

Holidays Home work for Class X

Science

Army public school Dagshai

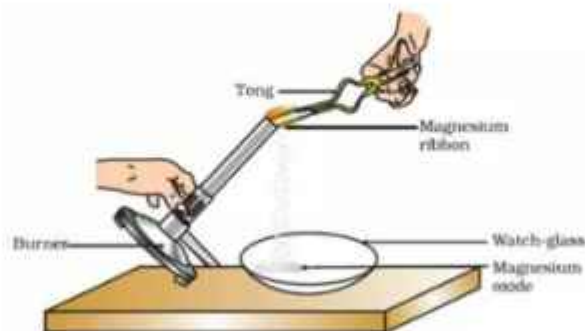
X SCIENCE

CH 1-CHEMICAL REACTIONS AND EQUATIONS

Q. NO QUESTION

MCQ s 1 MARK EACH

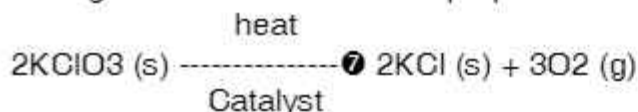
1. Which of the following is reaction shown in the



correct observation of the following set up?

- Brown powder of Magnesium oxide is formed
- Colourless gas which turns lime water milky is evolved
- Magnesium ribbon burns with brilliant white light
- Reddish brown gas with a smell of burning Sulphur has evolved.

2. The following reaction is used for the preparation of oxygen gas in the laboratory



- Which of the following statement is/are correct about correct about the reaction?
- It is a decomposition reaction and endothermic in nature
 - It is a combination reaction
 - It is a decomposition reaction and accompanied by release of heat
 - It is a photochemical decomposition reaction and exothermic in nature

3. Which of the following is not a physical change?

- Boiling of water to give water vapour
- Melting of ice to give water
- Dissolution of salt in water
- Combustion of Liquified Petroleum Gas (LPG)

4. A powdered salt (X) in a dry test tube was heated that evolves brown fumes of nitrogen dioxide and a yellow residue of lead oxide is also formed. The salt (X) is
- MgCO_3
 - $\text{Pb}(\text{NO}_3)_2$

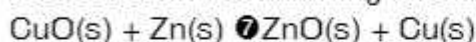
- $(\text{NH}_4)_2\text{SO}_4$
- CaCO_3

5. Solid Calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following is (are) true about slaking of lime and the solution formed?
- It is an endothermic reaction
 - It is an exothermic reaction
 - The pH of the resulting solution will be more than 7
 - The pH of the resulting solution will be less than 7
- i. and ii
 - ii and iii
 - i and iv
 - iii and iv

6. A person added aluminium metal to colourless solution of zinc sulphate. After half an hour, the solution was observed. It was colourless. She recorded her observations in the following statements:
- No reaction occurred
 - Reaction occurred and aluminium sulphate was formed
 - Zinc is more reactive than aluminium
 - Aluminium is more reactive than zinc
- The correct observations are:
- i and ii
 - ii and iii
 - iii and iv
 - ii and iv

7. Directions: (Q. No.'s 7-10) In each of the following questions, a statement of Assertion is given by the corresponding statement of Reason. Of the statements mark the correct answer as:
- Both Assertion and Reasons are true and reason is the correct explanation of Assertion.
 - Both Assertions and Reasons are true, but Reason is not the correct explanation of Assertion.
 - Assertion is true, but Reason is false
 - Assertion is false, but Reason is true

Assertion: In the following chemical equation,



Zinc is getting oxidized and copper oxide is getting reduced

Reason: The process in which oxygen is added to a substance is called oxidation whereas the process in which oxygen is removed from a substance is called reduction.

8. **Assertion:** Photosynthesis is considered as an endothermic reaction **Reason:** Energy gets released in the process of photosynthesis
9. **Assertion:** On adding a solution of Sodium sulphate to the solution of Barium Chloride, Barium sulphate and Sodium Chloride are formed as products. **Reason:** Such kind of reactions are called Decomposition reaction.
10. **Assertion:** When copper oxide is added to dilute hydrochloric acid, the colour of the solution becomes blue-green **Reason:** Blue-green colour of the solution is due to the formation of copper (II)chloride

11.	Endothermic reaction requires energy in the form of a.heat b.light c. Electric d.All of these
12.	Write Some characteristics of chemical reaction a. Change in colour b. Change in temperature c. Evolution of gas & formation of ppt d. All of these
13.	$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$ The above reaction is a /an a. Displacement reaction b. Endothermic reaction c. Exothermic reaction d. Neutralization reaction
14.	A teacher gave two test tubes to the Students One contains water and the other contains NaOH. She asked them to identify the test tube containing NaOH solution. Which one of the can be used for identifying a. Blue litmus b. Red litmus c. Sodium carbonate solution d. Dilute HCl
15.	In rusting of iron the reddish brown coating formed on iron is a. FeO b. Fe ₃ O ₄ c. Fe ₂ O ₃ d. FeO ₂
16.	Respiration is an _____ reaction a. Endothermic b. oxidation c. precipitate d. None
17.	Which option denotes a double displacement reaction? a. $A + B \rightarrow C$ b. $A + B \rightarrow C$ c. $AC + BD \rightarrow AD + BC$ $AC + B \rightarrow AB + C$
18.	Sublimation of solid ammonium chloride is a a. chemical change b. Physical change c. Both d. All of these
19.	$Mg + 2HCl \rightarrow MgCl_2 + \text{---}$ a. N ₂ b. O ₂ c. Br ₂ H ₂

20. Heating sugar is a
- decomposition reaction
 - Displacement reaction
 - Double displacement reaction
 - Combination reaction

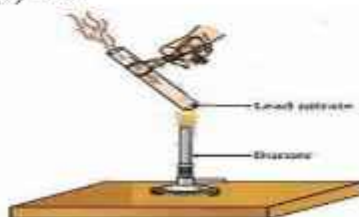
21. Magnesium ribbon burns with a dazzling white flame and changes into a white powder. What is the chemical name of this powder and when mix with water, it turns?

- MgO, turns blue litmus red.
- MgO, turns red litmus blue.
- MgO₂, turns red litmus blue.
- Mg₂O, turns blue litmus red.

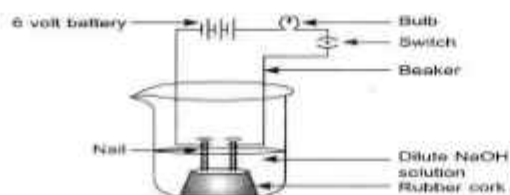


22. When lead nitrate powder heated in a test tube brown fumes emitted which is

- O₂
- N₂O
- NO
- NO₂



23. The apparatus given in the adjoining figure was set up to demonstrate electrical conductivity.



Which of the following statement(s) is (are) correct?

- Bulb will not glow because electrolyte is not acidic.
- Bulb will glow because HCl is a strong acid and furnishes ions for conduction.
- Bulb will not glow because circuit is incomplete.
- Bulb will not glow because it depends upon the type of Electrolytic solution.

- (i) and (iii)
- (ii) and (iv)
- (ii) only
- (iv) only

24. Which of the following processes involve in chemical reactions?

- Storing of Oxygen gas under pressure in a gas cylinder.
- Liquefaction of air.
- Keeping petrol in a china dish in the open.
- Heating copper wire in presence of air at high temperature.

25. Which among the following is(are) double displacement reaction(s)?



Hindi :

अनौपचारिक पत्र लेखन , कोई तीन

अनुच्छेद लेखन , कोई तीन

समास का अभ्यास कार्य , वाक्य विचार का अभ्यास

MATHEMATICS
CLASS X

SOLVE THE GIVEN QUESTIONS AND THEN FILL IN THE BLANK :

Question 1

If one of the zeroes of the quadratic polynomial $(k - 1)x^2 + kx + 1$ is -3, then the value of k is _____

Question 2

A quadratic polynomial, whose zeroes are -3 and 4, is _____

Question 3

If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3, then $a =$ _____ and $b =$ _____

Question 4

If a pair of linear equations is consistent, then the lines will be _____

Question 5

Aruna has only ₹1 and ₹2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is ₹75, then the number of ₹1 and ₹2 coins are, respectively _____

Question 6

The father's age is six times his son's age. Four years hence, the age of the father will be four times his son's age. The present ages, in years of the son and the father are, respectively _____

Question 7

Values of k for which the quadratic equation $2x^2$

$-kx + k = 0$ has equal roots is

Question 8

In an AP, if $d = -4$, $n = 7$, $a_n = 4$, then a is equal to _____

Question 9

In an AP, if $a = 3.5$, $d = 0$, $n = 101$, then a_n will be _____

Question 10

The first four terms of an AP, whose first term is -2 and the common difference is -2 , are _____

Question 11.

Two APs have the same common difference. The first term of one of these is -1 and that of the other is -8 . Then the difference between their 4th terms is _____

Question 12.

If 7 times the 7th term of an AP is equal to 11 times its 11th term, then its 18th term will be _____

Question 13.

The 4th term from the end of the AP: $-11, -8, -5, 49$ is _____

Question 14

If the first term of an AP is -5 and the common difference is 2 , then the sum of the first 6 terms is _____

Question 15.

