6. Living World of Plants - Plant Physiology

Multiple Choice Questions

1. Question

A big tree falls in a forest but its roots are still in contact with the soil. The branches of this fallen tree straight up. This happens in response to _____.

A. water and light

B. water and minerals

C. gravity and water

D. light and gravity

Answer

Shoots are positively phototropic so they bend towards light whereas roots grow towards earth's gravity i.e. they are positively geotropic. So roots are in contact with soil and branches grow straight.

2. Question

The tropic movement that helps the climbing vines to find a suitable support is _____.

A. phototropism

B. geotropism

C. thigmotropism

D. chemotropism

Answer

The growth movement of plants in response to touch stimulus is called thigmotropism. Vines when get any support they coil around the support and grows and this type of tropic movement is called thigmotropism.

3. Question

The chemical reaction occurs during photosynthesis is _____.

A. CO_2 is reduced and water is oxidized

B. water is reduced and CO_2 is oxidized

C. both CO_2 and water are oxidized

D. both CO_2 and water are produced

Answer

Water gets oxidised to form oxygen. Water splits by absorbing light energy to form oxygen. This is known as photolysis of water. Carbon dioxide is reduced to form glucose in dark phase of photosynthesis reaction by help of some enzymes.

4. Question

Transpiration is best defined as _____.

A. loss of water by the plant

B. evaporation of water from the aerial surfaces from the plant

C. loss of water in the form of water vapour from the underground parts of the plant body

D. release of water from the plant into the atmosphere

Answer

Transpiration is the loss of water in form of water vapours from the aerial parts of the plant like leaves, stem etc. There are minute openings called stomata on leaves surface and lenticels on surface of old, woody stem through which water is lost.

True or False

1. Question

The response of a plant part to the chemical stimulus is called phototropism.

Answer

False

The response of a plant part to the chemical stimulus is called chemotropism.

The growth of pollen tube down the style to reach ovary in response to the sugars secreted by style is an example of chemotropism.

2. Question

Shoot is positively phototropic and negatively geotropic.

Answer

True

Shoot is positively phototropic i.e. it bends towards light so it is a positive response towards the stimulus light. Shoot bends away from gravity of earth so it is negatively geotropic i.e. negative response towards the stimulus earth's gravity.

3. Question

Scientific term used to represent the bending of roots towards water is called geotropism.

Answer

False

Scientific term used to represent the bending of roots towards water is called hydrotropism.

The bending of roots towards water is an example of hydrotropism.

4. Question

Joseph Priestley devised an experiment to find out that water alone was the cause of the increase in the weight of the plant.

Answer

False

Jan Baptist van Helmont devised an experiment to find out that water alone was the cause of the increase in the weight of the plant.

He weighed the dry soil, then he weighed the small sapling and placed in the pot allowing only air and light and he regularly watered the plant. When sapling grows into a small tree again he weighed the plant. He found in increase of weight of the plant. He dried the soil in the pot in which sapling grew and took the weight of dried soil. He found very less difference in the weight of the soil before planting the sapling and after sapling grew into a small plant. So he came into conclusion that water was the cause of increase in weight of the plant.

5. Question

When the weather is hot, water evaporates lesser which is due to opening of stomata.

Answer

False

When weather is hot, water evaporates faster due to opening of stomata.

During day time it is hotter due to heat rays of sun and stomata are open at that time so more water is lost through these openings.

Fill In the Blanks

1. Question

The shoot system grows upward in response to _____

Answer

Light

Shoot grows towards light so it moves upwards in response to stimulus light and this response towards stimulus light is called phototropism.

2. Question

_____ is positively hydrotropic as well as positively geotropic.

Answer

Root

Roots show its growth towards earth's gravity as well as water so it is positively geotropic as well as positively hydrotropic.

3. Question

The green pigment present in the plant is _____

Answer

Chlorophyll

Chlorophyll a green pigment is present in the mesophyll cells of leaves which traps sunlight energy that is required for photosynthesis process.

4. Question

The minerals like nitrogen, potassium and phosphorus, are required in substantial quantity by the plants are called _____

Answer

Macronutrient

The minerals like nitrogen, potassium and phosphorus are required in more quantities by plants and hence are known as macronutrients. Other examples of macronutrients include carbon, hydrogen, oxygen, calcium, magnesium etc.

Match The Following

1. Question

Match column A with column B

	Column A	Column B
1.	Roots growing downwards into soil	Positive phototropism
2.	Shoots growing towards the light	Negative geotropism
3.	Shoots growing upward	Negative phototropism
4.	Roots growing downwards away from light	Positive geotropism

Answer

Column A	Column B
1. Roots growing downwards into soil	Positive geotropism
2. Shoots growing towards the light	Positive phototropism
3. Shoots growing upwards	Negative geotropism
4. Roots growing downwards away from light	Negative phototropism

Analog

1. Question

Towards a stimulus :_____ Away from the stimulus : Negative tropism

Answer

Positive tropism

The directional movement of plant parts towards a stimulus is positive tropism.

