पुथना International School
Shree Swaminarayan Gurukul, Zundal

CLASS – VII
SCIENCE(SEM-2)
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SCIENCE

TEXTBOOK FOR CLASS VII

SCIENCE

CLASS VII

NCERT

INDEX

Chapter – 15
Light

Key words:

- **Light:** It is the natural agent that stimulates sight and makes things visible.
- Light travels along straight line.
- Any polished or a shining surface acts as a mirror.
- An image which can be obtained on a screen is called a **real image**. It is formed by light rays that actually pass through the screen.
- An image which cannot be obtained on a screen is called a **virtual image**. It is formed by light rays that seem to pass through the screen.
- The image formed by a plane mirror is erect. It is virtual and is of the same size as the object.
- The image is at the same distance behind the mirror as the object is in front of it.
- In an image formed by a mirror, the left side of the object is seen on the right side in the image, and right side of the object appears to be on the left side in the image.
- A **concave mirror** can form a real and inverted image. When the object is placed very close to the mirror, the image formed is virtual, erect and magnified.
- A **Convex mirror** is the mirror that curves out; the reflecting surface is convex. Image formed is virtual, upright and diminished. Image formed by a convex mirror is erect, virtual and smaller in size than the object.
- A **Concave lens** is the lens that is thinner at the center than at the edges. It is a diverging lens. Image formed is virtual, erect and diminished.
- A **convex lens** can form real and inverted image. When the object is placed very close to the lens, the image formed is virtual, erect and magnified. When used to see objects magnified, the convex lens is called a magnifying glass.
- White light is composed of seven colors.

- **Properties of Light**:

1. **Rectilinear Propagation of Light:** It is the property of light by which it travels in a straight line in any direction. The direction of path in which light make a ray.

2. **Reflection of Light:** It is the bouncing back of light after striking the surface of an object. Shiny smooth surfaces reflect almost all the light.

3. **Dispersion:** It is the phenomenon of splitting of white light into its seven colors. White light is mixture of: Violet, Indigo, Blue, Green, Yellow, Orange and Red (VIBGYOR) colors.

VERY SHORT ANSWER QUESTIONS

1. The image formed by a lens is always virtual, erect and smaller in size for an object kept at different positions in front of it. Identify the nature of the lens.

Ans. The image formed by a concave lens is always virtual, erect and smaller in size than the object.

2. Fill in the blanks:

(a) The inner surface of a steel spoon acts as a _____ mirror.

(b) The outer surface of a flat steel plate acts as a _____ mirror.

(c) The outer shining surface of a round bottom steel bowl acts as a _____ mirror.

(d) The inner surface of the reflector of a torch acts as a _____ mirror.

Ans. (a) concave

(b) plane

(c) convex

(d) concave

3. State whether the following statements are True or False.

(a) A concave lens can be used to produce an enlarged and erect image.

(b) A convex lens always produces a real image.

(c) The sides of an object and its image formed by a concave mirror are always interchanged.

(d) An object can be seen only if it emits light.

Ans. (a) False – Concave lens always produce an erect, virtual and smaller image of an object.

(b) False – A convex lens forms a real and inverted image but it may produce a virtual, erect and magnified image if the object is placed very close to the lens.

(c) True

(d) False – It is not always true because objects can be seen if they reflect the light falling on its surface.

SHORT ANSWER QUESTIONS

1. What type of mirror is used as a side mirror in a scooter? Why is this type of mirror chosen?

Ans. Convex mirror is used as side mirror in a scooter because it can form dimnished and upright images of objects spread over a large area. So it enables drivers to see the traffic of a large area behind them.

2. Observe the figures given as Figure 15.1 carefully.

Fig 15.1

The given figures show the path of light through lenses of two different types, represented by rectangular boxes A and B. What is the nature of lenses A and B?

Ans. A – Convex lens - it converges the light ray falling on it;

B – Concave lens- it diverges the light ray falling on it.

3. Boojho made light from a laser torch to fall on a prism. Will he be able to observe a band of seven colours? Explain with a reason.

Ans. No, laser torch gives out light of only one colour.