In an AP if $a = 1$, $a_n = 20$ and $S_n = 399$, then n is _____

TICK THE CORRECT OPTION :

Question 1

If the zeroes of the quadratic polynomial $ax^2 + bx + c$, $c \neq 0$ are equal, then

- (A) c and a have opposite signs
- (B) c and b have opposite signs
- (C) c and a have the same sign
- (D) c and b have the same sign

Question 2

If one of the zeroes of a quadratic polynomial of the form $x^2 + ax + b$ is the negative of the other, then it

- (A) has no linear term and the constant term is negative.
- (B) has no linear term and the constant term is positive.
- (C) can have a linear term but the constant term is negative.
- (D) can have a linear term but the constant term is positive.

Question 3

The value of c for which the pair of equations $cx - y = 2$ and $6x - 2y = 3$ will have infinitely many solutions is

- (A) 3
- (B) -3
- (B) -12
- (D) no value

Question 4

A pair of linear equations which has a unique solution $x = 2$ and $y = -3$ is

- (A) $x + y = -1$ and $2x - 3y = -5$
- (B) $2x + 5y = -11$ and $4x + 10y = -22$
- (C) $2x - y = 1$ and $3x + 2y = 0$
- (D) $x - 4y - 14 = 0$ and $5x - y - 13 = 0$

Question 5

The famous mathematician associated with finding the sum of the first 100 natural numbers is

- (A) Pythagoras
- (B) Newton
- (C) Gauss
- (D) Euclid

TRUE OR FALSE :

Question

Are the following statements 'True' or 'False'? Justify your answers.

- (i) If the zeroes of a quadratic polynomial $ax^2 + bx + c$ are both positive, then a , b and c all have the same sign.
- (ii) If the graph of a polynomial intersects the x -axis at only one point, it cannot be a quadratic polynomial.
- (iii) If the graph of a polynomial intersects the x -axis at exactly two points, it need not be a quadratic polynomial.
- (iv) If two of the zeroes of a cubic polynomial are zero, then it does not have linear and constant terms.
- (v) If all the zeroes of a cubic polynomial are negative, then all the coefficients and the constant term of the polynomial have the same sign.
- (vi) If all three zeroes of a cubic polynomial $x^3 + ax^2 - bx + c$ are positive, then at least one of a , b and c is non-negative.
- (vii) The only value of k for which the quadratic polynomial $kx^2 + x + k$ has equal zeroes is $1/2$.

SOLVE THE FOLLOWING QUESTIONS:

Question 1

For each of the following, find a quadratic polynomial whose sum and product respectively of the zeroes are as given. Also find the zeroes of these polynomials by factorisation.

Question 2

Find k so that $x^2 + 2x + k$ is a factor of $2x^4 + x^3 - 14x^2 + 5x + 6$. Also find all the zeroes of the two polynomials.

Question 3

Do the following pair of linear equations have no solution? Justify your answer.

(i) $2x + 4y = 3$; $12y + 6x = 6$

(ii) $x = 2y$; $y = 2x$

Question 4

Do the following equations represent a pair of coincident lines? Justify your answer.

(i) $3x + \frac{1}{7}y = 3$; $7x + 3y = 7$

(ii) $-2x - 3y = 1$; $6y + 4x = -2$

Question 5

For which values(s) of λ , do the pair of linear equations $\lambda x + y = \lambda^2$ and $x + \lambda y = 1$ have

(i) no solution ?

(ii) infinitely many solutions ?

(iii) a unique solution ?

Question 6

The age of the father is twice the sum of the ages of his two children. After 20 years, his age will be equal to the sum of the ages of his children. Find the age of the father.

Question 7

There are some students in the two examination halls A and B. To make the number of students equal in each hall, 10 students are sent from A to B. But if 20 students are sent from B to A, the number of students in A becomes double the number of students in B. Find the number of students in the two halls.

Question 8

A shopkeeper gives books on rent for reading. She takes a fixed charge for the first two days, and an additional charge for each day thereafter. Latika paid ₹22 for a book kept for six days, while Anand paid ₹16 for the book kept for four days. Find the fixed charges and the charge for each extra day.

Question 9

The cost of 4 pens and 4 pencils boxes is ₹100. Three times the cost of a pen is ₹15 more than the cost of a pencil box. Form the pair of linear equations for the above situation. Find the cost of a pen and a pencil box.

Question 10

Ankita travels 14 km to her home partly by rickshaw and partly by bus. She takes half an hour, if she travels 2 km by rickshaw, and the remaining distance by bus. On the other hand, if she travels 4 km by rickshaw and the remaining distance by bus, she takes 9 minutes longer. Find the speed of the rickshaw and of the bus.

Question 11

A person, rowing at the rate of 5 km/h in still water, takes thrice as much time in going 40 km upstream as in going 40 km downstream. Find the speed of the stream.

Question 12

A two-digit number is obtained by either multiplying the sum of the digits by 8 and then subtracting 5 or by multiplying the difference of the digits by 16 and then adding

3. Find the number.

Question 13

A shopkeeper sells a saree at 8% profit and a sweater at 10% discount, thereby, getting a sum ₹1008. If she had sold the saree at 10% profit and the sweater at 8% discount, she would have got ₹1028. Find the cost price of the saree and the list price (price before discount) of the sweater.

Question 14

Vijay had some bananas, and he divided them into two lots A and B. He sold the first lot at the rate of ₹ 2 for 3 bananas and the second lot at the rate of ₹ 1 per banana, and got a total of ₹ 400. If he had sold the first lot at the rate of ₹1 per banana and the second lot at the rate of ₹ 4 for 5 bananas, his total collection would have been ₹ 460. Find the total number of bananas he had.

Question 15

Question 16

At present Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age, Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.

Question 17

Find the sum of all the 11 terms of an AP whose middle most term is 30.

Question 18

Find the sum of first seven numbers which are multiples of 2 as well as of 9.

Question 19

How many terms of the AP: -15, -13, -11, — are needed to make the sum -55?

Explain the reason for double answer.

Question 20

Kanika was given her pocket money on Jan 1st, 2008. She puts ₹ 1 on Day 1, ₹ 2 on Day 2, ₹ 3 on Day 3, and continued doing so till the end of the month, from this money into her piggy bank. She also spent ₹ 204 of her pocket money and found that at the end of the month she still had ₹ 100 with her. How much was her pocket

Social Science : CIVICS

Holidays Home work

Class : - X

Subject:- Civics

Complete the Question/Answers of Chapter (1) Power Sharing.

• Revise Chapter (1) Power Sharing

ARMY PUBLIC SCHOOL DAGSHAI

CLASS-10TH SCIENCES(BIO)

HOLIDAYS HOMEWORK

(Attempt any 20)

1. The process by which cells obtain energy from glucose is called:

- a) Respiration
- b) Digestion
- c) Absorption
- d) Circulation

2. Which of the following organs is responsible for removing waste products from the body?

- a) Liver
- b) Kidney
- c) Heart
- d) Lungs

3. Which of the following is NOT a type of blood vessel?

- a) Artery
- b) Vein
- c) Capillary
- e) Tendon

4. Which of the following is the correct pathway of urine in the excretory system?

a) Kidney -
Ureter →

Bladder →
Urethra →
Outside the body

b) Bladder →
urethra →
kidney →
ureter →
outside the body

c) Kidney →
bladder →
urethra →
ureter →
outside the body

d) Urethra →
Bladder →
Kidney →
Ureter →
Outside the body

5. Proteins after digestion are converted into

- I. Carbohydrates
- II. Small globules

III. Amino acids

IV. starch

6. Lipase acts on

I. Amino acids

II. Fats

III. Carbohydrates

IV. All of these

7. Blood consist of what fluid medium?

I. Lymph

II. Platelets

III. Plasma

IV. All of these

8. Out of the following choices, select the option that is not a life process.

a) Respiration

b) Digestion

c) Reproduction

d) Reflection

9. Which of the following is the primary site of photosynthesis in a plant cell

a) Mitochondria

b) Nucleus

c) Chloroplast

d) Golgi apparatus

10. Which of the following organisms does not show parasitic mode of nutrition?

(a) Cuscuta

(b) Ticks

© Orchids

(d) Paramecium

11. The respiratory pigment haemoglobin has a very high affinity for which gas?

(a) Carbon dioxide

(b) Oxygen

© Carbon monoxide

(d) Nitrogen

12. Which of the following has no muscular walls?

(a) Artery

(b) Arteriole

© Capillary

(d) Both (b) and (c)

13. Bicuspid valve is present between

(a) left atrium and left ventricle

(b) right atrium and right ventricle

© pulmonary artery and right ventricle

(d) aorta and left ventricle.

14. Translocation of solutes primarily takes place through

(a) phloem

- (b) cortex
- © xylem
- (d) pith.

15. Desert plants take up which gas at night and prepare an intermediate which is acted upon by the energy absorbed during day?