2. Question

Hydrotropism : Response towards water Phototropism :

_____

Answer

Response towards light

The directional movement of plant parts in response to stimulus light is called phototropism.

3. Question

Photosynthesis : _____ Transpiration : Stomata

Answer

Chloroplast

Chloroplast contains green pigment chlorophyll which traps sunlight energy to perform photosynthesis.

Answer in a word or two

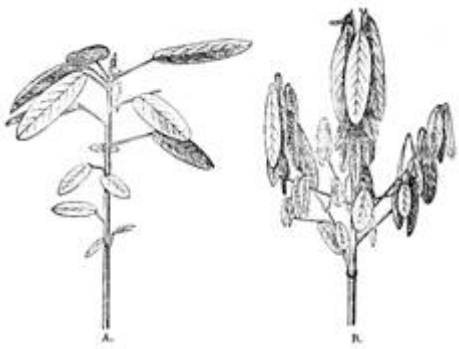
1. Question

Give an example for a plant whose leaf shows a mesmerizing movement.

Answer

Dance of *Desmodium gyrans* i.e. Indian telegraph plant leaf shows a mesmerizing movement.

It is also called dancing plant as the leaflets move up, back and then down finally back to its original position showing rhythmic movement. This plant was first used by Indian Scientist J.C. Bose for his experiment.



2. Question

Write the scientific terms used to represent the following:

a) Growing of roots towards the gravity.

b) Bending of roots towards the water.

Answer

a. Positive geotropism

Roots grow towards gravity of earth so it is positively geotropic.

b. Hydrotropism

Roots bend towards water showing positively hydrotropic movements.

3. Question

Observe the given picture.

a) Identify this plant. What type of special movement is shown by this plant?

b) What are the other movements seen in this plant?

Answer

(a) The plant in the above figure is *Mimosa pudica*. When we touch the leaves of this plant the leaves fold up and droop down and this type of movement is known as seismonasty or thigmonasty.

(b) This plant shows nastic movement i.e. it is not a directional movement of the plant part with response to the stimulus. Whatever the direction of stimulus may be it affects all parts of plant equally. When we touch the leaves of this plant due to loss of turgor pressure its leaves droop down.

4. Question

What is the end product of photosynthesis?

Answer

The end product of photosynthesis are glucose, oxygen, water. Glucose is utilized by plants or it is stored in form of starch. Oxygen is released into environment through stomata. Water is reutilized for photosynthesis process.

5. Question

Name the minute openings seen on the lower surface of the leaf.

Answer

Stomata are minute openings found on the lower surface of the leaf through which exchange of gases occurs and water is also lost in form of vapours.

Answer the following in one or two sentences

1. Question

What is nastic movement?

Answer

The movement of plant part in response to an external stimulus in which the direction of response is not determined by the direction of stimulus is known as nastic movement. Nastic movement may or may not be growth movement. Examples- Drooping down of leaves of Touch-me-not plant when slightly touched.

2. Question

Name the plant part

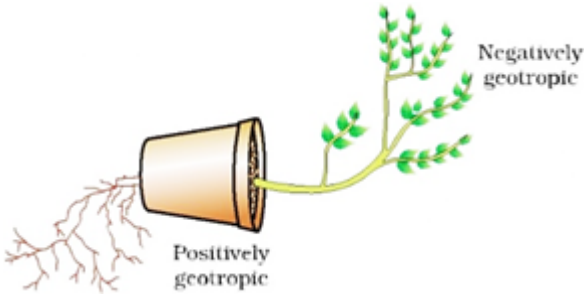
a) Which bends in the direction of gravity but away from the light.

b) Which bends towards light but away from the force of gravity.

Answer

a. Root bends towards gravity of earth i.e. it is positively geotropic but it bend away from light so it is negatively phototropic.

b. Shoot bends towards light i.e. positively phototropic but bends away from gravity of earth so negatively geotropic.



3. Question

Differentiate phototropism from photonasty.

Answer

Phototropism	Photonasty
It is the directional growth movement of plant parts in response to stimulus light.	It is non-directional growth movement of plant parts caused by stimulus light.
Stem is positively phototropic but root is negatively phototropic.	Dandelion flower opens up in morning in bright light and closes in the evening when light fades.
It shows growth i.e. stem will move upwards towards sunlight whereas root moves downwards away from light	It shows immediate response to stimulus light but do not involve any growth.

4. Question

Photosynthesis converts energy X into energy Y.

a) What are X and Y?

b) Green plants are autotrophic in their mode of nutrition. Why?