Prisms bend different colors at different amounts. So when we shine a torch light in, all of the different colors bend differently and get separated. (This is how we get a rainbow - by spreading the colors apart.) Laser light , on the other hand, is made up of only one color. Some of them are only red and some of them are only green, but they're only that color. So when we shine a laser through a prism, there's nothing to be separated, and the light stays together.

4. State the correct sequence (1-7) of colours in the spectrum formed by the prisms A and B, shown in Figure 15.2.

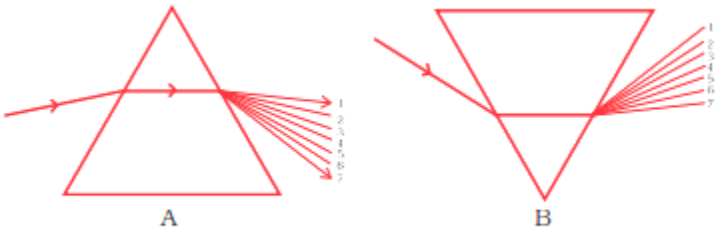


Fig 15.2

Ans. 1 → Red ← 7

2 → Orange ← 6

3 → Yellow ← 5

4 → Green ← 4

5 → Blue ← 3

6 → Indigo ← 2

7 → Violet ← 1

5. The side mirror of a scooter got broken. The mechanic replaced it with a plane mirror. Mention any inconvenience that the driver of the scooter will face while using it?

Ans. The driver will not be able to see traffic spread over a large area behind him as plane mirror will form image of same size that of an object but convex mirror can form dimnished image so that it can cover large area.

6. The concave reflecting surface of a torch got rusted. What effect would this have on the beam of light from the torch?

Ans. Reflection of light can't occur from rusted surface of torch so beam of light will get diffused and diminished. If the rusting is too much no light beam can pass from such surface.

7. An erect and enlarged image of an object is formed on a screen. Explain how this could be possible.

Ans. The image formed on the screen could be enlarged and erect if the object is placed upside down between F and 2F of the lens.

8. Two different type of lenses are placed on a sheet of newspaper. How will you identify them without touching?

Ans. If the letters appear bigger/magnified, then the lens is a convex lens. If the letters appear smaller, then the lens will be concave lens.

9. A shopkeeper wanted to fix a mirror which will give a maximum view of his shop. What type of mirror should he use? Give reason.

Ans. He will fix a convex mirror because it can form dimnished images of object and cover large area.

10. The distance between an object and a convex lens is changing. It is noticed that the size of the image formed on a screen is decreasing. Is the object moving in a direction towards the lens or away from it?

Ans. The object is moving away from the lens. Because it produces magnified image if the object is placed very close to the lens. But in this case the size of the image is decreasing and hence the object is moving far away.

LONG ANSWER QUESTIONS

1. Suppose we wish to obtain the real image of a distant tree. Explain two possible ways in which we can do it.

Ans. Hint : (i) By using a concave mirror and a screen - if the tree is beyond the focus of the concave mirror then the image formed is real, Inverted and in front of the mirror.

(ii) By using a convex lens and a screen- If the tree is beyond its focus then the convex lens creates a real and inverted image of the tree formed on the other side of the incident ray

2. It was observed that when the distance between an object and a lens decreases, the size of the image increases. What is the nature of this lens? If you keep on decreasing the distance between the object and the lens, will you still able to obtain the image on the screen? Explain.

Ans. If the size of image increases with the decrease in distance between the object and the mirror then the lens is a convex lens.

No, by decreasing the distance between the object and the lens we will not be able to obtain the image on the screen because if the object is placed too close to a convex lens then the image formed is virtual which cannot be obtained on screen.

3. You are given three mirrors of different types. How will you identify each one of them?

Ans. First, by looking at the reflecting surface , we can identify the type of mirror - Plane mirror or spherical mirror (concave and convex mirror)

Secondly, Using the mirrors to get the image of an object will help out to distinguish between the mirrors.

a) Image formed by plane mirror is virtual ,erect and is of same size as that of the object.

b)Image formed by concave mirror is real, inverted and magnified.

c) Image formed by convex mirror is virtual ,erect and dimnished .

TEXTUAL EXERCISE

Question 1. Fill in the blanks:

(a)An image that cannot be obtained on a screen is called ----------.

