Solved Question Paper 2017
Class 10
Summative Assessment II
Subject - Science

Time allowed: 3 hours   **Maximum Marks: 90**

General Instructions :

(i) The question paper comprises two Sections, A and B. You are to attempt both the sections.

(ii) All questions are compulsory.

(iii) There is no choice in any of the questions.

(iv) All questions of Section A and all questions of Section B are to be attempted separately.

(v) Question numbers 1 to 3 in Section A are one-mark questions. These are to be answered in one word or in one sentence.

(vi) Question numbers 4 to 6 in Section A are two-marks questions. These are to be answered in about 30 words each.

(vii) Question numbers 7 to 18 in Section A are three-marks questions. These are to be answered in about 50 words each.

(viii) Question numbers 19 to 24 in Section A are five-marks questions. These are to be answered in about 70 words each.

(ix) Question numbers 25 to 33 in Section B are multiple choice questions based on practical skills. Each question is a one-mark question. You are to select one most appropriate response out of the four provided to you.

(x) Question numbers 34 to 36 in Section B are two-marks questions based on practical skills. These are to be answered in brief.

SECTION A

Question 1. Write the molecular formula of the 2nd and the 3rd member of the homologous series whose first member is methane.

Answer.

The general formula for the homologous series whose first member is methane is C_nH_{2n+2}.

Molecular formulae of the 2nd and the 3rd members of this series are:
(i) Put n = 2 in C$_n$H$_{2n+2}$: C$_2$H$_6$ or CH$_3$CH$_3$ (Ethane)

(ii) Put n = 3 in C$_n$H$_{2n+2}$: C$_3$H$_8$ or CH$_3$CH$_2$CH$_3$(Propane)

Question 2. When a cell reproduces, what happens to its DNA?

Answer.

When a cell reproduces, its DNA gets transferred from parents to the offspring where it gets replicated, producing two copies of DNA. When the cell divides into two, these two copies are distributed equally between the two daughter cells so that similar amount and type of DNA is transferred from the parent cell to the daughter cells.

Question 3. In the following food chain, 100 J of energy is available to the lion. How much energy was available to the producer?

$$Plants \rightarrow Deer \rightarrow Lion$$

Answer.

Here we will use the 10% law of transfer of energy.

As, it is given that 100 J of energy is available to lion.
Let the amount of enrgy available to deer be x Joules.
According to 10% law,
Energy available to lion = 10% of energy of deer
$\qquad$ 100 J = 10/100 $\times x$

$\Longrightarrow \qquad x$ = 1000 J
Now, let the amount of enrgy available to plants be y Joules.
Again applying 10% law, we have:

Energy available to deer = 10% of energy of plant

$\qquad$ 1000 J = 10/100 $\times y$

$\Longrightarrow \qquad y$ = 10000 J
So, the energy available to plants, i.e., producer is 10,000J.

Question 4. An object is placed at a distance of 30 cm from a concave lens of focal length 15 cm. List four characteristics (nature, position, etc.) of the image formed by the lens.

Answer.

Given, object distance, $u = -30$ cm
And focal length, $f = -15$ cm
Now, we use the Lens formula:

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

$$\Rightarrow \quad \frac{1}{-15} = \frac{1}{v} - \frac{1}{-30}$$

$$\Rightarrow \quad \frac{1}{v} = \frac{1}{-15} + \frac{1}{-30}$$

$$\Rightarrow \quad \frac{1}{v} = \frac{-2-1}{30} = \frac{-3}{30}$$

$$\Rightarrow \quad \frac{1}{v} = \frac{-1}{10}$$

$$\Rightarrow \quad v = -10\,\text{cm}$$

From the image distance calculated above, we conclude that image formed by the concave lens is:
(i) Virtual
(ii) Erect
(iii) Diminished
(iv) On the same side of the lens as the object

Question 5. State two advantages of conserving (i) forests, and (ii) wild-life.

Answer.

Advantages of conserving forests are:
1. They help in retaining ground water and prevent soil erosion by holding the top layer of soil.

2. They help to prevent floods.

3. They help to improve the quality of air and maintain the moderate temperature.
4. They form a home to a large variety of flora and fauna.
5. They supply raw materials to many industries, like wood, rubber, spices, medicinal herbs, etc.
Advantages of conserving wildlife are:
1. It helps in maitaining ecological balance and biodiversity.
2. It provides food and forms raw material for clothing, medicines and many other products.

Question 6. Explain two main advantages associated with water harvesting at the community level.

Answer.

Two advantages associated with water harvesting at community level are:
1. It helps to raise the water level by the process of recharging.

2. It can resolve the problem of water crisis in areas affected by drought or having inadequate water resources.

Question 7. Write the structural formula of ethanol. What happens when it is heated with excess of conc. H_2SO_4 at 443 K? Write the chemical equation for the reaction stating the role of conc. H_2SO_4 in this reaction.

Answer.

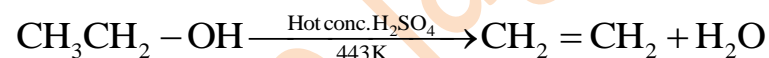Structural formula of ethanol (CH_3CH_2OH):
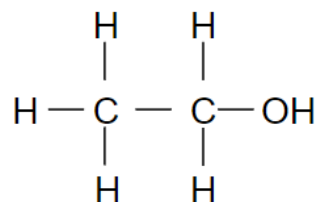
On heating ethanol with excess of conc. H_2SO_4 at 443 K, ethanol gets dehydrated to form ethane:

Chemical equation for the reaction is as below:

$$CH_3CH_2-OH \xrightarrow[443K]{Hot\,conc.\,H_2SO_4} CH_2=CH_2+H_2O$$

Role of conc. H_2SO_4: Conc. H_2SO_4 acts as a dehydrating agent which helps in removal of water from ethanol molecule.