Answer

a. X is light energy and Y is chemical energy.

The sunlight energy is trapped by chlorophyll and is used in photosynthesis process. By using raw materials carbon dioxide and water in presence of light energy, glucose and oxygen are produced. The whole process occurs in chloroplasts. Glucose is a chemical compound so light energy is converted into chemical energy.

b. Plants can prepare their own food, they do not depend upon others for food. They have chlorophyll pigment which can trap sunlight energy and by using carbon dioxide and water they produce glucose. So they are autotrophic in nature.

5. Question

Define transpiration.

Answer

Transpiration is the process of loss of water in form of water vapour from aerial parts of the plant.

There are three types of transpiration i.e. cuticular- where water is lost from cuticle of leaves, stomatal transpiration- where water is lost from stomata, lenticular transpiration- where water is lost from lenticels.

Answer in detail

1. Question

Design an experiment to demonstrate hydrotropism.

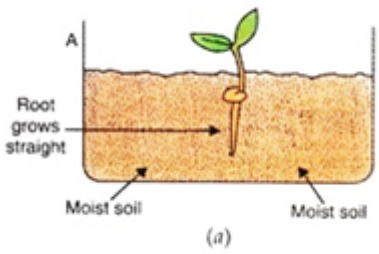
Answer

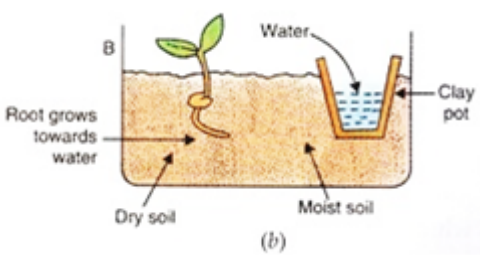
The orientation of plant part in response to water is called hydrotropism.

Activity to demonstrate hydrotropism:

Two glass troughs A and B were taken. Both the troughs were filled with soil upto two-third level. A tiny seedling was placed in both the troughs. A small clay pot with soil was placed in trough B. In trough A water was added uniformly to the soil but in trough B water was put only in small clay pot.

Observations: After few days it was noticed that in trough A roots of the seedlings had grown straight as water is added uniformly to the soil. But in trough B roots of seedling had grown in the direction towards the clay pot because water is contained in the clay pot. This shows that roots of plant shows its growth in the direction of water.





Work Book MCQ

1. Question

The bending of root of a plant in response to water is called _____.

A. thigmonasty

B. phototropism

C. hydrotropism

D. photonasty

Answer

Hydrotropism is the directional movement or orientation of plant part in response to stimulus water. Bending of roots of the plants towards water is an example of positive hydrotropism.

2. Question

A growing seedling is kept in the dark room. A burning candle is placed near it for a few days. The top part of the seedling bends towards the burning candle. This is an example of _____.

A. chemotropism

B. thigmotropism

C. phototropism

D. geotropism

Answer

Phototropism is the directional movement or orientation of plant part in response to stimulus light. As the top part of seedling i.e. plumule bends towards light so it shows positive phototropism.

3. Question

The root of the plant is _____.

i) positively phototropic but negatively geotropic

ii) positively geotropic but negatively phototropic

iii) negatively phototropic but positively hydrotropic

iv) negatively hydrotropic but positively phototropic

A. (i) and (ii)

B. (ii) and (iii)

C. (iii) and (iv)

D. (i) and (iv)

Answer

Root of plant bends towards earth's gravity so it is positively geotropic but it bends away from light so it is negatively phototropic. Roots of plants bend towards water so it is positively hydrotropic.

4. Question

The plant part which exhibits negative geotropism is _____.

A. root

B. stem

C. branch

D. leaves

Answer

Stem bends away from earth's gravity so it exhibits negative geotropism.

5. Question

The non-directional movement of a plant part in response to temperature is called _____.

A. thermotropism

B. Thermonasty

C. chemotropism

D. thigmonasty

Answer

The non-directional movement of plant part in response to temperature is called thermonasty. The position of flowers and leaves of plants changes in response to temperature of surroundings which are called thermonastic movements.

6. Question

Dandelion flowers open the petals in bright light during the day time but close the petals in dark at night. This response of Dandelion flowers is called _____.

A. geonasty

B. thigmonasty

C. chemonasty

D. photonasty

Answer

The position of plant part changes in response to the stimulus light but these are non-directional movements and do not involve growth which is known as photonastic movement. Dandelion flower open their petals in bright light during day time and closes their petals during night time.

7. Question

During photosynthesis plants exhale _____.