(b)Image formed by a convex ---------- is always virtual and smaller in size.

(c)An image formed by a ---------- mirror is always of the same size as that of the object.

(d)An image which can be obtained on a screen is called a --------- image.

(e)An image formed by a concave ---------- cannot be obtained on a screen.

Answer: Fill in the blanks:

(a) An image that cannot be obtained on a screen is called **virtual image**.

(b) Image formed by a convex **mirror** is always virtual and smaller in size.

(c) An image formed by a **plane** mirror is always of the same size as that of the object.

(d) An image which can be obtained on a screen is called a **real** image.

(e) An image formed by a concave **lens** cannot be obtained on a screen.

Question 2. Mark "T" if the statement is true and "F' if it is false.

(a) We can obtain an enlarged and erect image by a convex mirror. (T/F)

(b) A concave lens always forms a virtual image. (T/F)

(c) We can obtain a real, enlarged and inverted image by a concave mirror. (T/F)

(d) A real image cannot be obtained on screen. (T/F)

(e) A concave mirror always forms a real image. (T/F)

Answer: (a) F

(b) T

(c) T

(d) F

(e) F

Question 3. Match the items given in Column I with one or more item of Column II.

(a) A plane mirror	(i) used as magnifying glass.
(b) A convex mirror	(ii) can form image of objects spread over large area.

(c) A convex lens	(iii) used by dentist to see enlarged image of teeth.
(d) A concave mirror	(iv) the image is always inverted and magnified.
(e) A concave lens	(v) the image is erect and of the same size than object.
	(vi) the image is erect and smaller in size than the object.

Answer: (a) (v)

(b) (ii)

(c) (i)

(d) (iii)

(e) (vi)

Question 4. State the characteristic of the image formed by a plane mirror.

Answer: Characteristics of the image formed by a plane mirror:
(i) The image formed is virtual
(ii) The image is laterally inverted.
(iii) It is of the same size as the object.
(iv) The image is situated at the same distance from the mirror as the object.
(v) The image is erected.

Question 5. Find out the letters of English alphabet or any other language known to you in which the image formed in plane mirror appears exactly like the letter itself. Discuss your findings.

Answer: A, H, I, M, O, T, U, V, W, X, Y are the letters of English alphabet in which the image formed in a plane mirror appears exactly like the letter itself.

Question 6. What is a virtual image? Give one situation where a virtual image is formed.

Answer: The image that cannot be formed or obtained on the screen is called virtual image. When we stand in front of our dressing table mirror, we use to see our virtual image. The virtual

image is formed in case of plane and convex mirror.

Question 7. State the differences between convex and a concave lens.

Answer: Difference between convex lens and concave lens:

Convex lens	Concave lens
1. Thick at middle, thin at edge. 2. Can form real image. 3. Converges light falling on it	1. Thin at middle, thick at edge. 2. Cannot form real image. 3. Diverges light falling on it

Question 8. Give one use of a concave and a convex mirror.

Answer: Concave mirror – used by dentist to see enlarged image of teeth.
Convex mirror – used in vehicles as rear view mirror.

Question 9. Which type of mirror can form a real image?

Answer: Concave mirror.

Question 10. Which type of lens forms always a virtual image?

Answer: Concave lens.

Choose the correct option in questions 11-13.

Question 11. A virtual image larger than the object can be produced by a

(i) Concave lens

(ii) Concave mirror

(iii) Convex mirror

(iv) Plane mirror

Answer: (iii) concave mirror.

Question 12. David is observing his image in a plane mirror. The distance between the mirror and his image is 4 m. if he moves 1 m towards the mirror, then the distance between David

and his image will be:

(i) 3 m

(ii) 5 m

(iii) 6 m

(iv) 8 m

Answer: (iii) 6 cm.

Question 13. The rear view mirror of a car is a plane mirror. A driver is reversing his car at a speed of 2 m/s. The driver sees in his rear view mirror the image of a truck parked behind the car. The speed at which the image of the truck appears to approach the driver will be

(i) 1 m/s

(ii) 2 m/s

(iii) 4 m/s

(iv) 8 m/s.

Answer: (iii) 4 m/s.