Question 8. Distinguish between esterfication and saponification reaction with the help of the chemical equations for each. State one use of each (i) esters, and (ii) saponification process.

Answer.

Esterification reaction:

The reaction between alcohols and carboxylic acids, in the presence of conc. H_2SO_4, to form esters is called esterification.

$$RCOOH + R\,'OH \xrightarrow{\text{Conc.}H_2SO_4} RCOOR\,' + H_2O$$
Carboxylic   Alcohol   Ester
   acid
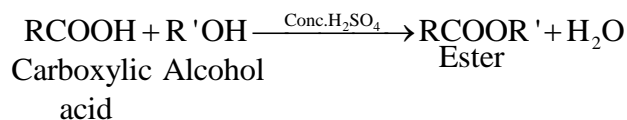
Saponification:

When an ester reacts with a base (say NaOH) it forms an alcohol and sodium salt of carboxylic acid. This acid is called saponification.

$$RCOOR' + NaOH \rightarrow RCOONa + R'OH$$
   Ester   Sodium   Sodium   Alcohol
hydroxide alkanoate
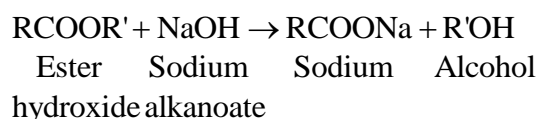
(i) **Use of esters:** Esters are used in making perfumes.
(ii) **Use of saponification process:** It is used in the preparation of soap.

Question 9. Write the number of periods and groups in the Modern Periodic Table. How does the metallic character of elements vary on moving (i) from left to right in a period, and (ii) down a group? Give reason to justify your answer.

Answer.

Number of periods in the Modern Periodic Table = 7

Number of groups in the Modern Periodic Table = 18

Metallic character: It is defined as the tendency of an atom to lose it valence electrons.

Vraiation of metallic character across the Modern Periodic Table:

(i) Moving from left to right in a period, the metallic character decreases.
On moving across a period from left to right, the effective nuclear charge increases which causes a decrease in the atomic size hence making it difficult to pull out the valence electron. Hence the metallic character decreases across a period.

(ii) In a group, the metallic character increases from top to bottom.
On moving down the group, the atomic size of elements increases due to the addition of a shell at each step. This causes the valence electrons to move away from the nucleus and thus feel lesser nuclear charge hence are free to move out which causes an increase in metallic character from top to bottom in a group.

Question 10. Na, Mg and Al are the elements of the 3rd period of the Modern Periodic Table having group number 1, 2 and 13 respectively. Which one of these elements has the (a) highest valency, (b) largest atomic radius, and (c) maximum chemical reactivity? Justify your answer stating the reason for each.

Answer.

As the elements Na, Mg and Al belong to the same period (3rd period) and group 1, 2 and 13 respectively. Hence the electronic configurations of these three elements can be written as follows:

Sodium, Na (11) = 2, 8, 1

Magnesium, Mg (12) = 2, 8, 2

Aluminium, Al (13) = 2, 8, 3

(a) The element which can lose or gain maximum number of electron will have the maximum valency. Here, Aluminium having configuration 2, 8, 3 will lose all 3 valence electrons to attain stable configuration hence it will have highest valency among all.

(b) As all three elements belong to the same radius in order Na(11), Mg(12), Al(13) and we know that the atomic size decreases on moving from left to right across a period. Therefore the element having the largest atomic radius will be sodium (Na).

(c) The given three elements are metals and we know that the the chemical reactivity of a metal is determined by its metallic character, i.e., its tendency to lose the valence electrons.
Now, the tendency to lose the electrons dereases across the period, i.e., from left to right. So, the element having highest chemical reactivity is sodium (Na).

Question 11. Reproduction is one of the most important characteristics of living beings. Give three reasons in support of the statement.

Answer.

Reproduction is the process of producing one of our kinds and is one of the most important characteristics of living beings due to the following reasons:
1. Reproduction helps to continue the population of a specie.
2. With the process of reproduction being carried out, the risk of extinction of a species is minimized.
3. It helps in evolution of species by bringing about variations in their characters.

Question 12. What is vegetative propagation? State two advantages and two disadvantages of this method.

Answer.

Vegetative propagation is a mode of asexual reproduction in which new plants are obtained from vegetative parts like stem, root, leaf etc. of the parent plant.

Two advantages of vegetative propagation are:

1. It is suitable for reproduction in plants which do not produce seeds. For example, potato, rose etc.

2. This method of propagation is easier, rapid and more economical than the reproduction of plants from their seeds.

Two disadvantages of vegetative propagation are:

1. As there is no genetic variation, No new varieties can be produced with better or improved traits.

2. Plants produced by this method are more susceptible to diseases as the entire plant may get affected as there is no genetic variation.

Question 13. List three techniques that have been developed to prevent pregnancy. Which one of these techniques is not meant for males? How does the use of these techniques have a direct impact on the health and prosperity of a family?

Answer.

Three techniques that have been developed to prevent pregnancy are:

(i) **Mechanical methods**: Use of condoms, diaphragms, IUDs, etc.

(ii) **Chemical methods**: Include oral contraceptive pills, spermicides, etc.

