Q1) What are the different ways of growing crops to get the maximum benefit?

Solution:

The net crop yield can be increased by adopting better cropping patterns. The following techniques can be employed for this.

- **Mixed cropping −** In this technique, two or more crops are sown simultaneously on the same piece of land. The two crops are selected in such a manner that the product and waste material of one crop benefits the other. For example, when we grow wheat along with leguminous crop such as gram, then the nitrogen fixed by the legume benefits the wheat.
- **Inter cropping −** This technique involves growing two or more crops in a field, in a definite pattern, e.g., growing alternating rows of two crops such as soyabean and maize. This ensures maximum utilisation of nutrients since the nutrition requirements of both the crops are different. This also prevents pests and the spread of disease. Soil erosion is also reduced.
- **Crop rotation −** It is the practice of growing two or more varieties of crops on the same piece of land in subsequent seasons. The selection of crops depends upon the duration of their growth, e.g., for one-year rotation, crops such as maize and mustard are grown with wheat and rice. One of the benefits of this process is that it improves soil fertility.

Q2) After leaving the station, a goods train standing has to cross a flyover. During the climb on the flyover, due to some technical problem, the engine stops functioning when the train reaches the top of the flyover. On the plane surface, the engine develops a total force of 264,000 N. During the climb, the train experiences a retardation of 2 m/s^2. The total distance to the top of the flyover is 100 m.

The engine drags the train only to a distance of 50 m out of the station before climbing up the flyover. How many wagons can be attached to the engine for it to climb the flyover? [Weight of each wagon = 5000 kg; and weight of engine = 6000 kg]

Solution:

Length of the inclined plane, l = 100 m

Retardation, r = 2 m/s^2

Final velocity at the top of the flyover, v = 0

Applying second equation of motion,

$0 = u^2 + 2 (-2) 100$ [Where, u is the velocity of the train at the bottom of the inclined plane]

$u^2 = 400$

u = 20 m/s

Therefore, the velocity of the train will be at least 20 m/s while starting the climb on the flyover.

The engine has to drag the train for 50 m to reach this velocity at the bottom of the incline.

Applying second equation of motion again,

$20^2 = 0 + 2 \times a \times 50$ [Where, a is acceleration)]

$a = 40\ m/s^2$

The engine should, thus, produce an acceleration of 4 m/s^2.

Now, let x be the number of wagons attached to the engine.

Mass of entire train = $(5000x + 6000)$ kg

Force generated = Mass × Acceleration = $(5000x + 6000) \times 4$

Given that,

Force generated by engine = 264000 N

$(5000x + 6000) \times 4 = 264000$

$5000x + 6{,}000 = 66000$

$5000x = 6000$

$x = 12$

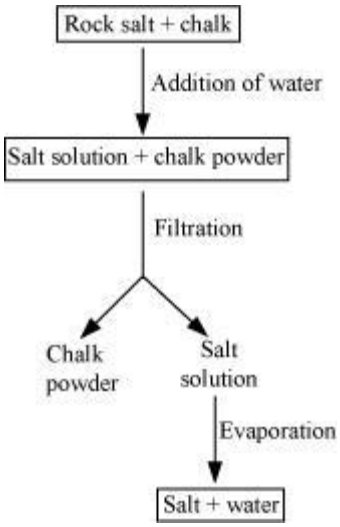
Therefore, 12 wagons can be attached to the engine for it to be able to climb the flyover

Q3) How can a mixture of powdered rock salt and chalk be separated?

Solution:

The mixture of powdered rock salt and chalk can be separated by first shaking the mixture in water, and then keeping the solution undisturbed for a few minutes.

The salt will dissolve in water, while the chalk powder will remain at the bottom. On filtering the solution, chalk powder will be obtained as residue. The rock salt can then be re-obtained by evaporating the filtered salt solution.



Q4) Anuj throws a stone vertically upwards with a velocity of 15 m/s. It hits a bell hanging at a height of 200 m. The bell rings as the stone hits it. After how much time from the time of the throw will Anuj hear the ring of the bell?

(Take speed of sound as 344 m/s and g as 10 m/s^2)

Solution:

We first calculate the time taken by the stone to reach the height of 200 m.

According to the second equation of motion,

$$s = ut + \frac{1}{2}at^2$$

Where,

u = 15 m/s

s = 200 m

a = 10 m/s^2

$$200t = 15t\frac{-10t^2}{2}$$

$t^2 + 3t + 40 = 0$

Or, $t^2 + 8t - 5t + 40 = 0$

Or, $t(t + 8) - 5(t + 8) = 0$

$(t + 8)(t - 5) = 0$

Thus, $t = 5$ or -8

Since time cannot be negative, the time taken is 5 seconds.

Now, let us calculate the time taken for the sound of the ringing bell to reach Anuj.

It can be obtained by dividing the height 200 m by the speed of sound 344 m/s.

Q5) Which of the following solutions are translucent?

A) Egg albumin in water

B) Common salt in water

C) Chalk powder in water

D) Copper sulphate in water

Answer:

A

Solution:

A colloidal solution is neither transparent like a true solution nor dirty like a suspension. It is generally translucent. Among the given solutions, egg albumin in water is an example of a colloidal solution.