Chapter – 17
Forests: our lifeline

Key words:

- **Forest:** Large area of land thickly covered with trees, bushes, etc.
- We get various products from the forests around us.
- Forest is a system comprising various plants, animals and micro-organisms.
- In a forest, trees from the uppermost layer, followed by shrubs, the herbs to the lowest layer of vegetation.
- Different layers of vegetation provide food and shelter for animals, birds and insects.
- The various components of the forest are interdependent on one another.
- The forest keeps on growing and changing, and can regenerate.
- In the forest, there is interaction between soil, water, air and living organisms.
- Forests protect the soil from erosion.
- Soil helps forests to grow and regenerate.
- Forests are the lifeline for the forest-dwelling communities.
- Forests influence climate, water cycle and air quality.

- **Deforestation:** Cutting down of trees is known as deforestation.

- **Importance of Forests**:

1. Provide timber.
2. Purify air.
3. Provide shelter.
4. Prevent soil erosion.
5. Control floods.
6. Noise absorbers.

- **Independence of Plants and Animals in Forest:**

1. Plants and animals depends on each other to remain alive.
2. All organisms interact with each other and their physical environment to derive energy and survive.

- **Effects of deforestation:**

1. Amount of carbon dioxide in air will increase, resulting in the increase of earth's temperature. (Global Warming)
2. Animals will not get food and shelter.
3. Soil will not hold water, which will cause floods.
4. Endanger lives and environment.

- **Conservation of Forests**:

1. Do not allow overgrazing.
2. Promote afforestation.
3. Protect wildlife.
4. Control forest fires.

- **Food Chain**: Interdependence between producers and consumers studied in form of various linkage that appears as a chain. or Interdependence of organisms which shows who eats whom.

VERY SHORT ANSWER QUESTIONS

1. Paheli while moving in a forest observed that there was no noise pollution, though lots of heavy vehicles were passing from the nearby highway. Explain why?

Ans. There is no noise pollution inside the forest because the trees absorb the noise.

2. State whether the following statements are true or false. If false, give the correct statement.

(a) Forests influence climate, water cycle and air quality.
(b) In a forest, trees form the uppermost layer, followed by herbs. The shrubs form the lowest layer of vegetation.
(c) The forest keeps on growing and changing and can regenerate.
(d) Forests protect the soil from erosion.

Ans. (a) True

(b) False – In a forest, trees form the uppermost layer, followed by shrubs. The herbs form the lowest layer of vegetation.

(c) True

(d) True

3. Paheli wrote a food chain in the following way:

frog → eagle → insects → grass → snake
The chain is not in the correct order. Help her to write the food chain correctly.

Ans. grass → insects → frog → snake → eagle

SHORT ANSWER QUESTIONS

1. Give names of any four birds which you expect to see in a forest.

Ans. Jungle crow, myna, dove, kingfisher, koel, blue jay, hornbill, forest owlet , great indian bustard , bulbul etc. (any four)

2. Two friends shared their experiences of their vacation trip to two different forests. Do you think they would have seen the same type of plants and animals during their respective trips? Give reason.

Ans. No, they would not have seen the same type of plants and animals. This is so because climatic conditions in the two forests would vary leading to variations and biodiversity in the types of plants and animals.

3. "A bunch of seedlings were seen sprouting on a heap of animal dropping in a forest." How do you think is the seedling benefited from the animal dung?

Ans. The decaying animal dung provides essential nutrients required for the proper growth of the seedlings.

4. Match Column I with Column II

Column I	Column II
(a) Decomposers	(i) dead plant and animal tissues
(b) Canopy	(ii) habitats for wild life

(c) Porcupine	(iii) micro-organisms
(d) Humus	(iv) wild animal
(e) Forest	(v) branches of tall trees.

Ans. (a) (iii);

(b) (v);

(c) (iv);

(d) (i);

(e) (ii)

5. Deforestation may lead to floods. Why?

Ans. If trees are not present, rain hits the ground directly and may flood the area around it. Heavy rain may also damages the soil. Roots of trees bind the soil together, but in their absence the soil is washed away or eroded.

6. Name any four useful products other than wood, which we get from forests.

Ans. Gum, oils, spices, fodder for animals, medicinal plants, oxygen is the main by product etc. (any four).