- (a) Oxygen
- (b) Carbon dioxide
- © Carbon monoxide
- (d) Nitrogen

16. Which of the following statements about autotrophs is incorrect?

- A) They synthesize carbohydrates by using carbon dioxide, water in presence of sunlight and chlorophyll
- B) They store carbohydrates in form of starch
- C) They convert carbon dioxide and water into carbohydrates in the absence of sunlight
- D) They form the first trophic level in the food chain

17. Select the correct statement –

- A) Heterotrophs make their food
- B) Heterotrophs utilize solar energy to make food
- C) Heterotrophs do not make their own food
- D) Heterotrophs are capable of converting carbon dioxide and water into carbohydrates

18. Which part of the alimentary canal receives bile from the liver –

- A) stomach
- B) small intestine
- C) large intestine
- D) oesophagus

19. Choose the function of pancreatic juice from the following :

- A) Trypsin digests proteins and lipase digests carbohydrates
- B) Trypsin digests emulsified fats and lipase digests proteins
- C) Trypsin and lipase digest fats
- D) Trypsin digests proteins and lipase digests emulsified fats

20. The correct sequence of anaerobic respiration –

- A) Glucose → pyruvate → lactic acid
- B) Glucose → Pyruvate → Ethanol + Carbon-Dioxide
- C) glucose → pyruvate → ADP → lactic acid
- D) glucose → pyruvate → carbon dioxide + ethanol + energy

21. The opening and closing of stomatal pore depends upon ____.

- A) Oxygen
- B) Guard Cells
- C) concentration of carbon dioxide in stomata
- D) temperature

22. Which of the following components of food is digested by s. amylase?

- A) proteins
- B) fats
- C) Minerals
- D) carbohydrates

23. The cellular energy reserves in autotrophs are _____.

- A) glycogen
- B) starch
- C) protein
- D) fatty acids

24. The breakdown of pyruvate into carbon dioxide, energy and water takes place in _____.

- A) mitochondria
- B) cytoplasm
- C) Endoplasmic reticulum
- D) ribosomes

25. Write the correct sequence of air passage involved in inhalation?

- A) larynx → Nostrils → Pharynx → lungs
- B) nostrils → Pharynx → larynx → Trachea → alveoli
- C) nasal passage → larynx → Trachea → Pharynx → Alveoli
- D) None

26. What prevents back flow of blood during contraction?

- A) Valves in heart
- B) Thick muscular walls of ventricles
- C) Thin walls of atria
- D) All

27. During deficiency of oxygen in tissues of humans, pyruvic acid is converted into lactic acid in _____.

- A) Cytoplasm
- B) chloroplast
- C) mitochondria
- D) golgi body

28. Xylem helps in _____.

- A) transportation of water
- B) translocation of food
- C) both a and b
- D) transportation of water and minerals

29. What is the approximate length of an alimentary canal?

- A) 3m
- B) 4m
- C) 5m
- D) 9m

30. Which respiration is much efficient?

- A) aerobic
- B) anaerobic
- C) both are equal
- D) none

31. Write full form of ATP.

- A) adenosine diphosphate
- B) adenosine phosphate
- C) adenosine triphosphate
- D) none

32. Which of the following statement(s) is (are) true about respiration?

- A) During inhalation, ribs move inward and the diaphragm is raised
- B) In the alveoli, exchange of gases takes place i.e., oxygen from alveolar air diffuses into blood and carbon dioxide from blood into alveolar air sacs
- C) Haemoglobin has greater affinity for carbon dioxide than oxygen. Alveoli does not help in increasing surface area for exchange of gases
- D) None

33. Choose the correct statement that describes arteries:

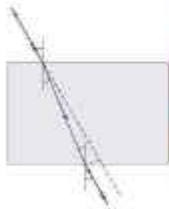
- A) They have thick elastic walls, blood flows under high pressure; collect blood from different organs and bring it back to the heart
- B) They have thin walls with valves inside, blood flows under low pressure and carry blood away from the heart to various organs of the body
- C) They have thick elastic walls, blood flows under low pressure; carry blood from the heart to various organs of the body
- D) They have thick elastic walls without valves inside. The Blood flows under high pressure and carry blood away from the heart to different parts of the body

34. Oxygen released during photosynthesis comes from _____.

- A) water
- B) Chlorophyll
- C) carbon dioxide
- D) glucose

35. Which process converts light energy to chemical energy ?

- A) Respiration
- B) photosynthesis
- C) transpiration
- D) transportation of water and minerals



CHAPTER 10

Light – Reflection and Refraction

Multiple Choice Questions

- Which of the following can make a parallel beam of light when light from a point source is incident on it?
 - Concave mirror as well as convex lens
 - Convex mirror as well as concave lens
 - Two plane mirrors placed at 90° to each other
 - Concave mirror as well as concave lens
- A 10 mm long awl pin is placed vertically in front of a concave mirror. A 5 mm long image of the awl pin is formed at 30 cm in front of the mirror. The focal length of this mirror is
 - 30 cm
 - 20 cm
 - 40 cm
 - 60 cm
- Under which of the following conditions a concave mirror can form an image larger than the actual object?
 - When the object is kept at a distance equal to its radius of curvature
 - When object is kept at a distance less than its focal length
 - When object is placed between the focus and centre of curvature
 - When object is kept at a distance greater than its radius of curvature
- Figure 10.1 shows a ray of light as it travels from medium A to medium B. Refractive index of the medium B relative to medium A is

(a) $\sqrt{3}/\sqrt{2}$

(b) $\sqrt{2}/\sqrt{3}$

(c) $1/\sqrt{2}$

(d) $\sqrt{2}$

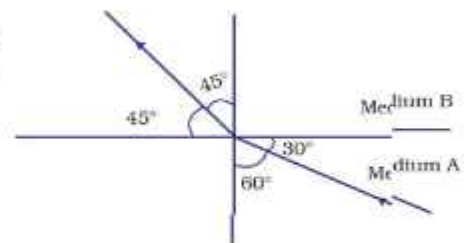


Fig. 10.1

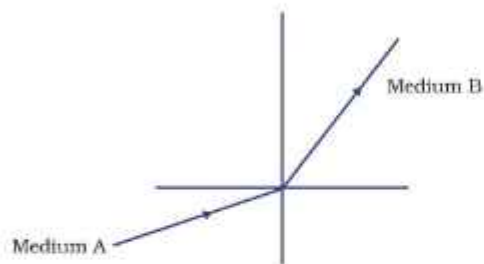


Fig. 10.2

5. A light ray enters from medium A to medium B as shown in Figure 10.2. The refractive index of medium B relative to A will be
- greater than unity
 - less than unity
 - equal to unity
 - zero

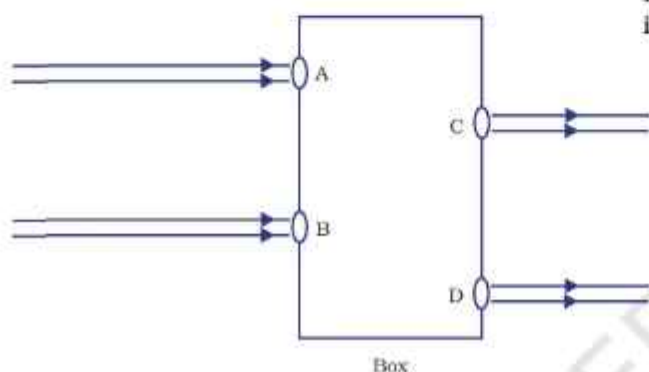


Fig. 10.3

- A rectangular glass slab
- A convex lens
- A concave lens
- A prism

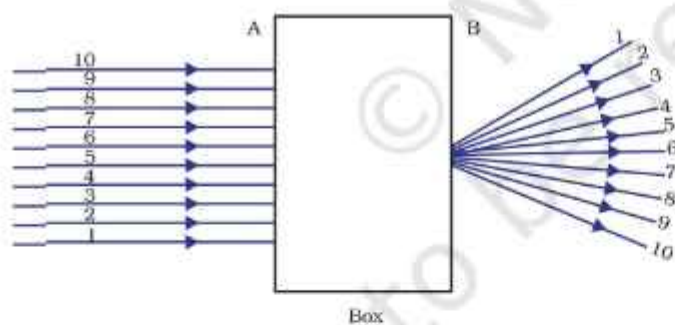


Fig. 10.4

7. A beam of light is incident through the holes on side A and emerges out of the holes on the other face of the box as shown in the Figure 10.4. Which of the following could be inside the box?
- Concave lens
 - Rectangular glass slab
 - Prism
 - Convex lens

8. Which of the following statements is true?

- A convex lens has 4 dioptre power having a focal length 0.25 m
- A convex lens has -4 dioptre power having a focal length 0.25 m
- A concave lens has 4 dioptre power having a focal length 0.25 m
- A concave lens has -4 dioptre power having a focal length 0.25 m

9. Magnification produced by a rear view mirror fitted in vehicles
- is less than one
 - is more than one
 - is equal to one
 - can be more than or less than one depending upon the position of the object in front of it
10. Rays from Sun converge at a point 15 cm in front of a concave mirror. Where should an object be placed so that size of its image is equal to the size of the object?
- 15 cm in front of the mirror
 - 30 cm in front of the mirror
 - between 15 cm and 30 cm in front of the mirror
 - more than 30 cm in front of the mirror
11. A full length image of a distant tall building can definitely be seen by using
- a concave mirror
 - a convex mirror
 - a plane mirror
 - both concave as well as plane mirror
12. In torches, search lights and headlights of vehicles the bulb is placed
- between the pole and the focus of the reflector
 - very near to the focus of the reflector
 - between the focus and centre of curvature of the reflector
 - at the centre of curvature of the reflector