A. Carbon dioxide

B. oxygen

C. hydrogen

D. helium

Answer

Oxygen is given as a by-product from the plants by photosynthesis process. They take in carbon dioxide and release oxygen during preparation of glucose by the cells containing chlorophyll mainly in leaves.

8. Question

Chlorophyll in a leaf is required for _____.

A. photosynthesis

B. transpiration

C. tropic movement

D. nastic movement

Answer

Chlorophyll pigment is present within chloroplasts which traps sunlight energy and by using raw materials carbon dioxide and water, the leaves prepare glucose and release oxygen into the environment. This process is called photosynthesis.

9. Question

A plant is kept in a dark room for about 24 hours before conducting any experiment on photosynthesis in order to _____.

A. remove chlorophyll from the leaf

B. remove starch from the leaves

C. ensure that photosynthesis occurred

D. to prove transpiration

Answer

When a plant is kept in dark it cannot perform photosynthesis process so it will used up the stored starch. Hence when a plant is kept in dark for more than 24 hours the stored starch will be used up by the plant, which will not interfere with the photosynthesis experiments.

10. Question

Transpiration takes place through _____.

A. fruit

B. seed

C. flower

D. stomata

Answer

Stomata are the minute openings found on the surface of leaves through which water is lost in form of vapours to the atmosphere. This process is called transpiration.

Work Book Fill in the blanks

1. Question

The solar tracking of sunflower in accordance with the path of sun is due to _____.

Answer

Heliotropism

It is the motion of flower in response to the direction of sun. Sunflower follows the path of sun from east to west from dawn to dusk. Then it moves from west to east during night.

2. Question

The response of a plant part towards gravity is _____.

Answer

Positive Geotropism

The movement of plant parts in response to gravity of earth is called geotropism. If the plant parts like root moves towards earth's gravity it is called positive geotropism.

3. Question

When the leaves of a sensitive plant are touched with a finger, they fold up and when light fades at dusk the petals of a Dandelion flower close. These two plants show ___ and____ movements.

Answer

Thigmonastic and photonastic movements.

When we touch the leaves of Touch-me-not they droop down, this response to touch stimulus is called thigmonastic movement. Dandelion flowers open their petals in bright light during day time and close their petals at night which is an example of photonastic movements.

4. Question

Opening and closing of Moon flower is not a tropism because the movement in this is _____.

Answer

Non-directional

In case of tropic movements movement of plant parts are directional i.e. either towards or away from the stimulus. But in case of nastic movements they are non-directional i.e. their movement is neither towards the stimulus nor away from the stimulus.

5. Question

The raw materials for photosynthesis are _____ and _____.

Answer

Carbon dioxide and water

Carbon dioxide and water are the raw materials required for photosynthesis which in presence of chlorophyll and sunlight energy gets converted into glucose and oxygen. This process mainly occurs in leaves.

6. Question

When iodine solution is added for testing starch, part of the leaf with _____ turn blue-black colour.

Answer

Starch

When iodine solution is added to the leaf the portion of leaf which contains starch turns blue-black colour whereas those portion which does not contain any starch turns brown colour.

7. Question

In leaves, the food is stored in the form of _____.

Answer

Starch

Glucose is synthesized in leaves by photosynthesis process some of glucose is utilized by the plants whereas the remaining glucose is stored in form of starch in the leaves.

8. Question

Plants may inhale carbon dioxide for photosynthesis but need _____ for their living.

Answer

Oxygen

Oxygen is required for living because it oxidises glucose to release energy in form of ATP that is required to carry out various metabolic activities.

9. Question

Plants utilize only _____% of the absorbed water for photosynthesis and the other activities.

Answer

1%

Only about 1% of absorbed water by roots is utilized for photosynthesis and other activities remaining 99% is lost in form of vapours from the plants.

10. Question

Plants inhale and exhale continuously through the _____.

Answer

Stomata

Through stomata exchange of gases occurs. Oxygen is taken in and carbon dioxide is given out during respiration but in photosynthesis carbon dioxide is taken in and oxygen is given out.

Work Book True or False

1. Question

When the leaves of *Mimosa pudica* plant are touched with the finger, they fold up quickly. This is an example of thigmonasty.

Answer

True

When we touch the leaves of *Mimosa pudica* plant the leaves gets folded up because due to loss of turgor pressure and this non-directional movement in response to touch stimulus is called thigmonasty.

2. Question

The petals of moon flower open up in morning and closes in the evening. This is called photonasty.

Answer

False

The petals of moon flower open up in night and closes in the morning which is an example of photonasty.

This non-directional movement of flower to the stimulus light is called photonastic movement.

3. Question

Photosynthesis produces glucose and carbon dioxide.

Answer

False

Photosynthesis produces glucose and oxygen.

During photosynthesis process carbon dioxide and water in presence of chlorophyll and sunlight produces glucose and oxygen.