Hence, the correct option is A.

$$\text{Hence, } t' = \frac{200}{344} = 0.58 \text{ s}$$

Therefore, Anuj will hear the sound 5 + 0.58 = 5.58 seconds after the throw.

Q6) A student performed an experiment to form iron sulphide in a chemistry laboratory. Given below are certain properties of iron sulphide noted by the student:

I: It is homogeneous in nature.
II: It is not affected by the presence of a magnet.
III: Its constituents can be separated by physical methods.
IV: It dissolves in carbon disulphide to form a yellow solution.

Which of the following observations made by the student are correct?

A) **I** and **II**

B) **IV** and **I**

C) **II** and **IV**

D) **III** and **IV**

Answer:

A

Solution:

Iron sulphide is a black mass compound. Each portion of the black mass has the same appearance. Thus, it is homogeneous in nature. Also, the presence of a magnet does not affect it.

Hence, the correct option is A.

Q7) If an iron nail is placed in a copper sulphate solution, then after some time the colour of the solution changes from ____*i*____ to _____*ii*_____.

Which of the following options correctly completes the given sentence?

A) *i*: blue, *ii*: green

B) *i*: green, *ii*: blue

C) *i*: blue, *ii*: colourless

D) *i*: green, *ii*: colourless

View Solution

Answer:

A

Solution:

Copper sulphate solution is blue in colour. If an iron nail is placed in it, then its colour changes to green. This happens because iron is more reactive than copper and displaces it from its solution.

$$Fe + CuSO_{4\ \text{Blue}} \rightarrow FeSO_{4\ \text{Green}} + Cu$$

Hence, the correct option is A.

Q8) Which of the following is **not** a technique employed to separate the components of a mixture of ammonium chloride, common salt and sand?

A) Sublimation

B) Evaporation

C) Dissolution in water

D) Magnetic separation

Answer:

D

Solution:

A magnet has no role in the separation of the components of a mixture of ammonium chloride, common salt and sand.

Hence, the correct option is D.

Q29)

Which of the following compounds **cannot** be separated from a mixture by sublimation?

A) Ammonium chloride

B) Common salt

C) Naphthalene

D) Camphor

View Solution

Answer:

B

Solution:

Among the given substances, common salt does not sublimate. Thus, it cannot be separated from a mixture by sublimation.

Hence, the correct option is B.

Q10) Name the process that changes a liquid into gas before reaching its boiling point.

A) Condensation

B) Vapourisation

C) Evaporation

D) Sublimation

Answer:

C

Solution:

The process that coverts a liquid into gas before reaching its boiling point is called evaporation. Evaporation can take place at all temperatures, whereas boiling takes place at a specified temperature.

Hence, the correct option is C.

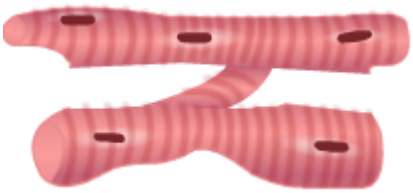
Q11)

Which of the following tissues is **not** a muscular tissue?

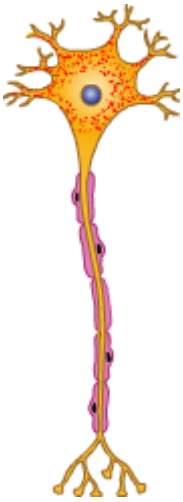
A)

B)

C)



D)



View Solution

Answer:

D

Solution:

Option D represents the nerve cell., which is a nervous tissue.

Hence, the correct option is D.

Q12) Explain the function of glycerine in mounting an onion peel?

A) It supports the cells.

B) It prevents excess staining.

C)It removes excess of water.

D) It prevents the peel from drying.

Answer:

D

Solution:

Glycerine is used as a mounting material for an onion peel. It prevents the onion peel from drying.

Hence, the correct option is D.

Q13) Rama is given four food items by his teacher for iodine test. Which of the following food items will show positive result?

A) Wheat flour

B) Lemon juice

C) *Arhar dal*

D) Honey

Answer:

A

Solution:

Iodine test is used to check the presence of starch in a food item. Wheat flour will test positive as it contains starch.

Hence, the correct option is A.

Q14)

Three types of solutions are given below:
I. Isotonic solution
II. Hypotonic solution
III. Hypertonic solution

Swelling of raisins occurs

A) only in II

B) only in III

C) in both I and II

D) in both II and III

View Solution

Answer:

A

Solution:

Swelling of raisins occurs in hypotonic solution. The concentration of hypotonic solution is lower than the internal solute concentration. Thus, it causes water to move into the cell (raisins), thereby making it swell.

Hence, the correct option is A.

Q15) A wooden block is made to slide on four different surfaces P, Q, R and S, respectively. The measures of force required to make them move are listed in the given table:

Surface	Force
P	0.3 N
Q	2.0 N
R	1.5 N
S	7.0 N

Which of the following surfaces is the smoothest?

A) P

B) Q

C) R

D) S

Answer:

A

Solution:

A smooth surface offers less friction. Thus, less force is required to make a body move on a smooth surface.

