray refracting the prism then answer the following questions.

- i) Identify the incident and emergent rays?
- ii) Where is angle of deviation? How do you find the angle of deviation?
- iii) If it is an equilateral prism what is the angle of prism?
- iv) What does the line ABMNCD indicate?

(OR)

Atomic sizes of few elements of 2nd period are given in the table. Observe the table and answer the questions given below.

Element of II period	F	B	Be	O	N	Li	C
Atomic Size	64	88	111	66	74	152	77

- i) Arrange the elements in increasing order of their atomic sizes.
- ii) Which is the element nearest to the electronic configuration of a noble gas in II period.
- iii) Which is the outermost orbit of all these elements?
- iv) Whose atomic size among Be and C is more?

INSTRUCTIONS:

- i) Answer ALL the questions.
- ii) Each question carries $\frac{1}{2}$ Mark.
- iii) Answers are to be written in question paper only.
- iv) Marks will not be awarded in any case of any over writing or rewriting or erased answers.
- v) Write the CAPITAL LETTER showing the correct answer for the following questions in the brackets provided against them. $10 \times \frac{1}{2} = 5$

18. If doctor advised to a person to use 2D (-ve) lens, What is its focal length and which type of lens is it? ()
- A) 50 cm, concave
B) 25 cm, concave
C) 50 cm, convex
D) 25 cm, convex
19. The angle of incidence for a ray of light passing through the centre of curvature of concave mirror is ()
- A) 0°
B) 45°
C) 90°
D) 180°
20. Convex lens is used in the making of microscope due to ()
- A) it gives diminished image.
B) it gives magnified, virtual image same side of the object.
C) it gives real image behind the screen.
D) it gives magnified image opposite side of the lens.
21. Select the correct balanced chemical equation of the following ()
- A) $C_3H_8 + 6 O_2 \longrightarrow 3 CO_2 + 4 H_2O$
B) $2 NaOH + 2 Zn \longrightarrow Na_2ZnO_2 + H_2$
C) $2 Na_2CO_3 + 2 HCl \longrightarrow 2 NaCl + CO_2 + H_2O$
D) $2 HCl + Zn \longrightarrow ZnCl_2 + H_2$
22. The molecule having covalent bond is ()
- A) NaCl
B) $AlCl_3$
C) $BeCl_2$
D) $MgCl_2$
23. Which of the following is against of Hund's rule? ()
- A) $\uparrow\downarrow$ \uparrow \uparrow \square
B) $\uparrow\downarrow$ $\uparrow\downarrow$ \uparrow \uparrow
C) $\uparrow\downarrow$ $\uparrow\downarrow$ \uparrow \square
D) $\uparrow\downarrow$ $\uparrow\downarrow$ $\uparrow\downarrow$ \uparrow
24. The colour of the flame of Strontium chloride ()
- A) Red
B) Blue
C) Green
D) Yellow
25. On dissolving acid or base in water, heat ()
- A) receives
B) produces
C) no change
D) depending on situation

26. The mirror used as a side mirror in a motor bike is ()
A) Convex mirror B) Concave mirror
C) Plane mirror D) None of these
27. The use of Chlorine is in ()
A) Water treatment B) CFC
C) Pesticides D) All the above

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ANSWERS

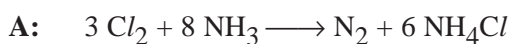
PART – A

SECTION – I

1. If the radius of curvature of a spherical mirror is 28 cm. What is its focal length?

A: $f = \frac{R}{2} = \frac{28}{2} = 14 \text{ cm.}$

2. $\text{Cl}_2 + \text{NH}_3 \longrightarrow \text{N}_2 + \text{NH}_4\text{Cl}$. Balance the chemical equation.



3. The power of lens is +1.5 D. What kind of lens it is?

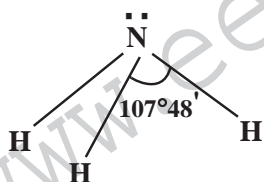
A: Convex lens.

4. What is the change you observe in litmus paper with acid?

A: In Acidic medium, blue litmus turns red and red litmus remains unchanged.