LONG ANSWER QUESTIONS

1. Figure 17.1 shows a part of a forest.

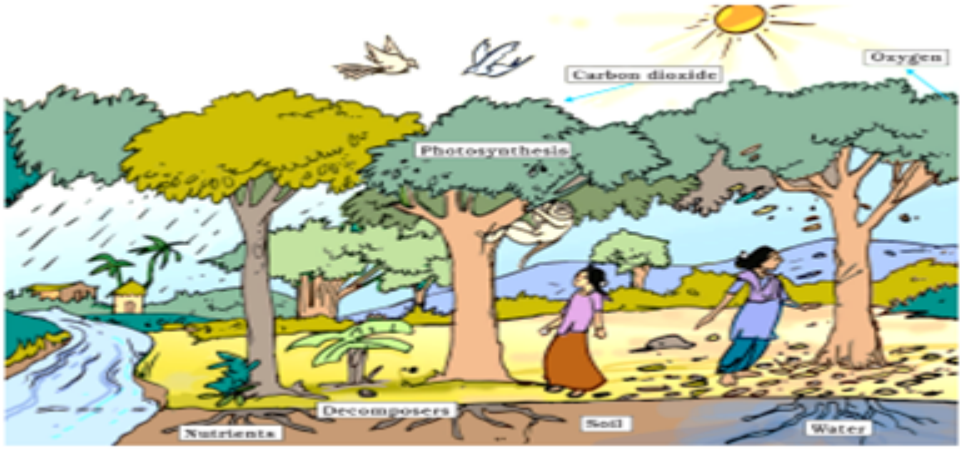


Fig. 17.1

Write any three activities going on in the forest on the basis of this figure

Ans. (i) Oxygen is given out by green leaves with the help of photosynthesis.

(ii) Carbon dioxide is consumed by the plants to prepare their food by the process of photosynthesis.

(iii) Decomposers play an important role in providing nutrients to plants by decomposing dead and decaying matter .

(iv) Roots are holding water and soil particles to replenish ground water and to prevent soil erosion . (Any three)

2. People say that nothing goes waste in a forest. Can you explain, how?

Ans. (i) In a forest, dry leaves and dead animals are converted into humus by the action of decomposers which provides the essential nutrients to the growing plants.

(ii) The dead remains of animals also serve as food for scavengers like vultures, crows, jackals and insects.

(iii) The dry leaves, broken branches and animal dropping serve as fuel for the people living nearby the forest.

3. Give any four factors which are responsible for the destruction of forests.

Ans. (i) Industrial development.

(ii) Increasing demand of wood.

(iii) Construction of roads.

(iv) Construction of buildings

(v) Overgrazing (Any four)

4. Draw a figure showing two animals, two birds and a few trees as a part of a forest.

Ans.

5. All the needs of animals living in a forest are fulfilled. Justify this statement in a few sentences.

Ans. Animals need food, cover, water, and living space to survive .The place that provides these needs is called habitat. Forest serves as a shelter, source for food and water to the animals living there. Food is any material eaten by an organism that gives it energy. Cover provides shelter from adverse weather, protection from predators, is a place to have young ones and a place to rest.Lack of cover can result in death due to exposure or predation. Water is another vital component of habitat. Life is impossible without it.

6. "Forests are our lifeline." Write five sentences on this topic.

Ans. Forests are indeed our lifeline due to following reasons:

(i) Forests serve as an oxygen producer to keep us alive.

(ii) During the process of photosynthesis carbon dioxide gets consumed by the plants for preparing food.

(iii) Wood, gum, medicinal plants and many more things are provided by the forests.

(iv) The roots of plants in forest holds the soil firmly and hence saves the soil from erosion.

(v) They also help in maintaining the ground water level.

TEXTUAL EXERCISE

Question 1. Explain how animals dwelling in the forest help it grow and regenerate.

Answer: Animals dwelling in the forest help in various way for growth and regenerate. Some of them are:
(i) Herbivores animals clear the land by eating grass for the new growth of vegetation.
(ii) Animals also help in the seed dispersal and pollination.
(iii) Dead and decaying bodies of animals convert to humus after decomposition which increase the fertility of the soil of the forest.
(iv) Dung of animals provide nutrient to various types of seedling to grow.