Hence, the correct option is A.

Q16)

Wheels are made circular in shape to convert

A) static friction into rolling friction

B) sliding friction into static friction

C) static friction into sliding friction

D) sliding friction into rolling friction

Answer:

D

Solution:

Wheels are made circular in shape to convert sliding friction into rolling friction.

Hence, the correct option is D.

Q17) If we increase the weight of an object sliding on a given surface, the value of limiting friction will

A) increase

B) decrease

C) first decrease and then increase

D) first increase and then decrease

Answer:

A

Solution:

Limiting friction is directly proportional to the weight of the body sliding on the given surface. Thus, when the weight of the object is increased, the limiting friction also increases.

Hence, the correct option is A.

Q18) Which of the following frictions has the maximum magnitude for a given body and surface?

A) Static friction

B) Sliding friction

C) Rolling friction

D) Limiting friction

Answer:

D

Solution:

Limiting friction has the maximum value for a given body and surface.

Hence, the correct option is D.

Q19) Which of the following materials offer less friction?

A) Wood

B) Glass

C) Cardboard

D) Wood mica

Answer:

B

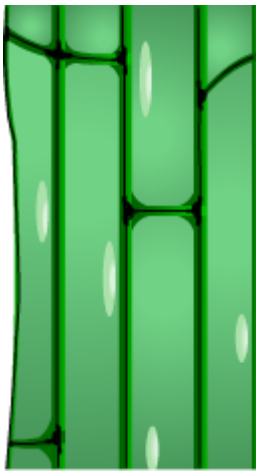
Solution:

Glass has a smoother surface among the given surfaces. So, it offers less friction to any body moving over it. The surfaces of wood, cardboard and wood mica are rough. Thus, they offer more friction to any body moving over them.

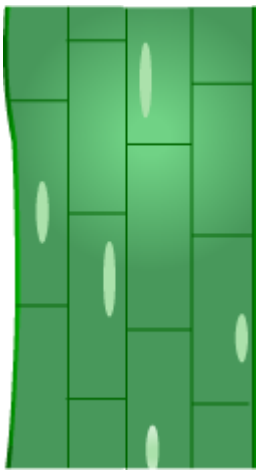
Hence, the correct option is B.

Q20) Four students made the images of collenchyma. Which of the following images correctly represents the collenchymatous tissue?

A)



B)



C)

D)

Answer:

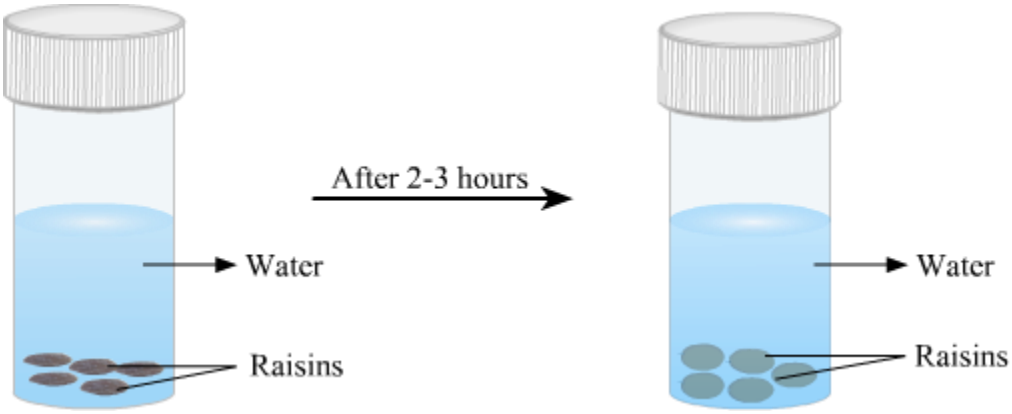
A

Solution:

Image A correctly represents the collenchymatous tissue that are thickened at the corners.

Hence, the correct option is A.

Q21) Consider the given experimental set-up.



Which phenomenon is observed in the given experiment?

A) Endosmosis

B) Plasmolysis

C) Exosmosis

D) Diffusion

Answer:

A

Solution:

It is clear in the given experiment that swelling of raisins occurred after 2−3 hours. This happened because the concentration of sugar solution inside the raisins was more than that of the water. Thus, the water moved inside the raisins, which resulted in the swelling of the raisins. This phenomenon is known as endosmosis.

Hence, the correct option is A.

Q22) A student obtained the following data after doing an experiment to determine the percentage of water absorbed by raisins.

Weight of dry raisins = 3 g
Weight of raisins after soaking in water for 2 hours = 7 g

The percentage of water absorbed by the raisins is

A) 133.3%

B) 132.4%

C) 166.7%

D) 165.8%

Answer:

A

Solution:

The percentage of water absorbed by raisins is calculated as follows:
Weight of dry raisins (W_1) = 3 g
Weight of wet raisins (W_2) = 7 g
Weight of water absorbed by raisins (W) = ($W_2 - W_1$) g
= (7 − 3) g
= 4 g

Percentage of water absorbed by raisins = WW1×100

= 43×100

= 133.3%

Hence, the correct option is A.