(iii) **Surgical methods**: Include vasectomy and tubectomy

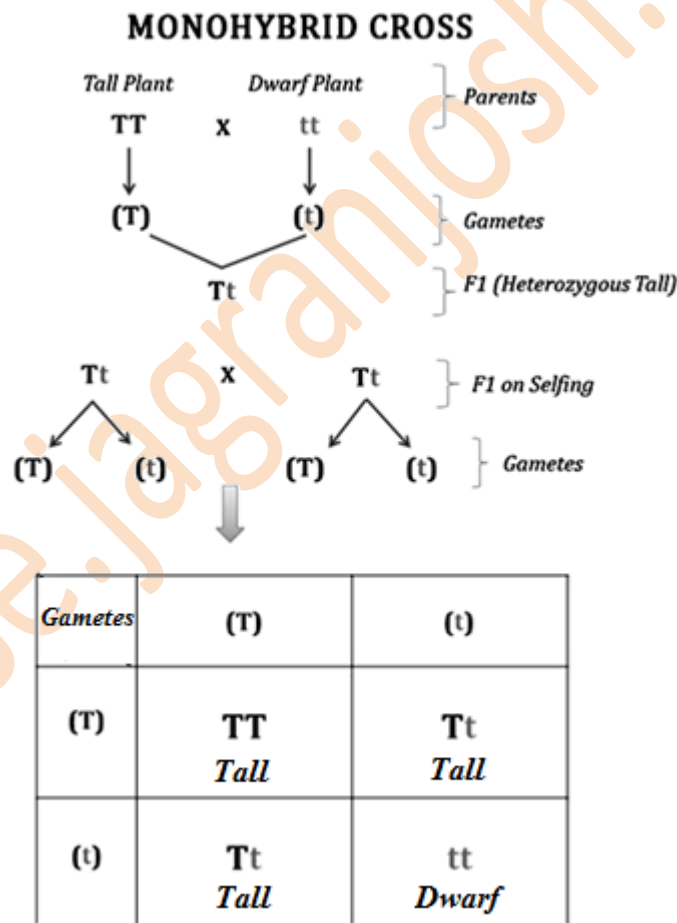Out of these three techniques, chemical methods are not meant for males.

Use of these techniques have the following advantages that directly affect the health and prosperity of a family:

- Use of these contraceptive techniques help in preventing unwanted pregnancies and thus reducing the family size and, thus, increases its prosperity.
- They help to improve the maternal health status by preventing the chances of frequent pregnancies which otherwise reduces mother's health and vitality.
- Use of some contraceptive devices like condoms reduce the chances of getting sexually transmitted diseases such as AIDS.

Question 14. How did Mendel explain that it is possible that a trait is inherited but not expressed in an organism?

Answer.

Not all the characteristics those inherited from the parents, are expressed. Some characters remain hidden and are tremed as recessive. Such recessive traits are suppressed by dominant genes. Mendel explained this phenomenon with the help of his experiment on monohybrid inheritence. In this experiment, Mendeltall crossed a tall plant with a dwarf plant which produced all tall plants in F_1 progeny. However, when these F_1 tall plants were crossed with each other, not all the plants produced were tall but some of them were dwarf, indicating both the traits that of tallness and shortness were inherited in the F_2 plants.which was not observed in the F_1 generation, reappeared in the F_2 generation.

MONOHYBRID CROSS

Tall Plant		Dwarf Plant	
TT	X	tt	Parents
(T)		(t)	Gametes
	Tt		F1 (Heterozygous Tall)
Tt	X	Tt	F1 on Selfing
(T) (t)		(T) (t)	Gametes

Gametes	(T)	(t)
(T)	TT *Tall*	Tt *Tall*
(t)	Tt *Tall*	tt *Dwarf*

With this experiment Mendal proved that the traits of dwarfness which were suppressed in the F_1 generation by the tallness traits and reappeared in the F_2 generation. So, we can say that a trait that is inherited may not be expressed in an organism.

Question 15. "Evolution and classification of organisms are interlinked." Give reasons to justify this statement.

Answer.

Classification refers to the grouping and naming of organisms based on the similarities and dissimilarities among organisms. Organisms having same type of features and level of development are kept in the same class. While carrying out the process of classification if we track the origin of organisms we conclude that they all are developed from the common ancestors and the new characters which we observe today are developed due to the evolutionary changes in the ancestral characteristics. So throughout the classification process we are actually tracing the path of evolution.

Actually evolution is the sequence of gradual changes over millions of years in which new species are produced. Classification of species is done by knowing the characteristics which evolved over a long period of time. So, the order followed while carrying out the classification process, we get familiar with the evolutionary relationships among the organisms. Common ancestors can also be predicted with the help of classification. The more characters two species have in common, the more closely they are related, and thus, more recently they will have had a common ancestor. Hence, we can say that the evolution and classification of organisms are interlinked.

Question 16. If the image formed by a lens for all positions of an object placed in front of it is always erect and diminished, what is the nature of this lens? Draw a ray diagram to justify your answer. If the numerical value of the power of this lens is 10 D, what is its focal length in the Cartesian system ?

Answer.

A concave lens always forms an erect and diminished image for all positions of an object placed in front of it.

Ray diagram for the image formed by a concave lens:
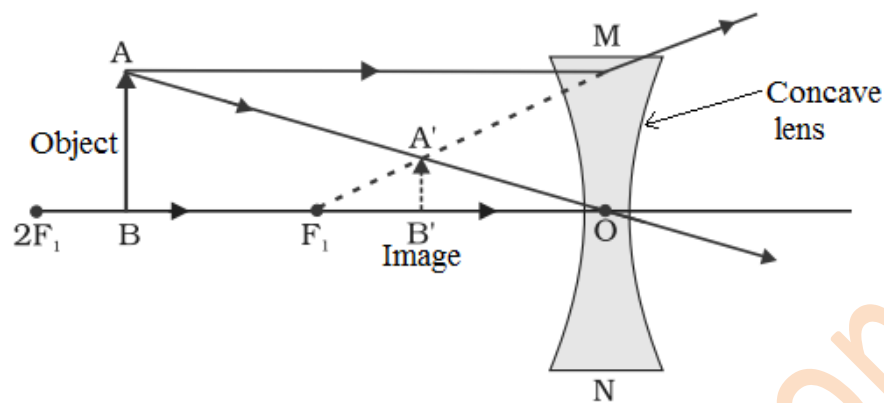
Now, numerical value of the power of this lens is given as 10 D.