4. Question

Photosynthesis is important in releasing oxygen to keep the atmosphere in balance.

Answer

True

In photosynthesis process carbon dioxide is taken in and oxygen is given out and oxygen is the life supporter which is required by every living organisms for respiration process. It also supports combustion. Hence oxygen is used up rapidly so plants release this gas by photosynthesis process to maintain the balance in the environment.

5. Question

Plants lose water when the stomata on leaves are closed.

Answer

False

Plants lose water when the stomata on leaves are open.

When stomata are open during day time water is lost through these openings by the plants.

Work Book Match the following

1. Question

Match the following:

S. No.	Column A	Column B	Column C
1.	Photonasty	Response to temperature	*Tulipa sp*
2.	Thigmonasty	Response to light	*Mimosa pudica*
3.	Thermonasty	Response to touch	Moon flower

Answer

Column A	Column B	Column C
1. Photonasty	Response to light	Moon flower
2. Thigmonasty	Response to touch	*Mimosa pudica*
3. Thermonasty	Response to temperature	*Tulipa sp*.

1. Moon flower closes at day time but opens during night time. This non-directional movement in response to stimulus light is called photonasty.

2. *Mimosa pudica* closes its leaves when slightly touched and this non-directional movement in response to stimulus touch is called thigmonasty.

3. *Tulipa sp*. responds to temperature and this movement is called thermonasty.

Work Book Answer in a word or two

1. Question

Give the technical terms for the following:

a) Growth dependent movement in plants.

b) Growth independent movement in plants.

Answer

a. Tropic movements

Tropic movements are growth dependent movements occurring in response to external stimuli like light, temperature, water, earth's gravity etc.

b. Nastic movements

Nastic movements are growth independent movements which occur in flowers and leaves of the plants mainly in response to stimuli like touch, light, temperature etc.

2. Question

Study the pictures below and then complete the table by putting a plus (+) if the shoot or root grows towards the stimulus and a minus (-) if it grows away from it.

Stimulus		
	Light	Gravity
Shoot	+	_
Root	?	+

Answer

Stimulus		
	Light	Gravity
Shoot	+	−
Root	−	+

Shoot grows towards the stimulus light whereas away from gravity of earth. Similarly root grows away from light and bends towards gravity of earth.

3. Question

Name the movement seen in Pneumatophores of *Avicennia*.

Answer

Nastic movement is seen in pneumatophores of *Avicennia*.

4. Question

What is the other name for thigmonasty?

Answer

Thigmonasty is also called seismonasty.

The non-directional movements which occurs in response to touch is called thigmonasty or seismonasty.

5. Question

Which flowering plant shows photonasty just opposite to that of Dandelion?

Answer

Moon flower closes its petals during day time and open at night time which is opposite to that of Dandelion.

6. Question

Give an example for negative hydrotropism.

Answer

Shoot grows away from water is an example for negative hydrotropism.

7. Question

Fill in the blanks:

$$6CO_2 + \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} + 6H_2O + 6O_2 \uparrow$$

Answer

$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2\uparrow$

Glucose and oxygen are the products of photosynthesis process.

8. Question

Which gas is evolved during photosynthesis?

Answer

Oxygen gas is evolved during photosynthesis.

Water gets splits by absorbing photons from sunlight energy which release oxygen gas.

9. Question

What is chlorophyll?

Answer

Chlorophyll is a green pigment present in chloroplast of leaves which traps sunlight energy for photosynthesis process.

10. Question

Give an example for micronutrients.

Answer

Micronutrients are required in very minute quantities by plants. Examples are iron, manganese, boron, molybdenum, copper etc.

Work Book Answer the following in one or two sentences

1. Question

Name the part of plant which shows positive geotropism. Why?

Answer

Root shows positive geotropism because root bends towards earth's gravity and the movement of plant parts towards a stimulus is called positive tropism.

2. Question

What does a *Mimosa pudica* plant do in response to touch? What is the phenomenon known as?

Answer

When we touch the leaves of *Mimosa pudica* plant the leaves droop down due to loss of turgor pressure. This phenomenon is known as thigmonasty or seismonasty.

3. Question

i) What happens to the dandelion flower

a) during the daytime?

b) at night?

ii) What is the phenomenon known as?

Answer

i.

a. During day time dandelion flower opens its petals.

b. During night time it closes its petals.

ii. This phenomenon is known as photonasty i.e. non-directional movements of flowers in response to stimulus of light.

4. Question

What is the difference between movement of flower in sunflower plant and closing of the leaves in the *Mimosa pudica*.?

Answer

Sunflower moves from east to west during day time in direction of sun and this movement is called heliotropism i.e. movement of flower in response to stimulus sunlight. Again in evening time it moves from west to east direction. The leaves of *Mimosa pudica* droops down when touched and this is an example of thigmonasty i.e. movement of leaves in response to stimulus touch.