13. The laws of reflection hold good for
- plane mirror only
 - concave mirror only
 - convex mirror only
 - all mirrors irrespective of their shape
14. The path of a ray of light coming from air passing through a rectangular glass slab traced by four students are shown as A, B, C and D in Figure 10.5. Which one of them is correct?
- A
 - B
 - C
 - D

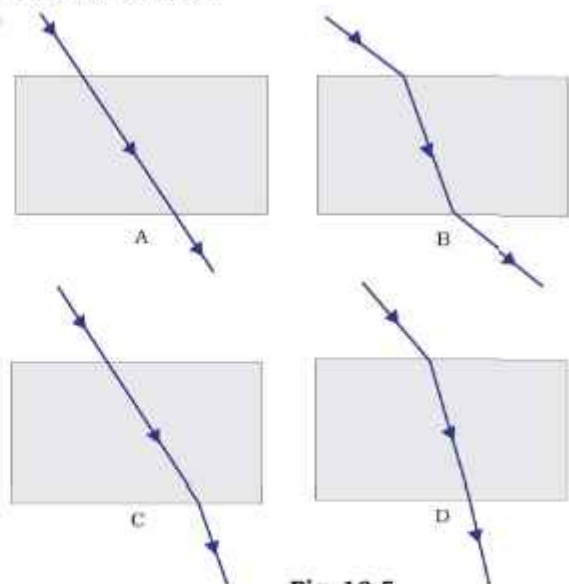


Fig. 10.5

15. You are given water, mustard oil, glycerine and kerosene. In which of these media a ray of light incident obliquely at same angle would bend the most?

- (a) Kerosene
- (b) Water
- (c) Mustard oil
- (d) Glycerine

16. Which of the following ray diagrams is correct for the ray of light incident on a concave mirror as shown in Figure 10.6?

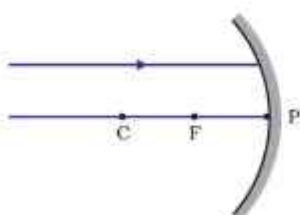


Fig. 10.6

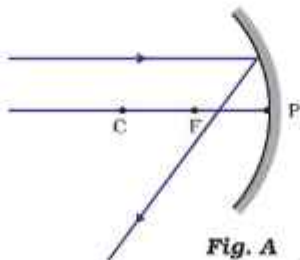


Fig. A

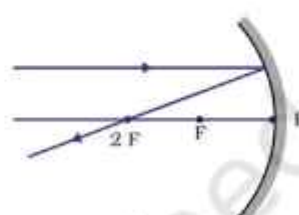


Fig. B

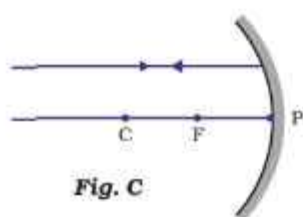


Fig. C

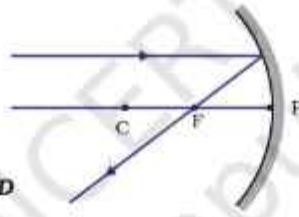


Fig. D

- (a) Fig. A
- (b) Fig. B
- (c) Fig. C
- (d) Fig. D

17. Which of the following ray diagrams is correct for the ray of light incident on a lens shown in Fig. 10.7?

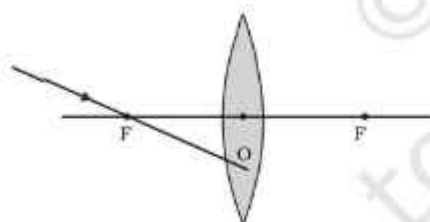


Fig. 10.7

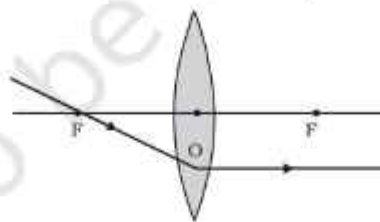


Fig. A

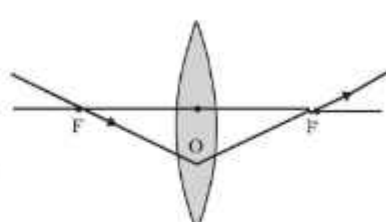


Fig. B

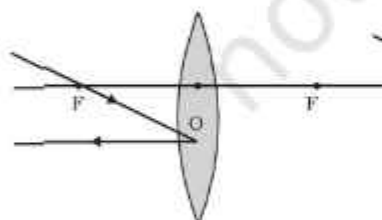


Fig. C

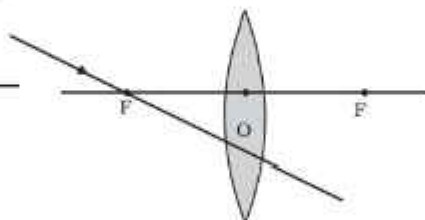


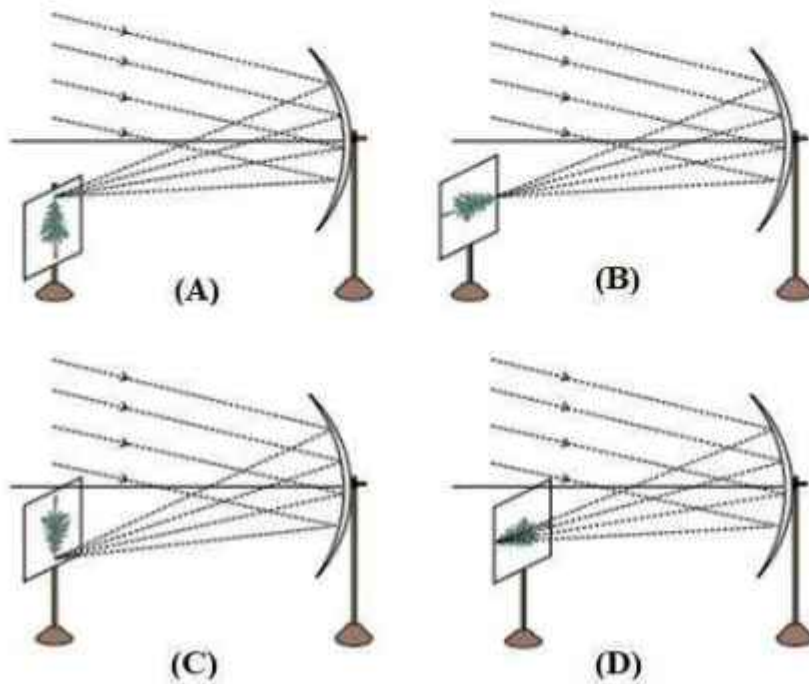
Fig. D

- (a) Fig. A.
- (b) Fig. B.
- (c) Fig. C.
- (d) Fig. D.

10. LIGHT – REFLECTION AND REFRACTION

MULTIPLE CHOICE QUESTIONS

1. Parallel rays, from the top of a distant tree, incident on a concave mirror, form an image on the screen. The correct diagram showing the image is



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

2. In an experiment to trace the path of a ray of light passing through a rectangular glass slab, four students tabulated their observations as given below.

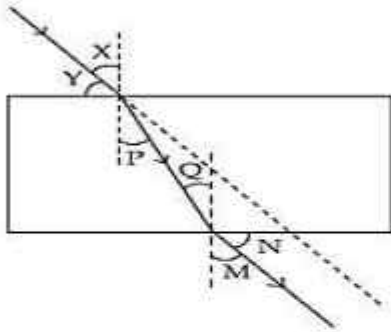
Student	A	B	C	D
$\angle i$	30°	30°	30°	30°
$\angle r$	18°	20°	19°	21.5°
$\angle e$	32°	32.5°	30°	29°

Which student performed the experiment most correctly?

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

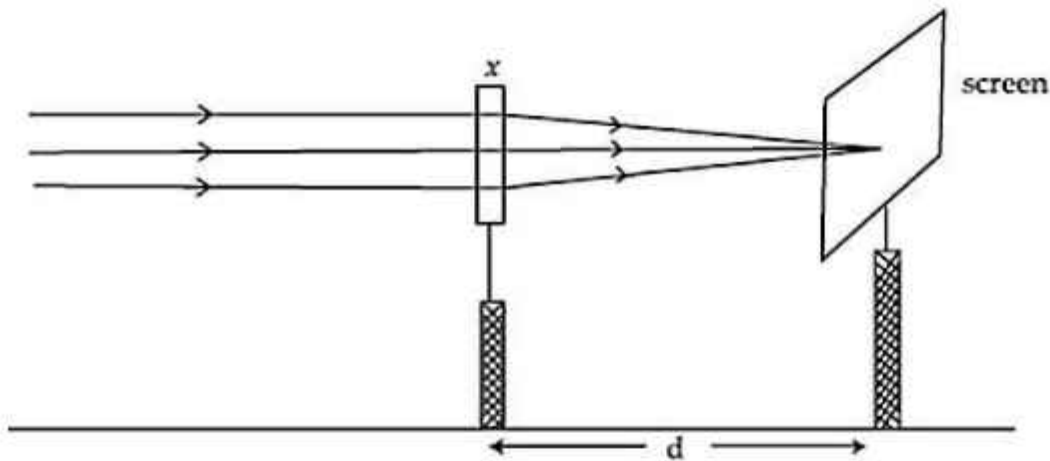
Class X – Science (Objective type Questions)

3. For the refraction through a rectangular glass slab the diagram is given below.



The angle of incidence, angle of emergence and angle of refraction are respectively.