Since, it is a concave lens,

$\therefore$ Power of the lens $= -10$ D

Formula for the power of a lens is given as,

$$P = \frac{1}{f \, (\text{in metres})}$$

$$\Rightarrow -10 = \frac{1}{f}$$

$$\Rightarrow \quad f = -\frac{1}{10} = -0.1 \text{m}$$

Hence, the focal length of the lens is -0.1 m.

Question 17. State the cause of dispersion of white light by a glass prism. How did Newton, using two identical glass prisms, show that white light is made of seven colours? Draw a ray diagram to show the path of a narrow beam of white light, through a combination of two identical prisms arranged together in inverted position with respect to each other, when it is allowed to fall obliquely on one of the faces of the first prism of the combination.

Answer.

Light rays of different colours travel with the same speed in vacuum and air but in any other medium, they travel with the different speeds and bend through the different angles or get refracted because the different component of light faces different refractive indices when passing through a medium. In the same way, when a beam of white light enters a prism, it gets refracted

at point and splits into its seven constituent colours, viz. violet, indigo, blue, green, yellow, orange, and red.

In order to show the dispersion of white light, Newton made a ray of white light to fall on a prism. The ray of white light on passing through the medium splits into seven colours. Newton then placed an inverted prism in the path of a colour band of seven colours. The second prism receives all the seven coloured rays from first prism and recombines them into, original white light. This observation shows that that white light comprises of seven component colours.
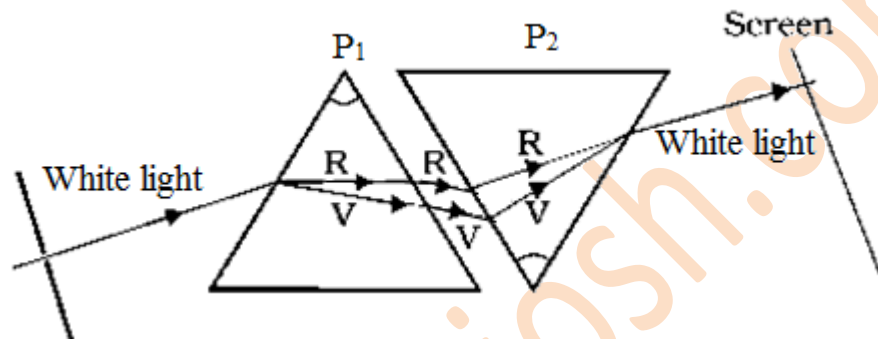
Question 18. (a) Water is an elixir of life, a very important natural resource. Your Science teacher wants you to prepare a plan for a formative assessment activity, "How to save water, the vital natural resource". Write any two ways that you will suggest to bring awareness in your neighbourhood, on 'how to save water'.
(b) Name and explain any one way by which the underground water table does not go down further.

Answer.

(a) Water is one of the most precious natural resources which makes the life exist on the earth. The most of the part of our body is made of water. It helps the various body cells to function normal and regular. However, the amount of fresh water available for sustaining life is very less. So, it is very important to conserve water. For that, we can adopt following two ways:
(i) Reduce the consumption and wastage of water: People must avoid the wasatage of water by not letting it run down uselessly. Turn off the taps during brushing or washing clothes/utensils, or by using buckets instead of showers for bathing, etc.
(ii) Reuse the water wherever possible: The water used for washing fruits and vegetables can be preserved and used for other purposes, like washing cars, watering the flower pots, etc.

(b) Rainwater harvesting is the most efficient method used for recharging the underground water table. Rainwater harvesting is a process by which rain water is collected and stored for the purpose of recharging the ground water or for future use like for irrigation and agriculture. By

capturing water directly, we can significantly reduce our reliance on water storage dams.
There are generally two ways of rainwater harvesting:

(i) Surface runoff harvesting: In urban areas, rain water that flows away from the surface can
be collected and used for various purposes.

(ii) Rooftop rainwater harvesting: The rainwater on the roofs of the buildings is collected that
is drained into ground reservoirs. This stored water is later utilised for various purposes like
irrigation, washing, cleaning etc.

Question 19. Why are certain compounds called hydrocarbons? Write the general formula for
homologous series of alkanes, alkenes and alkynes and also draw the structure of the first
member of each series. Write the name of the reaction that converts alkenes into alkanes and also
write a chemical equation to show the necessary conditions for the reaction to occur.

Answer.

The compounds which are purely consisted of carbons and hydrogens are known
as Hydrocarbons. They are divided into different categories. Some of the important categories
are given below:

(i) Saturated Hydrocarbons: These are the hydrocarbons which contain all the single bonded
carbon atoms. They include alkanes having the general formula as C_nH_{2n+2}. The first member of
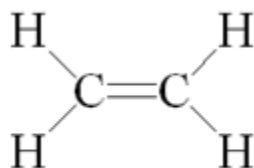homologous series of alkanes is methane (CH_4).
Structure of methane is as follows:
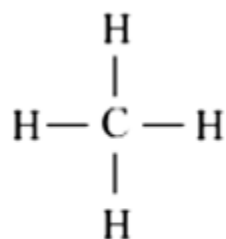
Methane

Unsaturated Hydrocarbons: These are the hydrocarbons which contain at least one double or
triple bond between two adjacent carbon atoms. This includes alkenes and alkynes having
general formula C_nH_{2n} and C_nH_{2n-2}, respectively. The first member of homologous series of
alkenes is Ethene (C_2H_4).