5. Question

Define photosynthesis.

Answer

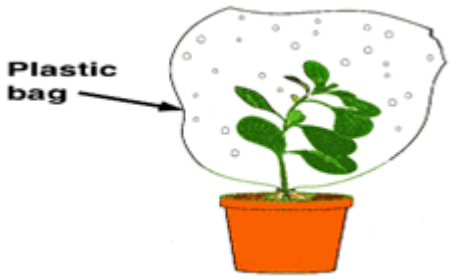
Photo means light and synthesis means to build. It is the process by which cells containing chlorophyll by using carbon dioxide and water in presence of sunlight will synthesise glucose and oxygen gas is evolved as by-product.

6. Question

Suppose you have a rose plant growing in a pot, how will you demonstrate transpiration in it?

Answer

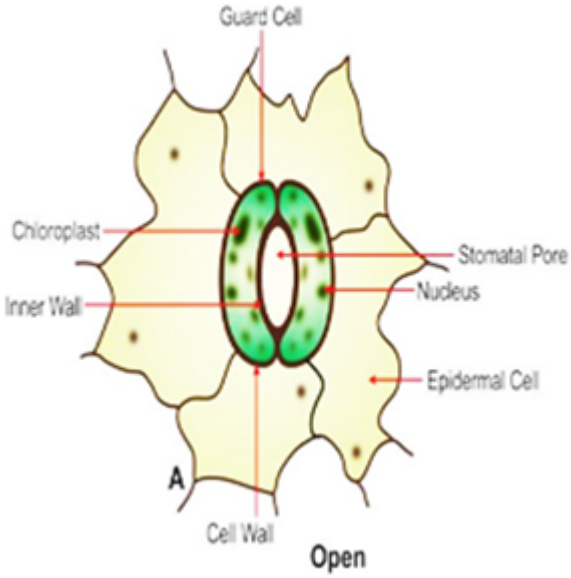
The process of transpiration can be demonstrated by tying a polythene bag around the rose plant and keeping the plant in sunlight for one or two hours. Droplets of water would be seen on the inner sides of polythene bag due to transpiration.



7. Question

Draw the diagram of open stoma and label the parts.

Answer



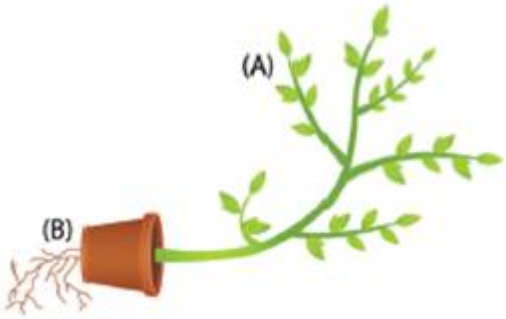
Stomata are minute openings present on surface of leaves whose opening and closing are guarded by guard cells. Guard cells have thick inner walls and thin outer walls. They have chloroplasts within them. Stomata open during day time when guard cells turn turgid. The cells surrounding the guard cells are called epidermal cells.

8. Question

A potted plant is kept horizontally for a considerable time. The three positions of the part A and B of the potted plant are shown in the following figures.

(i) Potted plant with shoot and root growing downward. (Diagram to be drawn)

(ii)



(iii) Potted plant with shoot and root growing upward (Diagram to be drawn)

a) Which figure shows the correct position taken by the parts A and B of the plant?

b) What type of phenomenon is exhibited by the figure by (A) in the figure (ii)?

Answer

(a) Fig. ii shows correct position. Because roots are positively geotropic so they bends towards earth's gravity downwards. Shoots are positively phototropic so they bend towards light i.e. move upwards.

(b) Shoot bends towards light so they exhibit positive phototropism. The movement of plant parts in response to stimulus light is called phototropism and as the shoot bends towards light so it is positive phototropism.

9. Question

Complete the following table with the different types of tropism:

Stimulus		Gravity	Unilateral light	Water
Tropism		Geotropism	?	Hydrotropism
Response	Shoot	?	Positive	No response
	Root	Positive	?	?