- (a) X,P,M (b) X,M,P (c) Y,M,P (d) Y,N,P
4. A student determined the focal length of a device 'X' by focusing a distant object on the screen as shown in the following diagram.



Select the correct option.

- (a) Device 'X' is a concave mirror and distance 'd' is its focal length
(b) Device 'X' is a concave mirror and distance 'd' is its radius of curvature
(c) Device 'X' is a convex lens and distance 'd' is its radius of curvature
(d) Device 'X' is a convex lens and distance 'd' is its focal length
5. Image formed by plane mirror is _____
- (a) Real and erect
(b) Real and inverted
(c) Virtual and erect
(d) Virtual and inverted

Class X – Science (Objective type Questions)

6. A concave mirror gives real, inverted and same size image if the object is placed at _____
- (a) At F
 - (b) At infinity
 - (c) At C
 - (d) Beyond C
7. The full length image of a distant tall building can be seen by using
- (a) concave mirror
 - (b) convex mirror
 - (c) concave lens
 - (d) convex lens
8. If the magnification of a lens has positive value, the image is
- (a) Real
 - (b) virtual and erect
 - (c) inverted
 - (d) none of these
9. The power of the lens is +2.5D. Its focal length in cm will be
- (a) + 40
 - (b) – 40
 - (c) + 80
 - (d) – 80
10. The magnification produced by a rear view mirror that is used in the vehicles is
- (a) less than 1
 - (b) more than 1
 - (c) equal to 1
 - (d) less than 1 or more than 1

ANSWER THE FOLLOWING

11. What is the magnification of images formed by the plane mirror?
12. Define focal length of a spherical mirror.
13. Define absolute refractive index.
14. Give two uses of concave mirror.
15. A ray of light travelling in air enters obliquely into water. Does the light ray bend towards or away from the normal?

Class X – Science (Objective type Questions)

FILL IN THE BLANKS

16. The mirror used in construction of shaving glass is _____
17. Velocity of light in air is _____
18. Focal length of the lens is 50cm, its Power is _____
19. A concave mirror gives virtual, and enlarged image of the object when the object is _____
20. In optics an object which has higher refractive index is called _____

ASSERTION AND REASONING

In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

21. **Assertion:** The mirrors used in searchlights are concave spherical.

Reason: In concave spherical mirror the image formed is always virtual.

22. **Assertion:** Light travels faster in glass than in air.

Reason: Glass is denser than air

23. **Assertion:** For observing traffic at back, the driver mirror is convex mirror.

Reason: A convex mirror has larger field of view has plane mirror.

24. **Assertion:** Refractive index has no units.

Reason: The refractive index is the ratio of two dissimilar units.

25. **Assertion:** The height of the object is always positive

Reason: The object is always placed above the principal axis in the upward direction.

.....

Class X – Science (Objective type Questions)

ANSWERS

MULTIPLE CHOICE QUESTIONS

1.	c	2.	c	3.	b	4.	d	5.	c
6.	c	7.	b	8.	b	9.	a	10.	a

ANSWER THE FOLLOWING

11.	One. (object size is equal to image size)
12.	The distance between pole and focus point is called focal length.
13.	Refractive index of a medium with respect to vacuum is called the absolute refractive index
14.	concave mirror is used in torch light, solar furnace
15.	Light rays bends towards the normal

FILL IN THE BLANKS

16.	concave	17.	3×10^8 m/s	18.	2D	19.	between P and F	20.	Denser medium
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ASSERTION AND REASONING

21.	c	22.	d	23.	a	24.	a	25.	a
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Name of the Chapter: LIGHT REFLECTION AND REFRACTION

Following questions consists of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- A. Both assertion and reason are true, and reason is the correct explanation of assertion.
- B. Both assertion and reason are true, but reason is not the correct explanation of assertion.
- C. Assertion is true but reason is false.
- D. Assertion is false and reason is true.

1)	Assertion(A) : Concave mirrors are used as make-up mirrors. Reason (R) : When the face is held within the focus of a concave mirror, then a diminished image of the face is seen in the concave mirror.	1
2)	Assertion(A) : The formula connecting u , v and f for a spherical mirror is valid in all situations for all spherical mirrors for all positions of the object. Reason (R) : Laws of reflection are strictly valid for plane surfaces.	1
3)	Assertion(A): The mirrors used in search lights are concave spherical. Reason (R) : In concave spherical mirror the image formed is always virtual.	1
4)	Assertion(A) : For observing traffic at back, the driver mirror is convex mirror. Reason (R) : A convex mirror has much larger field of view than a plane mirror.	1
5)	Assertion(A) : When the object moves with a velocity 2 m/s, its image in the plane mirror moves with a velocity of 4 m/s. Reason (R) : The image formed by a plane mirror is as far behind the mirror as the object is in front of it.	1
6)	Assertion(A): Virtual images are always erect. Reason (R) : Virtual images are formed by converging lenses only	1
7)	Assertion (A): The angle of incidence for a ray of light having zero angle of reflection is two. Reason (R): Refracting surfaces follow Snell's Law.	1

8)	<p>Assertion (A): A Concave mirror of radius R is placed in water .Its focal length differs in Air and Water.</p> <p>Reason (R): Focal length of concave mirror is equal to R/2.</p>	1
9)	<p>Assertion (A): Higher the Refractive index of the medium lesser will be the speed of light in that Medium.</p> <p>Reason (R): Refractive index is inversely proportional to the speed of light</p>	1
10)	<p>Assertion (A): Convex mirror is preferred for rear view mirrors in vehicles.</p> <p>Reason (R) :The field view of a convex mirror is lesser than that of concave mirror</p>	1
11)	<p>Assertion (A): Mirror Formula cannot be used for Plane Mirrors</p> <p>Reason (R): Plane Mirror is a Spherical Mirror of Infinite Focal Length.</p>	1
12)	<p>Assertion (A) : It is impossible to see virtual image with our naked Eye</p> <p>Reason (R) : The rays do not actually emanate from a virtual image</p>	1
13)	<p>Assertion (A): Light changes its speed when it passes from one medium to another.</p> <p>Reason (R): When a ray travels from vacuum to a medium, then refractive index is known as absolute refractive index.</p>	1
14)	<p>Assertion (A): Large Concave mirrors are used to concentrate sunlight to produce heat in solar cookers.</p> <p>Reason (R): Concave mirror converges the light rays falling on it to a point.</p>	1
15)	<p>Assertion(A): Light travels faster in water than air</p> <p>Reason (R): Water is denser than Air.</p>	1

- **Centre of curvature:** The centre of the hollow sphere of which the spherical mirror lens is a part, is called centre of curvature (C).
- **Radius of curvature:** The separation between the pole optical centre and the centre of the hollow sphere, of which the mirror lens is a part, is called radius of curvature (R).
- **Principal axis:** The straight line joining the pole optical centre and the centre of curvature is called principal axis.
- **Focus:** The point F on the principal axis, where a beam of light parallel to the principal axis actually meet after reflection refraction or appear to come from it is called its principal focus.
- **Focal length:** The distance between the pole optical centre and the focus is called focal length.



STAND ALONE MCQs

(1 Mark each)

Q. 1. The laws of reflection hold true for:

- (A) plane mirrors only
 (B) concave mirrors only
 (C) convex mirrors only
 (D) all reflecting surfaces [B] [CBSE Delhi 2020]

Ans. Option (D) is correct.

Explanation: The laws of reflection hold true for all reflecting surfaces.

Q. 2. When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is:

- (A) real
 (B) inverted
 (C) virtual and inverted
 (D) virtual and erect [A] [CBSE Delhi, 2020]

Ans. Option (D) is correct.

Explanation: When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is virtual and erect.

Q. 3. Consider the following properties of virtual images:

- (i) cannot be projected on the screen
 (ii) are formed by both concave and convex lens
 (iii) are always erect
 (iv) are always inverted

The correct properties are:

- (A) (i) and (iv) (B) (i) and (ii)
 (C) (i), (ii) and (iii) (D) (i), (ii) and (iv)

[A] [CBSE Delhi 2020, Set-3]

Ans. Option (C) is correct.

Explanation: A virtual image is formed when reflected rays appear to meet. Such images cannot be obtained on screen. Plane mirrors, convex mirror and concave lens always forms virtual image. They are always erect.

Q. 4. A real image is formed by the light rays after reflection or refraction when they:

- (i) actually meet or intersect with each other,

(ii) actually converge at a point,

(iii) appear to meet when they are produced in the backward direction.

(iv) appear to diverge from a point.

Which of the above statements are correct?

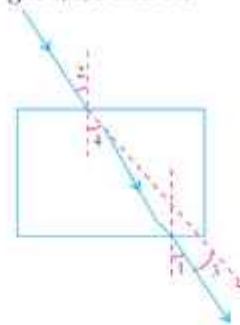
- (A) (i) and (iv) (B) (ii) and (iv)
 (C) (i) and (ii) (D) (ii) and (iii)

[AE] [CBSE Delhi 2020, Set-3]

Ans. Option (C) is correct.