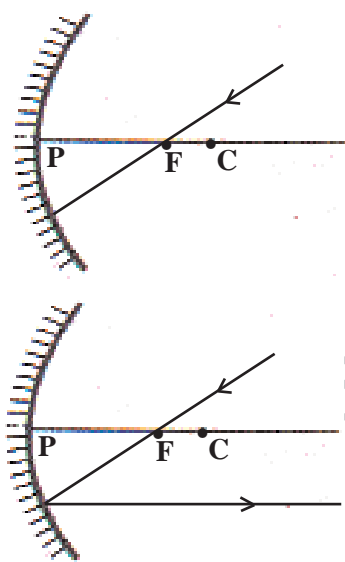
5. Draw the structure of NH_3 molecule?

A:



6. Draw the path of ray after reflection in diagram.

A:



7. Which mirror has wider field of view?

A: Convex mirror

SECTION – II

8. Compare the real and virtual images.

Real Image	Virtual image
i) The real image will always be formed on other side of the lens system.	i) The virtual image will always be formed towards the same side of the lens system.
ii) This can be caught on the screen.	ii) This can not be caught on the screen.
iii) This is always formed inverted with respect to the object.	iii) This is always formed erected with respect to the object.
iv) The distances of the real objects and real images are always taken as positive.	iv) The distances of the virtual objects and virtual images are always taken as negative.

9. What are the consequences occur when the spherical mirrors were not known to human beings?

- A:
- ★ It would be unsafe to drive cars, especially in the night.
 - ★ Automobile head lights, torch lights, search lights cannot given lighting for long distances.
 - ★ Dentists may not have proper diagnosis of teeth.
 - ★ Making of reflecting telescopes would not be possible.

10. Sigma (σ) bond is stronger than pi (π) bond. Predict the reasons.

A: If two atoms form multiple bonds between them the first bond is due to the overlap of orbitals along the inter nuclear axis giving a stronger sigma (σ) bond. After formation of σ bond the other bonds are formed due to the overlap of orbitals side wise or laterally giving weaker pi(π) bonds.

The σ bond is stronger because the electron pair shared is concentrated more between the two nuclei due to end-end or head on overlap and attracted to both the nuclei. The π bond overlap gives a weaker bond due to the lateral overlap of 'p' orbitals which is not to greater extent.

11. Fill the following table with suitable answers.

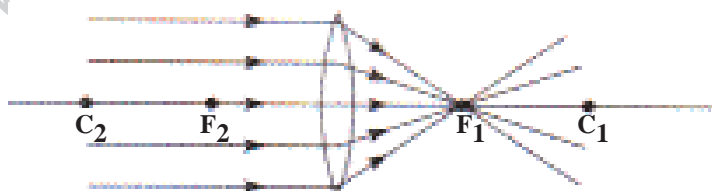
Name of the element	Electron configuration	Group number	Name of the family of element	Block name	Period number

A:

Name of the element	Electron configuration	Group number	Name of the family of element	Block name	Period number
Mg	$1s^2 2s^2 2p^6 3s^2$	2(IIA)	Alkali earth metal family	s-block	3
Al	$1s^2 2s^2 2p^6 3s^2 3p^1$	13 (III A)	Boron family	p-block	3

12. Draw a ray diagram shows a point sized image with Convex lens.

A:



13. What are the uses of Washing Soda?

- A: ★ Sodium carbonate (Washing Soda) is used in glass, soap and paper industries.
 ★ It is used in the manufacture of Sodium compounds such as Borax.
 ★ Sodium carbonate can be used as a cleaning agent for domestic purposes.
 ★ It is used for removing permanent hardness of water.

SECTION – III

14. An object is placed at i) 5 cm, ii) 10 cm in front of a concave mirror of radius of curvature 15 cm. Find the position, nature and magnification of the image in each case.

A: The focal length (f) = $\frac{-15}{2}$ cms = -7.5 cm.

i) The object distance u = -5 cm

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

$$\frac{1}{-7.5} = \frac{1}{v} + \frac{1}{(-5)}$$

$$-\frac{1}{7.5} = \frac{1}{v} - \frac{1}{5}$$

$$\frac{1}{v} = \frac{1}{5} - \frac{1}{7.5}$$

$$\frac{1}{v} = \frac{7.5 - 5}{5 \times 7.5}$$

$$\frac{1}{v} = \frac{2.5}{5 \times 7.5}$$

$$\frac{1}{v} = \frac{1}{5 \times 3}$$

$$\frac{1}{v} = \frac{1}{15}$$

$$\therefore v = 15 \text{ cm}$$

This image is formed at 15 cm behind the mirror. It is a virtual image.

$$\text{Magnification } m = \frac{-v}{u} = \frac{-15}{(-5)} = \frac{15}{5} = 3$$

The image is magnified, virtual and erected.