Structure of ethene is as follows:

Ethane

The first member of homologous series of alkynes is Ethyne (C_2H_2) having structural formula:
Structure of ethyne is as follows:

Ethyne

Conversion of alkenes to alkanes:
The reaction which converts unsaturated hydrocarbons to saturated hydrocarbons, i.e. alkenes to alkanes is know as Hydrogenation Reaction.
The reaction is as follows:
Hydrogen can be added to unsaturated hydrocarbons in the presence of nickel to yield saturated hydrocarbons. In this reaction, nickel acts as a catalyst.

Ethylene   Hydrogen   Ethane
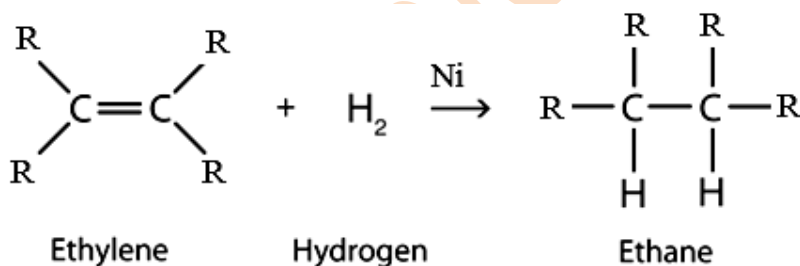
Question 20. (a) Write the functions of each of the following parts in a human female reproductive system:
(i) Ovary
(ii) Uterus
(iii) Fallopian tube
(b) Write the structure and functions of placenta in a human female.

Answer.

(a) **Functions of the Ovary:**
(i) It produces female gametes (ova). One ovum is released by one ovary every month.
(ii) It secretes female sex hormones (estrogen and progesterone).
Functions of the Uterus:

(i) It protects and nourishes the developing foetus.

(ii) It provides sufficient space for the growing embriyo.

Functions of Fallopian tube:

(i) It passes down the ovum towards the uterus released by the ovary.

(ii) It acts as the site of fertilisation.

(b) Structure of the placenta in human female:

- Placenta is a disc embedded in the uterine wall which is the connecting link between the mother's body and the baby.
- It contains villi on the embryo's side of the tissue. The mother's end of the placenta has blood spaces which surround the villi.

Functions of placenta in human female:

- Placenta functions as a site of exchange of materials between the blood of mother and foetus.
- It provides a large surface area for glucose and oxygen to pass from the mother to the baby.
- The foetus gives away waste products and carbon dioxide to the mother's blood for excretion.

Question 21. Write the help of one example for each, distinguish between the acquired traits and the inherited traits. Why are the traits/experiences acquired during the entire lifetime of an individual not inherited in the next generation? Explain the reason of this fact with an example.

Answer.

Differences between acquired and inherited traits are as follows:

S. No.	Acquired Traits	Inherited Traits
1.	Acquired traits are those that are developed by an individual during his/her lifetime.	Inherited traits are the qualities or characteristics present in an individual since birth.
2.	They are a result of changes in non-reproductive tissues (somatic cells).	They are a result of changes in the DNA.
3.	They cannot be passed on to the progeny.	They are transmitted to the progeny.

4.	Examples: Pierced ear, large muscle size, etc	Examples: Colour of eyes, skin or hair

Only those traits can be passed on to the next generation which have some direct effect on the genes. The traits acquired during the lifetime of an individual cannot be inherited as they do not affect the genetic make up of an organism. Such traits develop only due to the human activities or due to direct affect of environment. Thus, they are not passed on to the next generation. For example, if a person acquires a lean body shape by taking part in the the physical workout sessions then it does not mean that his offspring will have the same body structure.

Question 22. Analyse the following observation table showing variation of image-distance (v) with object-distance (u) in case of a convex lens and answer the questions that follow without doing any calculations :

S. No.	Object-Distance u (cm)	Image-Distance v (cm)
1	−100	+25
2	−60	+30
3	−40	+40
4	−30	+60
5	−25	+100
6	−15	+120

(a) What is the focal length of the convex lens? Give reason to justify your answer.
(b) Write the serial number of the observation which is not correct. On what basis have you arrived at this conclusion?
(c) Select an appropriate scale and draw a ray diagram for the observation at S.No. 2. Also find the approximate value of magnification.
Answer.

(a) From the third observation we can say that the radius of curvature of the lens is 40 cm because when an object is placed at the centre of curvature of a convex lens its image is formed on the other side of the lens at the same distance from the lens. And, we also know that focal length is half of the radius of curvature. Thus, focal length of the lens is + 20 cm.

(b) Observation given in serial number 6 is not correct as the object distance is between focus and pole so for such cases the image formed is always virtual but here the image formed is real real as the image distance is given to be positive.

(c) Approximate value of magnification of object distance −60 cm and image distance + 30 cm is − 0.5.
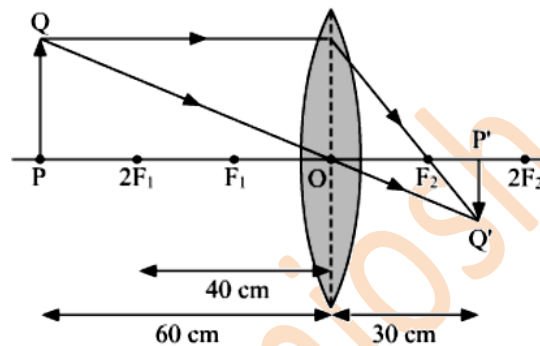
Question 23. (a) If the image formed by a mirror for all positions of the object placed in front of it is always diminished, erect and virtual, state the type of the mirror and also draw a ray diagram to justify your answer. Write one use such mirrors are put to and why.