Question 2. Explain how forests prevent floods.

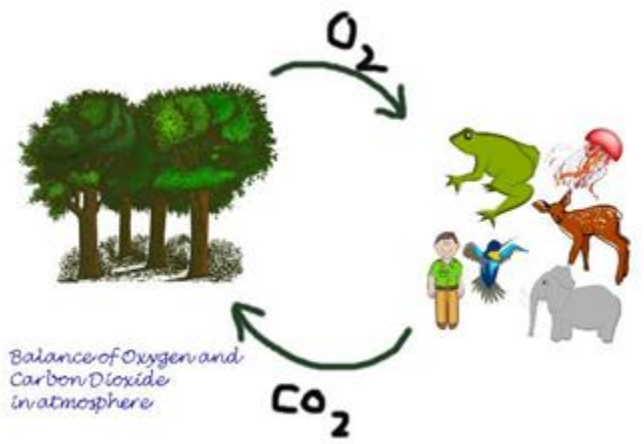
Answer: Forest acts as a natural absorber of rainwater and allows it to seep. It helps in controlling the flow of water and slows it down which helps in preventing flood. Also, the trees present in the
forest prevents the rain from directly hitting the ground and bind the soil together which helps in absorption of the rain water and thus prevent flood.

Question 3. What are decomposers? Name any two of them. What do they do in the forest?

Answer: The micro-organisms which convert the dead plants and animals to humus are known as decomposers. Bacteria. Mushrooms etc. are common decomposer. They decompose dead organisms and provide nutrient to trees.

Question 4. Explain the role of forest in maintaining the balance between oxygen and carbon dioxide in the atmosphere.

Answer: Plants release oxygen as a by product during the process of photosynthesis. This oxygen is inhaled by animals for respiration. This respiration process releases carbon dioxide which is used again by plants during photosynthesis. In this way, use and consumption of oxygen and carbon dioxide goes on. They thus maintain the balance of oxygen and carbon dioxide in the atmosphere.



Question 5. Explain why there is no waste in a forest.

Answer: There is no waste in a forest because whatever produced here are utilized by the other organisms or plants for sustainability. Even the waste materials and dead remains which are produced are biodegradable and converted into humus which returns back to the soil as nutrient.

Question 6. List five products we get from forests?

Answer: Products that we get from forests includes:

(i) Wood

(ii) Medicine

(iii) Spice

(iv) Fodder

(v) Honey

Question 7. Fill in the blanks:

(a)The insects, butterflies, honeybees and birds helps flowering plants in --------.

(b)A forest is a purifier of ---------- and ----------.

(c)Herbs form the ---------- layer in the forest.

(d)The decaying leaves and animals dropping in a forest enrich the ----------.

Answer: Fill in the blanks:

(a)The insects, butterflies, honeybees and birds helps flowering plants in **pollination**.

(b)A forest is a purifier of **air** and **water**.

(c)Herbs form the **ground** layer in the forest.

(d)The decaying leaves and animals dropping in a forest enrich the **Soil**.

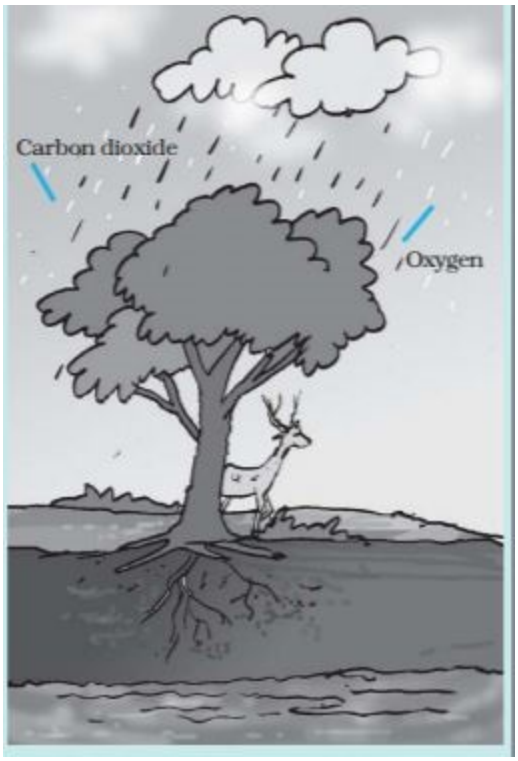
Question 8. Why should we worry about the conditions and issues related to forests far from us?