ii) The object distance u = -10

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

$$\frac{1}{-7.5} = \frac{1}{v} + \frac{1}{(-10)}$$

$$\frac{-1}{7.5} = \frac{1}{v} - \frac{1}{10}$$

$$\frac{1}{v} = \frac{1}{10} - \frac{1}{7.5}$$

$$\frac{1}{v} = \frac{7.5 - 10}{10 \times 7.5}$$

$$\frac{1}{v} = \frac{-2.5}{10 \times 7.5}$$

$$\frac{1}{v} = \frac{-1}{10 \times 3}$$

$$\frac{1}{v} = \frac{-1}{30}$$

$$v = -30 \text{ cm}$$

The image is 30 cm from the mirror on the same side as the object.

Also magnification

$$\begin{aligned} m &= -\frac{v}{u} = -\frac{-30}{(-10)} \\ &= \frac{-30}{10} \\ &= -3 \end{aligned}$$

The image is magnified, real and inverted.

(OR)

Q. Write the common defects of vision and explain with diagrams? How can you correct these visual defects by using lens?

A: Sometimes the eye may gradually lose its ability for accommodation. In such conditions the person cannot see an object clearly and comfortably. The vision becomes blurred due to defects of the eye lens. There are mainly three common defects of vision.

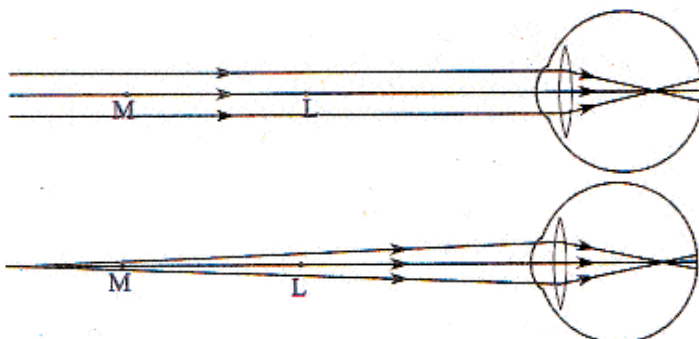
They are

- i) Myopia
- ii) Hyper metropia
- iii) Presbyopia

Myopia:

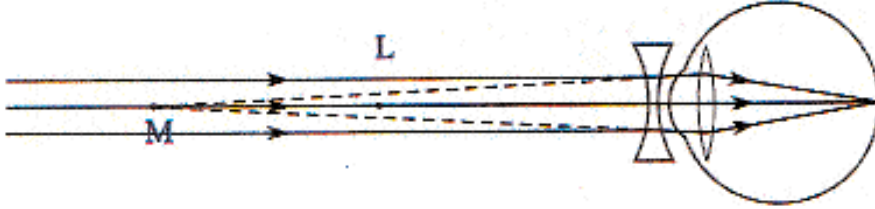
- ★ Some people cannot see objects at long distances but can see nearby objects clearly. This type of defect in vision is called **Myopia**.
- ★ For these people the maximum focal length is less than (<) 2.5 cm.
- ★ Image of distance objects forms before the retina.
- ★ The least distance of vision (L) is generally 25 cm.
- ★ M is a point of far vision to Myopia.

He/She can see the object in between L and M.



Correction Myopia:

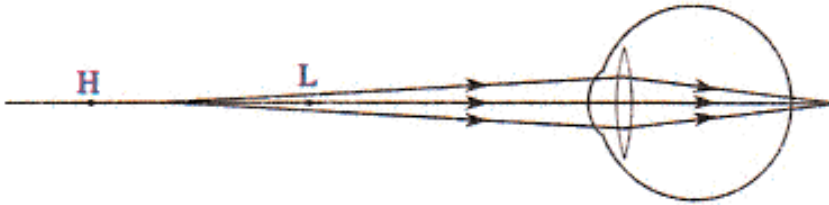
- ★ The eye lens can form clear on the retina when an object is placed between far point and least point (M and L) of distinct vision.
- ★ If we are able to bring the image of the object kept beyond far point, between the far point and the point of least distance of distinct vision using a lens, this image acts as an object for the eye lens.



- ★ This can be made possible only when concave lens is used.