(b) Define the radius of curvature of spherical mirrors. Find the nature and focal length of a spherical mirror whose radius of curvature is +24 cm.

Answer.

(a) It is the convex mirror which always forms a diminished, erect and virtual image for all positions of the object placed in front of it.

Ray diagram is shown below:
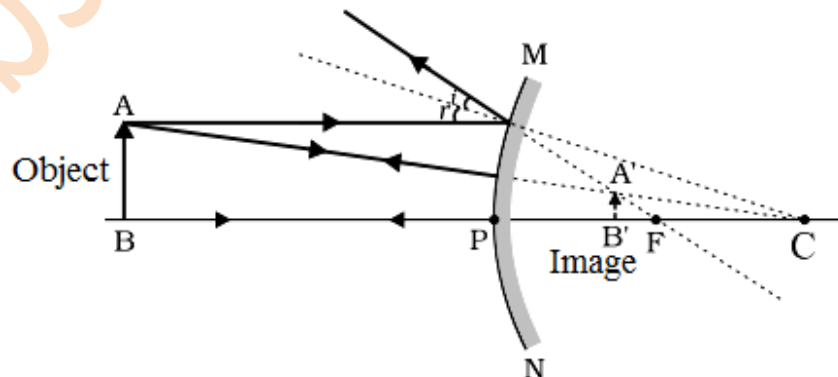
Use of convex mirror:
It is used as a side view mirror in vehicles because it forms an erect, virtual and diminished image providing a wider view of the area behind the vehicle.

(b) **Radius of curvature**
The distance (PC) between the centre of curvature and pole of a spherical mirror is known as the radius of curvature.

Concave mirror   Convex mirror
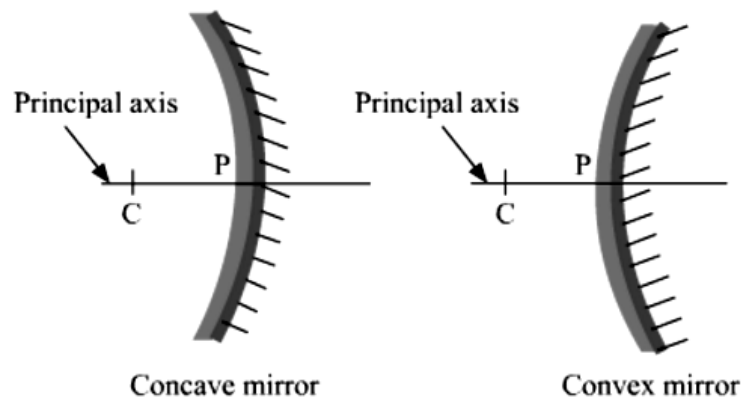
The radius of curvature of the given spherical mirror is, $R = +24$ cm
So, its focal length, $f = R/2 = 24/2 = +12$ cm
Therefore, the focal length of the mirror is 12 cm.
Since the focal length of the given mirror is positive, the mirror is convex mirror.

Question 24. (a) A student suffering from myopia is not able to see distinctly the objects placed beyond 5 m. List two possible reasons due to which this defect of vision may have arisen. With the help of ray diagrams, explain
(i) why the student is unable to see distinctly the objects placed beyond 5 m from his eyes.
(ii) the type of the corrective lens used to restore proper vision and how this defect is corrected by the use of this lens.
(b) If, in this case, the numerical value of the focal length of the corrective lens is 5 m, find the power of the lens as per the new Cartesian sign convention.

Answer.

(a) Two possible reasons due to which this defect of vision may have arisen are:
 • increase in curvature of the lens
  • increase in length of the eyeball
(i) A myopic eye has its far point is 5 m instead of being at infinity. Due to which the image of the object placed beyond 5 m from his eyes is formed in front of the retina but not on the retina.

Due to this the image appears blurred. That is why the student is unable to see distinctly the objects placed beyond 5 m from his eyes.
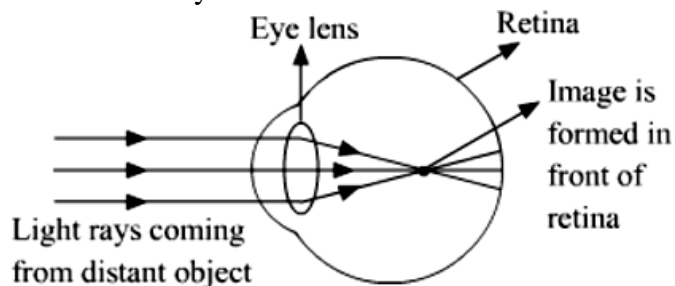
(ii) To correct the myopic eye, a concave lens of suitable power is used as it has an ability to diverge incoming rays, allowing the image to form on retina.
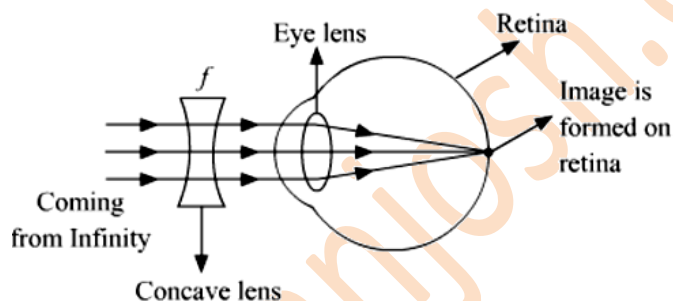
(b) Power of the required corrective lens, $P = -\dfrac{1}{f\,(\text{in m})}$

$$P = -\dfrac{1}{5} = -0.2\text{D}$$

Hence, the power of corrective lens is −0.2 D.