Explanation: A real image is formed when light rays actually meet or intersect at a point after reflection or refraction.

[AI] Q. 5. The correct sequencing of angle of incidence, angle of emergence, angle of refraction and lateral displacement shown in the following diagram by digits 1, 2, 3 and 4 is: [U] [Delhi Set-1, 2017]



- (A) 2, 4, 1, 3 (B) 2, 1, 4, 3
 (C) 1, 2, 4, 3 (D) 2, 1, 3, 4

Ans. Option (B) is correct.

Explanation: Angle 2 is angle of incidence, as it is formed between the incident ray and the normal.

Angle 1 is angle of emergence, as it is formed between the emergent ray with normal.

Angle 4 is angle of refraction as it is formed between the refracted ray and the normal.

3 shows the lateral displacement.

Hence, the correct answer is 2,1,4,3.

Q. 6. A student obtained a sharp image of a candle flame placed at the distant end of the laboratory table on a screen using a concave mirror to determine its focal length. The teacher suggested him to focus a

distant building about 1 km far from the laboratory, for getting more correct value of the focal length. In order to focus the distant building on the same screen the student should slightly move the:

- (A) mirror away from the screen
- (B) screen away from the mirror
- (C) screen towards the mirror
- (D) screen towards the building

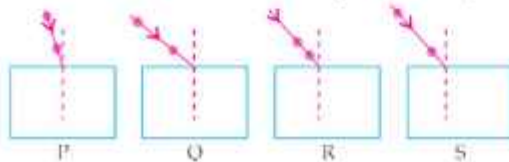
[AE] [CBSE Delhi Set-1, 2016]

Ans. Option (C) is correct.

Explanation: The object is at infinity, so to obtain sharp image screen should be moved towards mirror.

Q. 7. Select from the following the best experimental set-up for tracing the path of a ray of light passing through a rectangular glass slab;

[CBSE Delhi, 2016]



- (A) P
- (B) Q
- (C) R
- (D) S

Ans. Option (D) is correct.

Explanation: Among the given options, S will be the most suitable set up for tracing a ray of light passing through a rectangular glass slab.

Q. 8. To determine the approximate value of the focal length of a given concave mirror, you focus the image of a distant object formed by the mirror on a screen. The image obtained on the screen, as compared to the object is always:

- (A) Laterally inverted and diminished
- (B) Inverted and diminished
- (C) Erect and diminished
- (D) Erect and highly diminished

[CBSE Outside Delhi Set-1, 2016]

Ans. Option (B) is correct.

Explanation: When the object is at infinity, diminished, inverted and real image is formed.

Q. 9. In your laboratory you trace the path of light rays through a glass slab for different values of angle of incidence ($\angle i$) and in each case measure the values of the corresponding angle of refraction ($\angle r$) and angle of emergence ($\angle e$).

On the basis of your observation your correct conclusion is:

- (A) $\angle i$ is more than $\angle r$, but nearly equal to $\angle e$
- (B) $\angle i$ is less than $\angle r$, but nearly equal to $\angle e$

(C) $\angle i$ is more than $\angle e$, but nearly equal to $\angle r$

(D) $\angle i$ is less than $\angle e$, but nearly equal to $\angle r$ [U]

[CBSE Outside Delhi Set-1, 2016]

Ans. Option (A) is correct.

Explanation: When a ray of light passes through the glass slab, then the angle of incidence is found to be nearly equal to angle of emergence and greater than angle of refraction.

Q. 10. Which of the following can make a parallel beam of light when light from a point source is incident on it?

- (A) Concave mirror as well as convex lens
- (B) Convex mirror as well as concave lens
- (C) Two plane mirrors placed at 90° to each other
- (D) Concave mirror as well as concave lens

Ans. Option (A) is correct.

Explanation: When a point source of light is placed at the focus of concave mirror then all light rays after reflection through mirror will become parallel to the principal axis.

When this point source of light is placed at the focus of convex lens then after refraction by light rays convex lens will become parallel to the principal axis.

Q. 11. Magnification produced by a rear-view mirror fitted in vehicles

- (A) is less than one.
- (B) is more than one.
- (C) is equal to one.
- (D) can be more than or less than one depending upon the position of the object in front of it.

Ans. Option (A) is correct.

Explanation: Convex mirror is used as rear-view mirror in vehicles. It forms virtual, erect, and diminished images of the objects.

Magnification is ratio of height of image to the height of the object, hence, magnification produced by a rear-view mirror fitted in vehicles is less than one.

Q. 12. Rays from sun converge at a point 15 cm in front of a concave mirror. Where should an object be placed so that size of its image is equal to the size of the object?

- (A) 15 cm in front of the mirror
- (B) 30 cm in front of the mirror
- (C) Between 15 cm and 30 cm in front of the mirror
- (D) More than 30 cm in front of the mirror [AE]

Ans. Option (B) is correct.

Explanation: The distance of the sun is infinite as compared to the radius of curvature of concave mirror, so, light rays from sun incident parallel all the rays converge at the principal focus. So, the focal length is 15 cm.

In case of a concave mirror, the size of image and object will be same if the object is placed at $2f$. Hence, in this case object must be placed at $2f$ or $2 \times 15 = 30$ cm.

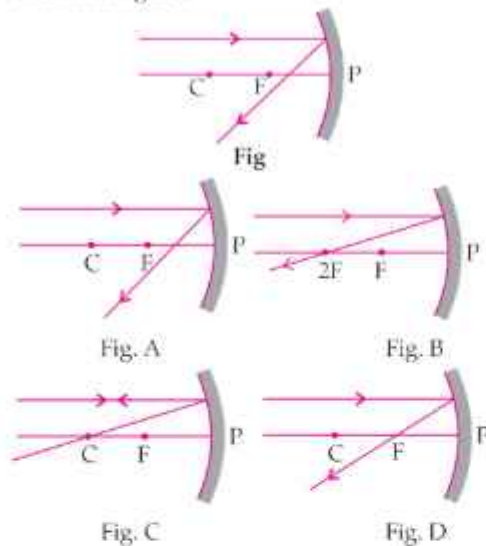
Q. 13. In torches, search lights and headlights of vehicles, the bulb is placed

- (A) between the pole and the focus of the reflector.
- (B) very near to the focus of the reflector.
- (C) between the focus and centre of curvature of the reflector.
- (D) at the centre of curvature of the reflector.

Ans. Option (B) is correct.

Explanation: The rays of light passing through the principal focus will go parallel to principal axis after reflection thus, forming a concentrated beam of light. So, due to this reason in torches, search lights, and headlights of vehicles, the bulb is placed very near to the focus of the reflector.

Q. 14. Which of the following ray diagrams is correct for the ray of light incident on a concave mirror as shown in figure?



- (A) Fig. A
- (B) Fig. B
- (C) Fig. C
- (D) Fig. D

Ans. Option (D) is correct.

Explanation: In case of concave mirror, an incident ray parallel to principle axis passes through F after reflection.

Q. 15. A student determines the focal length of a device 'X' by focussing the image of a distant object on a

screen placed 20 cm from the device on the same side as the object. The device 'X' is

- (A) Concave lens of focal length 10 cm
- (B) Convex lens of focal length 20 cm
- (C) Concave mirror of focal length 10 cm
- (D) Concave mirror of focal length 20 cm

[CBSE Board, Foreign Scheme, 2016]

Ans. Option (D) is correct.

Explanation: Image formed by the concave mirror in this case is same as when object is at infinity. Due to the great distance, light rays will incident almost parallel to principal axis. After reflection all the rays will converge and meet at principal focus. So, focal length is 20 cm.

Q. 16. A student obtains a blurred image of a distant object on a screen using a convex lens. To obtain a distinct image on the screen he should move the lens

- (A) away from the screen
- (B) towards the screen
- (C) to a position very far away from the screen
- (D) either towards or away from the screen depending upon the position of the object

[CBSE Board, All India Region, 2017]

Ans. Option (D) is correct.

Explanation: The incident rays coming from the distant object will be parallel to the principal axis and as we know the rays parallel to the principal axis, after refraction by convex lens, will pass through the principal focus. Hence, a distinct image will be obtained immediately when distance between screen and lens is equal to focal length, so option (D) is correct choice.

Q. 17. A student very cautiously traces the path of a ray through a glass slab for different values of the angle of incidence ($\angle i$). He then measures the corresponding values of the angle of refraction ($\angle r$) and the angle of emergence ($\angle e$) for every value of the angle of incidence. On analyzing these measurements of angles, his conclusion would be

- (A) $\angle i > \angle r > \angle e$
- (B) $\angle i = \angle r > \angle e$
- (C) $\angle i < \angle r < \angle e$
- (D) $\angle i = \angle e < \angle r$

[CBSE Board, All India Region, 2017]

Ans. Option (B) is correct.

Explanation: (Angle of incidence) $\angle i = \angle e$ (angle of emergence) because the direction of incident ray and emergent ray is parallel to each other.

$\angle e > \angle r$ (angle of refraction) because at point of emergence light is entering into optically rarer medium (air) from optically denser medium (glass), so light will bend away from the normal making the angle bigger.