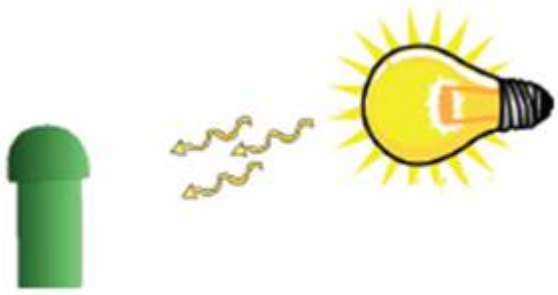
Answer

Stimulus		Gravity	Unilateral light	Water
Tropism		Geotropism	Phototropism	Hydrotropism
Response	Shoot	Negative	Positive	No response
	Root	Positive	Negative	Negative

The directional movement of plant parts in response to stimulus light is called phototropism. The directional movement of plant parts in response to stimulus earth's gravity is called geotropism. The directional movement of plant parts in response to water is called hydrotropism. Roots bend away from light so they are negatively phototropic. Roots bend towards water and earth's gravity so they are positively hydrotropic and geotropic respectively. Shoot bends towards light but bends away from earth's gravity so it is positively phototropic but negatively geotropic. It shows no response to water.

10. Question

Cover the tip of the shoot with tin foil cap and light it from the side as shown in the given picture. What would you expect to happen? Why?

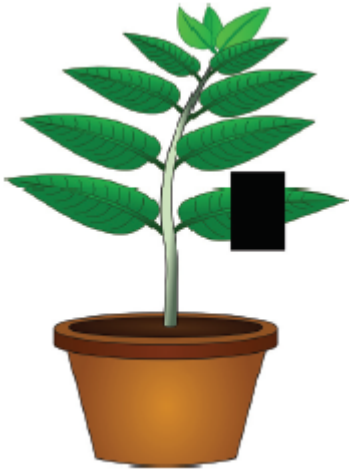


Answer

As tips of shoot are covered with tin foil cap the shoot does not show any bending towards light. Because light cannot penetrate through tin foil cap to reach shoot tip to break down auxin. Auxin are responsible for bending of shoot tip towards light.

11. Question

In the given photosynthetic experiment, what will happen to the leaf closed with black paper in starch test? Why?

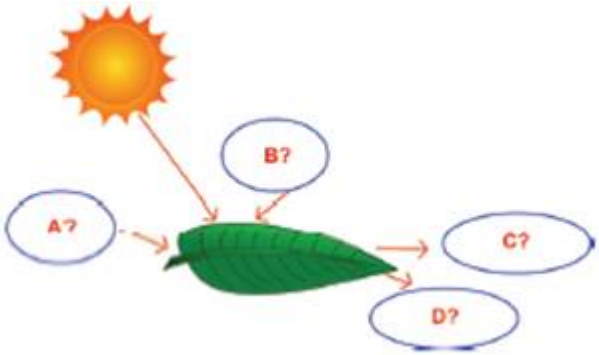


Answer

When the portion of leaf covered with black paper is tested for starch it will show brown colouration i.e. indication of absence of starch as that portion of leaf does not receive sunlight so photosynthesis cannot occur.

12. Question

Label the diagram with the raw materials and products of photosynthesis.



Answer

A- water, B- carbon dioxide, C- oxygen, D- glucose

Chlorophyll containing cells in leaves trap sunlight energy and by using raw materials carbon dioxide and water synthesize glucose and release oxygen gas into atmosphere. This process is called photosynthesis.

13. Question

Mention the differences between stomatal and lenticular transpiration.

Answer

Stomatal transpiration	Lenticular transpiration
Transpiration occurs through stomata.	Transpiration occurs through lenticels.
Stomata are minute openings found on the surface of leaves through which water is lost in form of vapours.	Lenticels are minute openings found on old, woody stem through which water is lost.
Stomatal transpiration is maximum.	The transpiration through lenticel is less as compared through stomata.

14. Question

Give an example for the movement plant part which is very quick and can be observed easily.

Answer

Thigmonastic or seismonastic movement- where when we touch the leaves of *Mimosa pudica* plant its leaves droop down and this movement is immediate, quick and easily noticed. This is non-directional movement in response to stimulus touch.

15. Question

To which directional stimuli do (a) roots respond (b) shoots respond?

Answer

Roots bend towards gravity and water but bends away from light. Shoots bend towards light but away from gravity. It shows no response to water.

16. Question

Name the cell that surrounds the stoma.

Answer

Guard cells surround the stoma. They are bean or kidney shaped. They have thick inner walls but thin outer walls. When they become turgid the stomata opens during day time. But at night time the guard cells turn flaccid closing the stomata.

Work Book Assertion Reason

1. Question

Assertion (A): If the plant part moves in the direction of gravity, it is called positive geotropism.

Reason (R) : Stem shows positive geotropism

A. A and R are incorrect

B. A is incorrect, R is correct

C. A is correct, R is incorrect

D. Both A and R are correct

Answer

Assertion is correct. When the plant part moves in the direction of gravity i.e. root it is called positive geotropism. When the plant part shows its movement towards the stimulus it is called positive tropism.

But reason is incorrect because stem moves away from the earth's gravity so it is called negative geotropism.