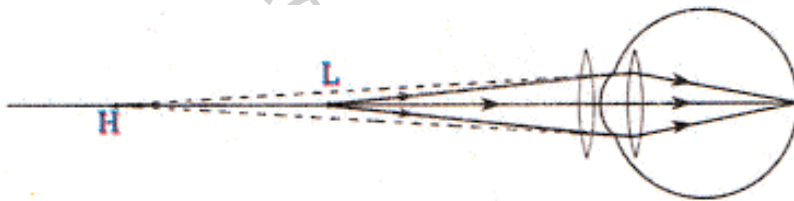
2) Hypermetropia:

- ★ A person with hypermetropia can see distant objects clearly but cannot see objects at near distances because the minimum focal length of eye lens for the person of hypermetropia is greater than 2.27 cm.
- ★ The image of object nearly forms beyond the retina.
- ★ If H is the near point and L is the point of least vision, then he can see the objects beyond the point H.



Correction of Hyper metropia:

- ★ Eye lens can form a clear image on the retina when any object is placed beyond near point.
- ★ To correct the defect of hypermetropia, we need to use a lens, which forms an image of an object beyond near point, when the object is between near point (H) and least distance of distinct vision (L).
- ★ This is possible only when a double convex lens is used.



Presbyopia:

- ★ Presbyopia is vision defect when the ability of accommodation of the eye usually decreases with ageing. For most people the near point gradually recedes away. They find it difficult to see near by objects clearly and distinctly.
- ★ This happens due to gradual weakening of ciliary muscles and diminishing flexibility of the eye lens. This effect can be seen in aged people.
- ★ Sometimes a person may suffer from both myopia and hypermetropia with ageing.

Correction of presbyopia:

- ★ To correct this type of defect of vision we need bifocal, lenses which are formed using both concave and convex lenses.
- ★ Its upper portion consists of the concave lens and lower portion consists of the convex lens.

15. Explain the principles used to explain the electronic configuration with one example each.

A: Pauli's Exclusion Principle:

No two electrons of the same atom can have all the four quantum numbers same.

e.g.: If n , l and m_l are the same for two electrons then m_s must be different. In the Helium atom the spins must be paired.

Electrons with paired spins are denoted by $\uparrow\downarrow$ one electron has $m_s = +\frac{1}{2}$ and the other has $m_s = -\frac{1}{2}$. They have anti parallel spins. So electronic configuration of Helium atom is $\boxed{\uparrow\downarrow}$

The set of four quantum numbers is

$1s^2$

	n	l	m_l	m_s
1 st electron	1	0	0	$+\frac{1}{2}$
2 nd electron	1	0	0	$-\frac{1}{2}$

Aufbau principle:

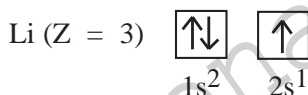
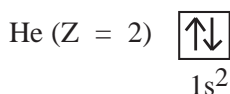
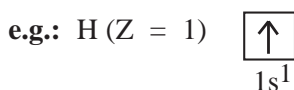
In the ground state the electronic configuration can be build up by placing electrons in the lowest available orbitals until the total number of electrons added is equal to the atomic number. This is called Aufbau principle.

Thus orbitals are filled in the order of increasing energy. Electrons are assigned to orbitals in order of increasing value of $(n + l)$

For Sub-shells with the same value of $(n + l)$, electrons are assigned first to the sub-shell with lower n .

Ascending order of energies of various atomic orbitals is given below.

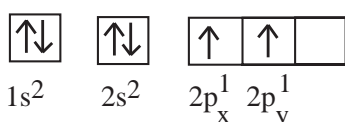
$$1s < 2s < 2p < 3s < 3p < 4s < 3d < 4p < 5s < 4d < 5p < 6s \dots\dots\dots$$



Hunds Rule:

Electron pairing in orbitals starts only when all empty orbitals of the same energy (degenerate orbitals) are singly occupied.

e.g.: The configuration of Carbon atom ($Z = 6$) is $1s^2 2s^2 2p^2$. The first four electrons go into 1s and 2s orbitals. The next two electrons go into separate 2p orbitals with both electrons having the same spin.