Q. 18. An optical device has been given to a student and he determines its focal length by focusing the image of the sun on a screen placed 24 cm from the device

on the same side as the sun. Select the correct statement about the device

- (A) Convex mirror of focal length 12 cm
- (B) Convex lens of focal length 24 cm
- (C) Concave mirror of focal length 24 cm
- (D) Convex lens of focal length 12 cm

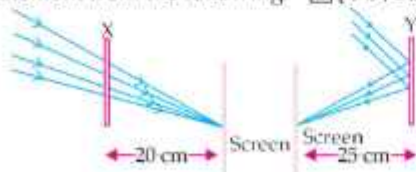
[AE]

[CBSE Board, Foreign Scheme, 2017]

Ans. Option (C) is correct.

Explanation: Because the screen is on the same side of the object which means it cannot be a lens because it happens behind the lenses in such case. Moreover, concave mirror forms real images, that is, image can be obtained on a screen.

Q. 19. Study the given ray diagrams and select the correct statement from the following: [B] [OD, Set-1, 2017]



- (A) Device X is a concave mirror and device Y is a convex lens, whose focal lengths are 20 cm and 25 cm respectively.
- (B) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 20 cm and 25 cm respectively.
- (C) Device X is a concave lens and device Y is a convex mirror, whose focal lengths are 20 cm and 25 cm respectively.
- (D) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 20 cm and 25 cm respectively.

Ans. Option (D) is correct.

Q. 20. A student obtains a blurred image of a distant object on a screen using a convex lens. To obtain a distinct image on the screen he should move the lens:

- (A) away from the screen
- (B) towards the screen
- (C) to a position very far away from the screen
- (D) either towards or away from the screen depending upon the position of the object.

[B] [OD, Set-1, 2017]

Ans. Option (D) is correct.

Q. 21. A teacher sets up the stand carrying a convex lens of focal length 15 cm at 42.7 cm mark on the optical bench. He asks four students A, B, C and D to suggest the position of screen on the optical bench so that a distinct image of a distant tree is obtained almost immediately on it. The positions suggested by the students were as:

- (i) 12.7 cm (ii) 29.7 cm
- (iii) 57.7 cm (iv) 72.7 cm

The correct position of the screen was suggested by

- (A) (i) (B) (ii)
- (C) (iii) (D) (iv)

[AE]

[CBSE Board, Foreign Scheme, 2016]

Ans. Option (C) is correct.

Explanation: The incident rays coming from the distant tree placed will be parallel to the principal axis and as we know the rays parallel to the principal axis, after refraction by convex lens, will pass through the principal focus. Hence, a distinct image will be obtained immediately when distance between screen and lens is equal to focal length.

42.7 cm (position of lens on optical bench) + 15 cm (focal length of lens) = 57.7 (the position of screen on optical bench)

Q. 22. To determine the approximate focal length of the given convex lens by focussing a distant object (say, a sign board), you try to focus the image of the object on a screen. The image you obtain on the screen is always: [A] [CBSE, Delhi-2016]

- (A) erect and laterally inverted
- (B) erect and diminished
- (C) inverted and diminished
- (D) virtual, inverted and diminished

Ans. Option (C) is correct.

Explanation: The image formed by lens will be inverted and diminished.

Q. 23. Suppose you have focussed on a screen the image of candle flame placed at the farthest end of the laboratory table using a convex lens. If your teacher suggests you to focus the parallel rays of sun, reaching your laboratory table, on the same screen, what you are expected to do is to move the:

- (A) lens slightly towards the screen
- (B) lens slightly away from the screen
- (C) lens slightly towards the sun
- (D) lens and screen both towards the sun

[A] [OD Set-1, 2016]

Ans. Option (A) is correct.

Explanation: The candle is at the farthest end of the laboratory. So, it may be considered at a distance greater than $2F_1$ and hence the image of formed between F_2 and $2F_2$. when the sun will be focussed, the image will be formed as F_2 . So, the lens is to be shifted towards the screen.

Q. 24. A spherical mirror and a thin spherical lens have each a focal length of -15 cm. The mirror and the lens are likely to be

- (A) both concave.
- (B) both convex.
- (C) the mirror is concave and the lens is convex.
- (D) the mirror is convex, but the lens is concave. [B]

Ans. Option (A) is correct.

Explanation: As per the sign convention, the focal length of a concave mirror and a concave lens are taken as negative. Hence, both the spherical mirror and the thin spherical lens are concave in nature.

Q. 25. Which of the following lenses would you prefer to use while reading small letters found in a dictionary?

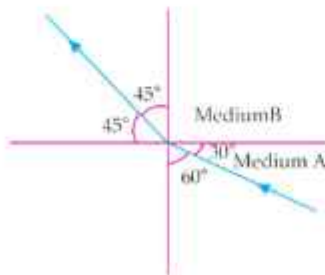
- (A) A convex lens of focal length 50 cm
- (B) A concave lens of focal length 50 cm

- (C) A convex lens of focal length 5 cm.
- (D) A concave lens of focal length 5 cm

Ans. Option (C) is correct.

Explanation: A magnified image of an object will be obtained when it is placed between the optical centre and focus of a convex lens. Magnification is also higher for convex lenses having shorter focal length. Therefore, for reading small letters, a convex lens of focal length 5 cm should be used.

Q. 26. Figure shows a ray of light as it travels from medium A to medium B. Refractive index of the medium B relative to medium A is



- (A) $\frac{\sqrt{3}}{\sqrt{2}}$
- (B) $\frac{\sqrt{2}}{\sqrt{3}}$
- (C) $\frac{1}{\sqrt{2}}$
- (D) $\sqrt{2}$

AE

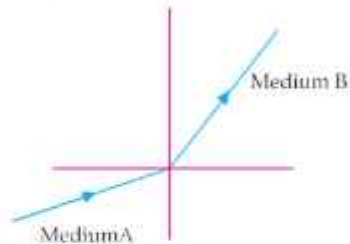
Ans. Option (A) is correct.

Explanation: Here, angle of incidence = 60°
 Angle of refraction = $r = 45^\circ$
 Refractive index of the medium B relative to medium A

$$= n_{BA} = \frac{\sin i}{\sin r} = \frac{\sin 60^\circ}{\sin 45^\circ}$$

$$= \frac{\frac{\sqrt{3}}{2}}{\left(\frac{1}{\sqrt{2}}\right)} = \frac{\sqrt{3}}{\sqrt{2}}$$

Q. 27. A light ray enters from medium A to medium B as shown in the figure. The refractive index of medium B relative to A will be



U

- (A) Greater than unity
- (B) Less than unity
- (C) Equal to unity
- (D) Zero

Ans. Option (A) is correct.

Explanation: Since, light rays in medium B go towards normal, so it has greater refractive index and lesser velocity of light with respect to medium A. So refractive index of medium B with respect to medium A is greater than unity.

Q. 28. Which of the following statements is true?

- (A) A convex lens has 4 dioptre power having a focal length 0.25 m
- (B) A convex lens has - 4 dioptre power having a focal length 0.25 m
- (C) A concave lens has 4 dioptre power having a focal length 0.25 m
- (D) A concave lens has - 4 dioptre power having a focal length 0.25 m

Ans. Option (A) is correct.

Explanation: The power (P) of a lens of focal length (f) is given by $P = 1/f$ where f is the focal length meter and power in dioptre.

Now, $P = 1/f$

or, $4 = \frac{1}{f}$

or $f = \frac{1}{4} \text{ m} = 0.25 \text{ m.}$

?
ASSERTION AND REASON BASED MCQs
(1 Mark each)

Directions : In the following questions, A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as.

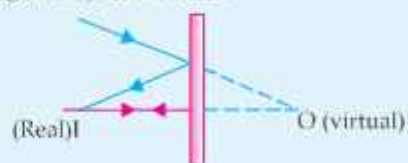
- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is NOT the correct explanation of A.
- (C) A is true but R is false.
- (D) A is false and R is True.

Q. 1. Assertion (A): Plane mirror may form real image.

Reason (R): Plane mirror forms virtual image, if object is real.

Ans. Option (B) is correct.

Explanation: Plane mirror may form real image, if object is virtual.



Q. 2. Assertion (A): The focal length of the convex mirror will increase, if the mirror is placed in water.

Reason (R): The focal length of a convex mirror of radius R is equal to, $f = \frac{R}{2}$.

Ans. Option (D) is correct.

Explanation: Focal length of the spherical mirror does not depend on the medium in which it is placed.

Q. 3. Assertion (A): The image formed by a concave mirror is certainly real if the object is virtual.

Reason (R): The image formed by a concave mirror is certainly virtual if the object is real.

Ans. Option (C) is correct.

Explanation: The image of real object may be real in case of concave mirror.

Q. 4. Assertion (A): An object is placed at a distance of f from a convex mirror of focal length f , its image will form at infinity.

Reason (R): The distance of image in convex mirror can never be infinity.

Ans. Option (D) is correct.

Explanation: The distance of image in convex mirror is always finite.

Q. 5. Assertion (A): If the rays are diverging after emerging from a lens; the lens must be concave.

Reason (R): The convex lens can give diverging rays.

Ans. Option (D) is correct.

Explanation: If the rays cross focal point of convex lens, they become diverging.

Q. 6. Assertion (A): Refractive index of glass with respect to air is different for red light and violet light.

Reason (R): Refractive index of a pair of media depends on the wavelength of light used.