2. Question

Assertion (A): The loss of excess water from the aerial parts of the plant in the form of water vapour is known as transpiration.

Reason (R) : Stomata of the leaf perform transpiration.

A. A and R are incorrect

B. A is incorrect, R is correct

C. A is correct, R is incorrect

D. Both A and R are correct

Answer

Assertion is correct. The loss of excess water from aerial parts of the plant in the form of water vapour is known as transpiration.

Reason is also correct. Stomata are minute openings found on the surface of leaves through which water is lost in form of vapours. So transpiration process occurs through stomata.

Work Book HOTS

1. Question

There are 3 plants A, B and C. The flowers of A open their petals in bright light during the day but close them when it gets dark at night. On the other hand, the flowers of plant B open their petals at night but close them during the day when there is bright light. The leaves of plant C fold up and droop when touched when fingers or any other solid object.

a) Name the phenomenon shown by the flowers of plant A and B.

b) Name one flower each which behaves like the flowers of plant A and B.

c) Name the phenomenon exhibited by the leaves of plant C.

d) Name a plant whose leaves behave like those of plant C.'

Answer

a. The flowers show nastic movements i.e. photonasty. These are non-directional movement caused by stimulus light.

b. Dandelion flower [*Taraxacum officinale*] opens up in the morning in bright light while closes its petal in dark or night time. Moon flower [*Ipomoea alba*] opens its petals at night and closes during day time.

c. The leaves of plant C exhibit seismonasty or thigmonasty. These are non-directional movements which occur in response to touch and these are very quick.

d. *Mimosa pudica* [touch-me-not] plant, leaves droop down immediately when slightly touched due to change in turgor pressure.

2. Question

While conducting experiments to study the effects of various stimuli on the plants, it was observed that the roots of a plant X grow and bend towards two stimuli A and B but bend away from a third stimulus C. The stem of the plant X however bends away from stimulus A and B but bends towards the stimulus C. The stimulus B is known to act on the roots due to factors related with Earth. Keeping these points in mind, answer the following questions:

a) What could be stimulus A ?

b) Name the stimulus seen in B.

c) What could be stimulus C ?

Answer

a. Stimulus A is water as roots bend towards it but shoot bends away from it. Roots are positively hydrotropic whereas shoot is negatively hydrotropic.

b. Stimulus B is gravity of earth. Roots bend towards earth gravity so it is positively geotropic whereas shoot bends away from it so it is negatively geotropic.

c. Stimulus C is light as shoot bends towards light showing positively phototropism but roots bend away from light showing negatively phototropism.

3. Question

An organism A which cannot move from one place to another makes a simple food B from the substances C and D available in the environment. The food is made in the presence of green coloured substance E present in organs F in the presence of light energy in a process called G. Some of the simple food B also gets converted into a complex food H for storage purposes. This food gives blue-black colour with iodine solution?

a) What is (i) organism A (ii) food B and food H?

b) What are C and D?

c) Name (i) green pigments E and organ F.

d) What is the process G?

Answer

a. Organism A is green plant which cannot move from one place to another. It prepares simple food B which is glucose. Complex food H is starch i.e. excess glucose is stored in form of starch in the plants.

b. C and D are carbon dioxide and water respectively which are important raw materials required for preparation of glucose by the green plants.

c. Green pigment E is chlorophyll which is found in cell organelle chloroplast. Chloroplast has disc like structures called thylakoids and in their walls chlorophyll pigment is present.

d. Process G is photosynthesis where chlorophyll containing cells in presence of light energy using raw materials carbon dioxide and water synthesize glucose and oxygen is released as by-product.

4. Question

Imagine that student A studied the importance of certain factors in photosynthesis. He took a potted plant and kept it in dark for over 24 hours.

In the early hours of the next morning, he covered one of the leaves with dark paper in the centre only. Then he placed the plant in sunlight for a few hours and tested the leaf which was covered with black paper for starch.

a) What aspect of photosynthesis was being investigated?

b) Why was the plant kept in the dark before the experiment?

c) How will you prove that starch is present in the leaves?

d) What are the other raw materials for photosynthesis?

Answer

a. Sunlight is required for photosynthesis. This experiment shows that sunlight is an important factor that is required for photosynthesis. Because in absence of sunlight glucose cannot be synthesized by the leaves of the plant.

b. The plant was kept in dark for 24-48 hours to destarch the plant so that whole stored starch would be used up by the plant and it will not interfere on the experiments of photosynthesis.

c. First the leaf is placed in boiling water followed by boiling the leaf in methylated spirit which removes chlorophyll. Then iodine solution is poured over leaf. The blue-black colour will indicate the presence of starch whereas brown colour will indicate absence of starch.

d. Carbon dioxide, water and chlorophyll are required for photosynthesis.