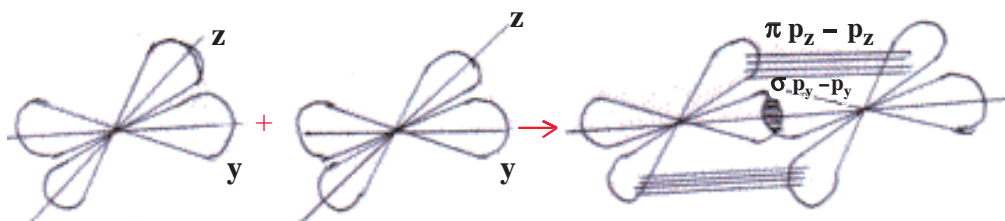


(OR)

Q. Write the formation of double bond and triple bond according to valence bond theory.

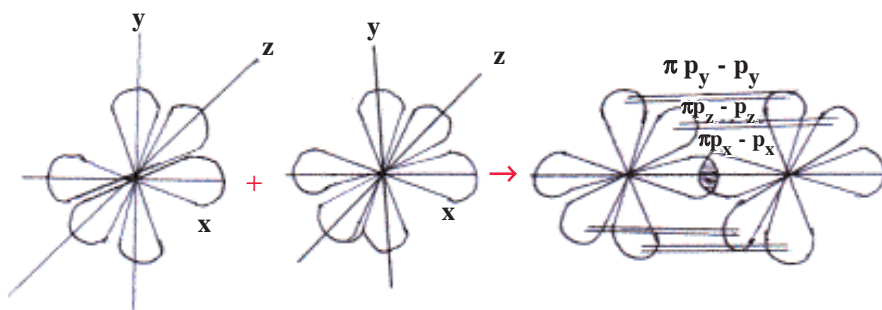
A: i) **Formation of double bond (Formation of O₂ molecule):**

${}_8\text{O}$ has electronic configuration $1s^2 2s^2 2p_x^2 2p_y^1 2p_z^1$. If the p_y orbital of one O atom overlaps the p_y of other O atom along the inter nuclear axis, a Sigma $p_y - p_y$ bond ($\sigma p_y - p_y$) is formed. p_z orbital of one O atom overlaps the p_z orbital of other O atom laterally, perpendicular to the inter nuclear axis giving a $\pi p_z - p_z$ bond. O₂ molecule has a double bond between two Oxygen atoms.



ii) **Formation of triple bond (Formation of N₂ molecule):**

${}_7\text{N}$ has electronic configuration $1s^2 2s^2 2p_x^1 2p_y^1, 2p_z^1$. Suppose that p_x orbital of one N atom overlaps the p_x orbital of the other N atom giving $\sigma p_x - p_x$ bond along the inter nuclear axis. The p_y and p_z orbitals of one N atom overlaps the p_y and p_z orbital of other N atom laterally, respectively perpendicular to inter nuclear axis giving $\pi p_y - p_y$ and $\pi p_z - p_z$ bonds. Therefore, N₂ molecule has a triple bond between two Nitrogen atoms.



16. List out the apparatus required to find the focal length of a convex lens and describe the procedure to find the focal length.

A: **Aim:** To determine the focal length of a convex lens.

Apparatus: Convex lens, Meter scales, V – stand, Screen, Candle.

Procedure:

- ★ Place the convex lens on a V – stand.
- ★ Light a candle and take it far away from the lens along the principal axis.
- ★ Adjust the screen on the other side of the lens to get a clear image on it.
- ★ Measure the distance between the V – stand and the screen. It gives the value of image distance.

u – v method (Displacement method):

- ★ Now place The candle at a distance of 60 cm from the lens, such that the flame of the candle lies along the principle axis of the lens.
- ★ Adjust the screen to get a clear image and measure the values of object distance (u) and image distance (v) and note them in a table.
- ★ Repeat the above step for various distances like 50 cm, 40 cm, 30 cm etc. Measure the image distance corresponding to each position of the object, and note the values in table.

S.No.	Object distance (u)	Image distance (v)	Focal Length $\left(f = \frac{uv}{u+v}\right)$

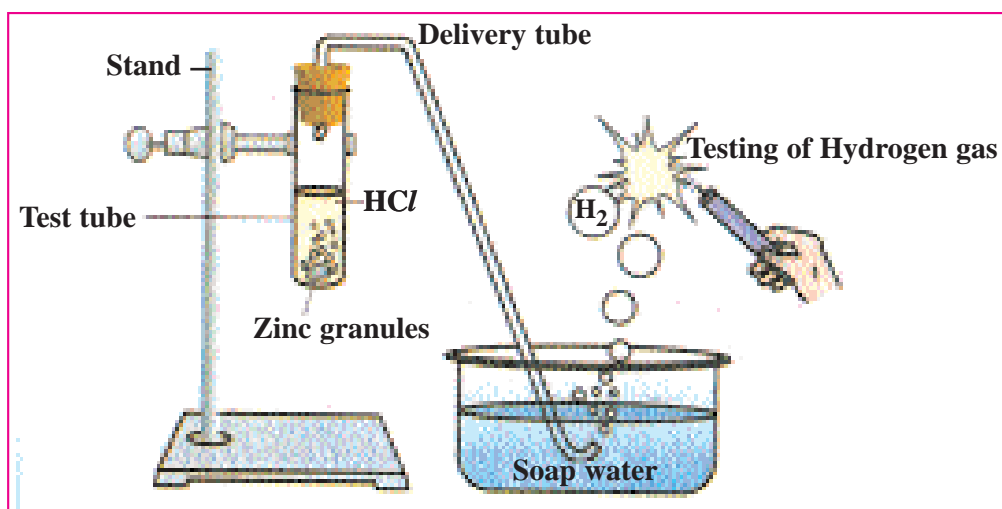
- ★ Calculate the focal length for each case, we find that the focal length remains constant for a given lens.