Ans. Option (A) is correct.

Explanation: Refractive index of any pair of media is inversely proportional to wavelength of light.

Hence, $\lambda_v < \lambda_r$

so, $\mu_v < \mu_r$

where, λ_v and λ_r are the wavelengths of violet and red light, μ_v and μ_r are refractive index of violet and red light.

Q. 7. Assertion (A): The refractive index of diamond is $\sqrt{6}$ and refractive index of a liquid is $\sqrt{3}$. If the light travels from diamond to the liquid, it will be initially reflected when the angle of incidence is 30° .

Reason (R): $\mu = \frac{1}{\sin C}$, where μ is the refractive

index of diamond with respect to liquid.

Ans. Option (A) is correct.

Explanation: Refractive index of diamond w.r.t. liquid

$${}^d\mu_l = \frac{1}{\sin C} = \frac{\mu_d}{\mu_l} \Rightarrow \frac{\sqrt{6}}{\sqrt{3}} = \frac{1}{\sin C}$$

$$\Rightarrow \sin C = \frac{1}{\sqrt{2}} = \sin 45^\circ$$

$$\therefore C = 45^\circ.$$

Q. 8. Assertion: Light travels faster in glass than in air.

Reason: Glass is denser than air.

Ans. Option (D) is correct.

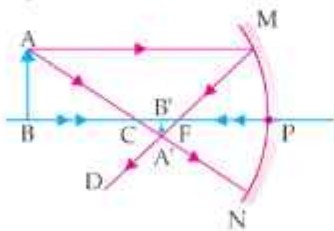
Explanation: Light travels faster in air than in glass, because glass is denser than air.



CASE-BASED MCQs

Attempt any 4 sub-parts from each question. Each sub-part carries 1 mark.

1. Following figure illustrates the ray diagram for the formation of image by a concave mirror. The position of the object is beyond the centre of curvature of the concave mirror. On the basis of given diagram answer any four questions from Q.1. to Q.5.



Q. 1. If the focal length of the concave mirror is 10 cm, the image formed will be at a distance _____.

- (A) Between 10cm and 15cm
(B) Between 10cm and 20cm
(C) Beyond 20cm
(D) At 20 cm

Ans. Option (B) is correct.

Explanation: If the focal length of the concave mirror is 10 cm, the image formed will be at a distance between 10 cm and 15 cm.

Q. 2. In case of concave mirror, the image distance is _____ when image is formed in front of the mirror and _____ when the image is formed behind the mirror.

- (A) positive, negative

- (B) negative, negative
(C) negative, positive
(D) positive, positive

Ans. Option (C) is correct.

Explanation: If an image formed behind the concave mirror, the object distance is positive but if an image is formed in front of the mirror, the image distance is negative.

- Q. 3. If the size of the object in the given figure is 5 cm and the magnification produced is -0.5 . The size of the image is (in cm) _____
(A) -2.5 (B) -0.1
(C) 2.5 (D) 0.1

Ans. Option (A) is correct.

Explanation: As we know, magnification,

$$m = \frac{h_2}{h_1}$$

$$h_2 = \frac{-(0.5 \times 5)}{10}$$

$$h_2 = -2.5$$

- Q. 4. A negative sign in the magnification value indicate that the image is _____
(A) Real and inverted
(B) Real and erect
(C) Virtual and erect
(D) Virtual and inverted

Ans. Option (A) is correct.

Explanation: A negative sign in the magnification value indicate that the image is real and inverted.

- Q. 5. An image formed by concave mirror is virtual, when the object is placed:
(A) at infinity (B) at C
(C) Between C and F (D) Between P and F

Ans. Option (D) is correct.

Explanation: An image formed by concave mirror is virtual, when the object is placed between P and F.

II. Read the following passage and answer any four questions from Q.1. to Q.5.

A student wants to project the image of a candle flame on the walls of the school laboratory by using a mirror.

- Q. 1. Which type of mirror should he use and why?
(A) Convex mirror, it forms virtual image
(B) Concave mirror, it forms virtual image
(C) Concave mirror, it forms real image
(D) Convex mirror, it forms real image

Ans. Option (C) is correct.

Explanation: He should use a concave mirror as it forms real images.

- Q. 2. At what distance, in terms of focal length ' f ' of the mirror, should he place the candle flame to get the magnified image on the wall?

- (A) At F (B) Between F and C
(C) At C (D) At infinity

Ans. Option (B) is correct.

Explanation: He should place the candle flame between the focus and centre of curvature of the mirror to get the magnified image on the wall.

- Q. 3. To get the diminished image of the candle flame, the object must be placed at:
(A) infinity (B) at C
(C) between F and C (D) At F

Ans. Option (A) is correct.

Explanation: To get the diminished image of the candle flame, the object must be placed at infinity.

- Q. 4. If the image formed by this mirror is inverted and real, the magnification will be:
(A) Positive (B) Negative
(C) Either of them (D) None of the above

Ans. Option (B) is correct.

Explanation: If the image formed by this mirror is inverted and real, the magnification will be negative.

- Q. 5. A virtual image formed by concave mirror is:
(A) erect and enlarged
(B) erect and diminished
(C) inverted and diminished
(D) inverted and enlarged

Ans. Option (A) is correct.

Explanation: A virtual image formed by concave mirror is erect and enlarged.

III. Read the following passage and answer any four questions from Q.1. to Q.5.

A student wants to project the image of a candle flame on a screen 60 cm in front of a mirror by keeping the flame at a distance of 15 cm from its pole.

- Q. 1. Suggest the type of mirror he should use:
(A) convex mirror (B) plane mirror
(C) concave mirror (D) none of the above

Ans. Option (C) is correct.

Explanation: He should use a concave mirror, as it forms a real image on the same side of the mirror.

- Q. 2. Find the linear magnification of the image produced.
(A) -4 (B) $+4$
(C) $-9(0)$ (D) $+9(0)$

Ans. Option (A) is correct.

Explanation: Object distance, $u = -15$ cm

Image distance, $v = -60$ cm

$$\text{Magnification, } m = \frac{-v}{u} = \frac{-(-60)}{-15} = -4.$$

The minus sign in magnification shows that the image formed is real and inverted.

Q. 3. When object distance is less than focal length the image is _____ and when object distance is more than focal length the image is _____.

- (A) real in both case (B) virtual in both case
(C) real, virtual (D) virtual, real

Ans. Option (D) is correct.

Explanation: When object distance is less than focal length the image is virtual and when object distance is more than focal length the image is real.

Q. 4. What is the distance between the object and its image ?

- (A) 45 cm (B) 35 cm
(C) 75 cm (D) 0 cm

Ans. Option (A) is correct.

Explanation: The image is formed at a distance of 45 cm from the object.

Q. 5. The image formed in the above case is:

- (A) virtual, inverted and magnified.
(B) real, erect and magnified
(C) real, inverted and magnified
(D) real, erect and diminished

Ans. Option (C) is correct.

Explanation: In this case, the image is formed beyond the centre of curvature. This image is real, inverted and enlarged.

IV. Read the following passage and answer the following questions from Q.1. to Q.4.

A student focuses the image of a candle flame, placed at about 2 m from a convex lens of focal length 10 cm, on a screen. After that he moves gradually the flame towards the lens and each time focuses its image on the screen. [U]

Q. 1. In which direction does he move the lens to focus the flame on the screen ?

- (A) away from screen
(B) towards the screen
(C) should not move the screen
(D) toward the candle

Ans. Option (D) is correct.

Explanation: Let us assume the screen to lens distance is greater than 20 cm. Since it is required to get image beyond 2F,

the object should be F and 2F on other side of the lens. Hence student will move the lens towards candle.

(F means a location at a distance from lens that equals the focal length of lens. 2F means distance that equals twice the focal length).

Q. 2. What happens to the size of the image of the flame formed on the screen?

- (A) size of image will decrease
(B) size of image will increase
(C) remains unchanged
(D) size will become too small

Ans. Option (B) is correct.

Explanation: Size of the image of the flame increases when object is moving towards lens, from a distance beyond 2F, then 2F, then less than 2F.

Q. 3. What difference is seen in the intensity (brightness) of the image of the flame on the screen ?

- (A) intensity of image increases
(B) intensity of image remains same
(C) intensity of image reduces
(D) the image disappears

Ans. Option (A) is correct.

Explanation: As the object (candle) is moved towards lens more light intensity is collected by lens, hence brightness of the image increase.

Q. 4. What is seen on the screen when the flame is very close (at about 5 cm) to the lens ?

- (A) a bright image (B) a magnified image
(C) diminished image (D) no image

Ans. Option (D) is correct.

Explanation: When the candle is very close about 5 cm, focussing the flame is not possible. Hence student will not get any image on the screen.

He will get diffused light on the screen.

[AI] V. Read the passage and note the following observations. Answer any four questions from Q.1. to Q.5.

A student focussed the image of a candle flame on a white screen by placing the flame at various distances from a convex lens. He noted his observations as:

S. No.	Distance of flame from the lens (cm)	Distance of the screen from the lens (cm)
(a)	60	20
(b)	40	24
(c)	30	30
(d)	24	40
(e)	15	70

Q. 1. From the above table, find the focal length of lens without using lens formula: [AE]

- (A) 15cm (B) 30cm