Answer: We should worry about the conditions and issues related to forests far from us because more or less we are dependent on it because:
(i) The amount of carbon dioxide in air will increase if forest will disappear and thus less oxygen in atmosphere o breathe in.
(ii) There will be more soil erosion and thus increase in floods as soil will not able to hold water.
(iii) Increase in the percentage of carbon dioxide will also leads to global warming.
(iv) Deforestation will endanger our life and environment and also there will be no shelter for animals.
(v) There is also imbalance in nature and thus causing climate changes and less rainfall.

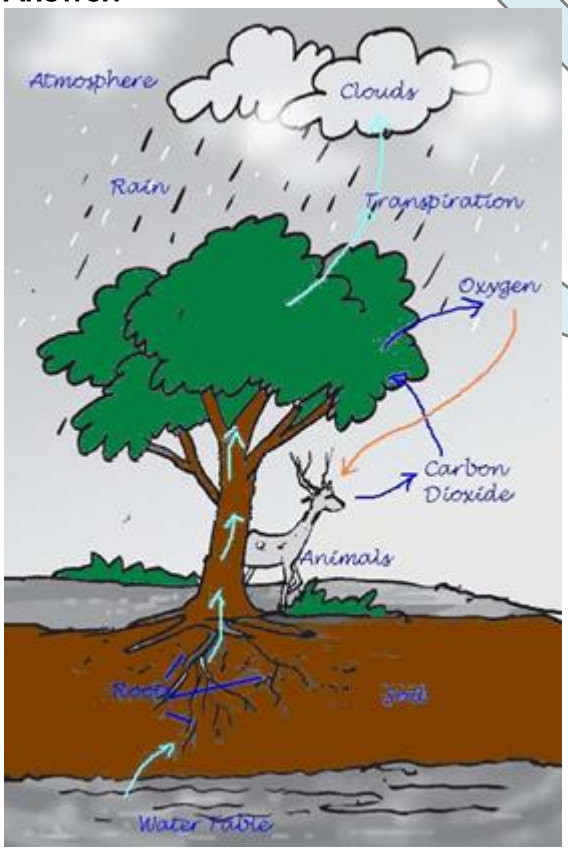
Question 9. Explain why there is a need of variety of animals and plants in a forest.

Answer: By harbouring grater variety of plants, the forest provides greater opportunities for food and habitat for the herbivores,Larger number of herbivores means increased availability of food for a variety of carnivores. The wide variety of animals helps the forest to regenerate and grow.
Varieties of animals are necessary for their survival and maintenance of food chain. For example grass is eaten by insects, which in turn, are eaten by the frog. The frog is consumed by snakes which are eaten by eagles. Thus it forms a food chain.
Every part of the forest is dependent on the other parts. If we remove one component, say trees, all other components would be affected.

Question 10. In Fig17.15, the artist has forgotten to put the labels and directions on the arrows. Mark the directions on the arrows and label the diagram using the following labels: clouds, rain, atmosphere, carbon dioxide, oxygen, plants, animals, soil, roots, water table.


Carbon dioxide
Oxygen

Answer:


Atmosphere
Clouds
Rain
Transpiration
Oxygen
Carbon Dioxide
Animals
Roots
Soil
Water Table

Question 11. Which of the following is not a forest product?

(i) Gum

(ii) Plywood

(iii) Sealing wax

(iv) Kerosene

Answer: (iv) Kerosene.

Question 12. Which of the following statements is not correct?

(i) Forests protect the soil from erosion.

(ii) Plants and animals in a forest are not dependent on one another.

(iii) Forests influence the climate ans water cycle.

(iv) Soil helps forests to grow and regenerate.

Answer: (ii) Plants and animals in a forest are not dependent on one another.

Question 13. Micro-organisms act upon the dead plants to produce.

(i) Sand

(ii) Mushrooms

(iii) Humus

(iv) Wood

Answer: (iii) Humus