(OR)

Q: List out the materials used in an experiment to prove when acid reacts with metal evolves Hydrogen gas. Describe the experimental process.

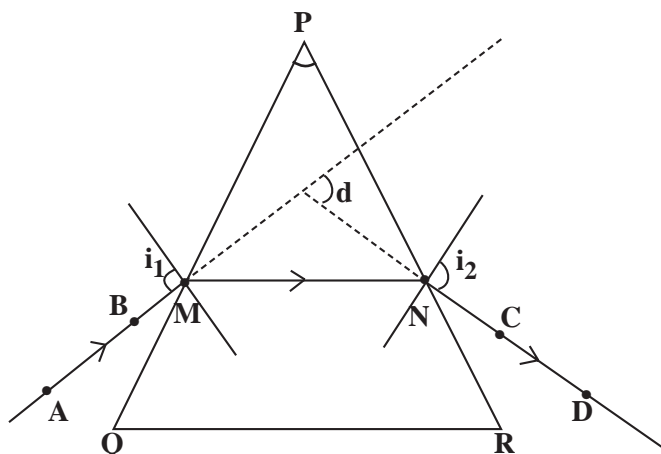
A: **Materials required:** Test tube, delivery tube, glass trough, candle, soap water, dil. HCl, Zinc granules and stand.

Procedure:



- ★ Set the apparatus as shown in figure.
 - ★ Take about 10 ml of dilute HCl in a test tube and add a few Zinc granules to it.
 - ★ We observe a gas is evolved from the Zinc granules.
 - ★ Pass the gas being evolved through the soap water.
 - ★ We observe some bubbles formed in the soap, solution.
 - ★ Bring a burning candle near the gas filled bubble.
 - ★ The candle turn of with a pop sound.
 - ★ The pop sound indicates that the gas evolved Hydrogen.
- $$2 \text{HCl} + \text{Zn} \longrightarrow \text{ZnCl}_2 + \text{H}_2 \uparrow$$
- Acid + Metal \longrightarrow Salt + Hydrogen
- ★ Repeat this experiment with H₂SO₄, HNO₃ etc.
 - ★ From the above experiment, we conclude that Hydrogen gas is produced when acid reacts with metals.

17.



The given above diagram shows that the light ray reflecting the prism then answer the following questions.

- i) Identify the incident and emergent rays.
- ii) Where is angle of deviation? How do you find the angle of deviation?
- iii) If it is an equilateral prism what is the angle of prism?
- iv) What does the line ABMNCD indicate?

- A:**
- i) AB is the incident ray and CD is the emergent ray.
 - ii) Angle of deviation is 'd'. Extend both incident and emergent rays till they meet at a point 'O'. The angle in between of these two rays is angle of deviation.
 - iii) 60°
 - iv) The path of light ray.

(OR)

Q: Atomic sizes of few elements of 2nd period are given in the table. Observe the table and answer the questions given below.

Element of II period	F	B	Be	O	N	Li	C
Atomic Size	64	88	111	66	74	152	77

- i) Arrange the elements in increasing order of their atomic sizes.
- ii) Which is the element nearest to the electronic configuration of a noble gas in II period.
- iii) Which is the outermost orbit of all these elements?
- iv) Whose atomic size among Be and C is more?

- A:**
- i) F, O, N, C, B, Be, Li
 - ii) Li, F
 - iii) L – Shell
 - iv) Be

PART – B

ANSWERS

18-A; 19-C; 20-B; 21-D; 22-C; 23-C; 24-A; 25-B; 26-A; 27-D.

Writer: K. Gagan Kumar