<div align="center">

Section B

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Question 25. When you add a few drops of acetic acid to a test-tube containing sodium bicarbonate powder, which one of the following is your observation?

(A) No reaction takes place

(B) A colourless gas with pungent smell is released with brisk effervescence

(C) A brown coloured gas is released with brisk effervescence

(D) Formation of bubbles of a colourless and odourless gas

Answer. (D) Formation of bubbles of a colourless and odourless gas

Explanation:

When a few drops of acetic acid are added to a test-tube containing sodium bicarbonate powder its leads to the formation of sodium acetate along with release of carbon dioxide gas, which is colourless and odourless gas.

Question 26. While studying the saponification reaction, what do you observe when you mix an equal amount of colourless vegetable oil and 20% aqueous solution of NaOH in a beaker?
(A) The colour of the mixture has become dark brown
(B) A brisk effervescence is taking place in the beaker
(C) The outer surface of the beaker has become hot
(D) The outer surface of the beaker has become cold

Answer. (C) The outer surface of the beaker has become hot

Explanation:

While studying saponification reaction, when equal amount of colourless vegetable oil and 20% aqueous solution of NaOH are mixed in a beaker, the beaker becomes hot due to the release of heat because saponification is an exothermic reaction.

Question 27. A student requires hard water for an experiment in his laboratory which is not available in the neighbouring area. In the laboratory there are some salts, which when dissolved in distilled water can convert it into hard water. Select from the following groups of salts, a group, each salt of which when dissolved in distilled water will make it hard.
(A) Sodium chloride, Potassium chloride
(B) Sodium sulphate, Potassium sulphate
(C) Sodium sulphate, Calcium sulphate
(D) Calcium sulphate, Calcium chloride

Answer. (D) Calcium sulphate, Calcium chloride

Explanation:

Hardness of water occurs due to the presence of calcium and magnesium ions. Hydrogencarbonate, sulphate and chloride of these ions make the water hard. Therefore, student need to dissolve calcium sulphate and calcium chloride in distilled water to convert it into hard

water.

Question 28. To perform an experiment to identify the different parts of an embryo of a dicot seed, first of all you require a dicot seed. Select dicot seeds from the following group:

Wheat, Gram, Maize, Pea, Barley, Ground-nut

(A) Wheat, Gram and Pea

(C) Maize, Pea and Barley

(D) Gram, Maize and Ground-nut

Answer. (B) Gram, Pea and Ground-nut

Explanation:

Dicots have two seed leaves inside the seed coat whereas monocots have only one seed leaf inside the seed coat. Here, gram, pea and groundnut are the dicots and the rest are monocots.

Question 29. The following vegetables are kept in a basket :

Potato, Tomato, Radish, Brinjal, Carrot, Bottle-gourd

Which two of these vegetables correctly represent the homologous structures?

(A) Carrot and Tomato

(B) Potato and Brinjal

(C) Radish and Carrot

(D) Radish and Bottle-gourd

Answer. (C) Radish and Carrot

Explanation:

Out of all the given vegetables, only radish and carrot represent the homologous structures, as both of them are modified roots.

Question 30. Study the given ray diagrams and select the correct statement from the following: **(1)**
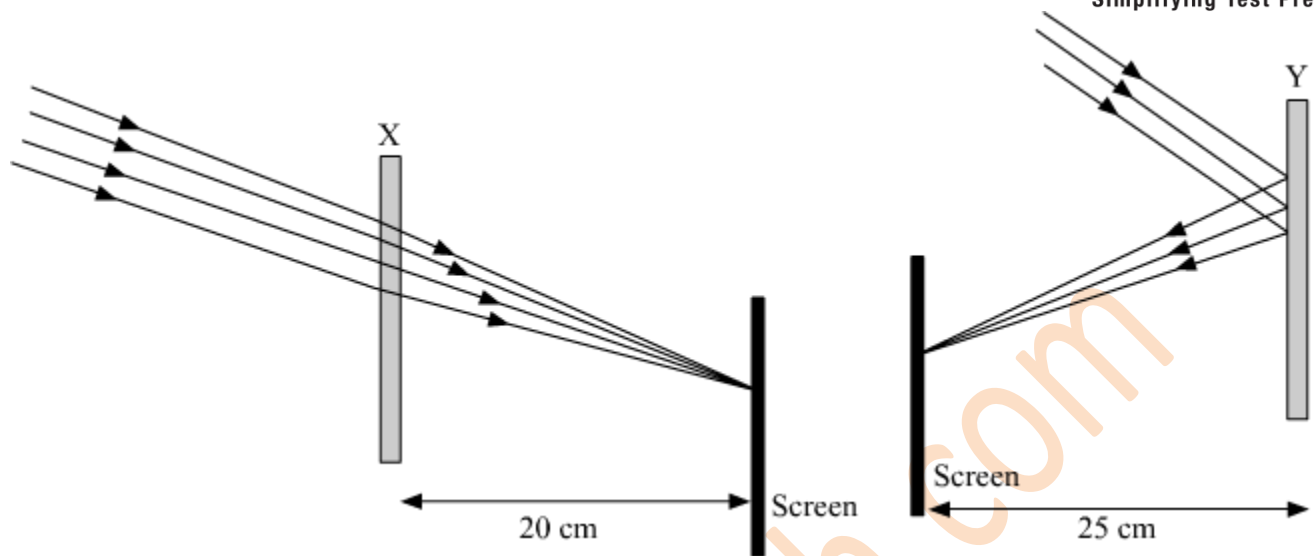
(A) Device X is a concave mirror and device Y is a convex lens, whose focal lengths are 20 cm and 25 cm respectively.

(B) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 10 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.

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

Explanation:

Here device X is convex lens because for a convex lens light rays which are parallel to each other but not to the principle axis come to meet on the focal plane. As, the distance between the focal plane and the lens gives the focal length of the lens so the focal length of the device X is 20 cm.

Device Y is concave mirror since for a concave mirror light rays which are parallel to each other but not to the principle axis, get reflected to meet on the focal plane. Also, the distance between the focal plane and the lens is equal to the focal length of the mirror. Thus the focal length of the device Y is 25 cm.

Question 31. 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

Answer. (D) either towards or away from the screen depending upon the position of the object

Explanation:

Here, no information is given about the position of the object. So, to obtain the distinct image the lens nedd to be moved as per the position of the object.

If the object is very far away, it would form the image close to focal length of concave mirror.
If the object is at center of curvature, the image would also lie at same distance.
If the object is closer than the center of curvature (but farther than focal length) then the image will be formed farther than center of curvature.
If the object is closer than the focal length, the image will be virtual and never obtainable on a screen.

Question 32. 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 analysing these measurements of angles, his conclusion would be

(A) $\angle i > \angle r > \angle e$

(B) $\angle i = \angle e > \angle r$

(C) $\angle i < \angle r < \angle e$

(D) $\angle i = \angle e < \angle r$

Answer. (B) $\angle i = \angle e > \angle r$

Explanation:

When a light ray is made to strike the wall of a glass slab it emerges out from the other side in a direction partallel to the incident ray, therefore the angle of incidence is always equal to the angle of emergence
$\angle i = \angle e$ ..... (i)

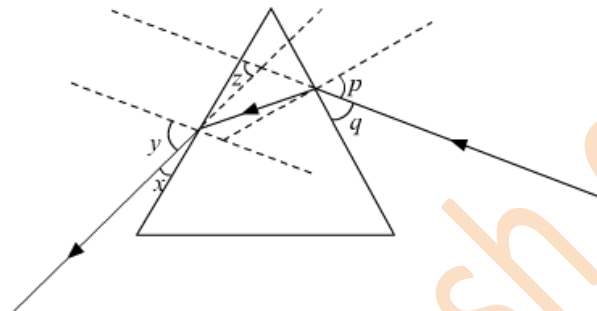Again, when a light ray travels from rarer to the denser medium, it bends towards the normal.
Hence

$\angle i > \angle r$ ..... (ii)

So, using relations (i) and (ii), we get

$\angle i = \angle e > \angle r$

Question 33. Study the following ray diagram:

In this diagram, the angle of incidence, the angle of emergence and the angle of deviation respectively have been represented by

(A) y, p, z

(B) x, q, z

(C) p, y, z

(D) p, z, y

Answer. (C) p, y, z

Explanation:

Angle formed between the the incident ray and the normal ray is called the angle of incidence. So here p represents angle of incidence.
Again the angle formed between the emergent ray and the normal ray is called the angle of emergence. Therefore, here y represents the angle of emergence.
Also the formed between the emergent ray and the incident ray is termed as the angle of deviation which is represented by z in the given diagram.

Question 34. Mention the essential material (chemicals) to prepare soap in the laboratory. Describe in brief the test of determining the nature (acidic/alkaline) of the reaction mixture of saponification reaction.

Answer.

The essential material (chemicals) required to prepare soap in the laboratory are: Vegetable oil or fat and sodium hydroxide solution.

$$\text{Fat or oil} + \text{NaOH} \xrightarrow{\text{Heat}} \text{Soap} + \text{Glycerol}$$
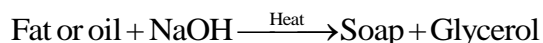
In order to determine the nature of the reaction mixture of saponification reaction, a red litmus paper is dipped into the reaction mixture which will turn blue indicating the basic nature of the mixture.

Question 35. Draw in sequence (showing the four stages), the process of binary fission in Amoeba.

Answer.

The four steps of binary fission in *Amoeba* are shown in the following figures:

1 Parent cell   2 Nucleus divides

3 Cytoplasm divides   4 Two daughter cells
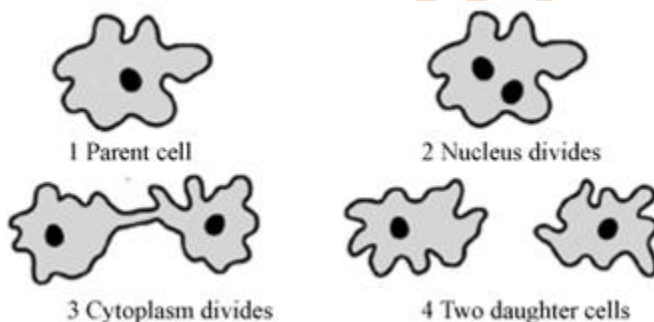
Question 36. A student focuses the image of a candle flame, placed at about 2 m from a convex lens of focal length 10 cm, on a screen. After that he moves gradually the flame towards the lens and each time focuses its image on the screen.
(A) In which direction does he move the lens to focus the flame on the screen?
(B) What happens to the size of the image of the flame formed on the screen?
(C) What difference is seen in the intensity (brightness) of the image of the flame on the screen?
(D) What is seen on the screen when the flame is very close (at about 5 cm) to the lens?

Answer.

(A) He moves the lens away from the screen to focus the image.

(B) Size of the image increases.

(C) The intensity of image decreases as the flame moves towards the lens.

(D) No distinct image is formed on the screen as in this case the image formed is virtual which can't be obtained on the screen.

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