

Solution
Class 10 - Science
2020-2021 - Paper-3

Section A

1. No, chlorophyll can function under artificial light also.
2. Sexual reproduction involves the fusion of male and female gametes, which leads to the mixing of, characters of parents and thus, causes variations in characters.
Sexual reproduction leads to genetic recombination and thus, recombinants are produced. It means that the new offspring produced will have variation from parental genetic make up. It causes genetic variation.

OR

No, visible movement is not the only defining characteristic of life.

3. Female reproductive system is composed of following organs:
- 1) A pair of ovaries.
 - 2) A pair of fallopian tubes
 - 3) Uterus
 - 4) Vagina
 - 5) Vulva
4. Pigments which along with chlorophyll helps in photosynthesis called accessory pigments, such as xanthophylls, carotenoids etc.

OR

Chlorophyll is a green coloured pigment found in the green leaves or green parts of the plant which traps solar energy and helps in the process of photosynthesis.

5. The chromosomal aberrations and gene mutations are the only source of genetic variation in monoparental reproduction.
6. Cuscuta, ticks, and leeches have one thing in common that is Parasitism. They live on or inside another body to obtain food from the host. In obtaining food parasites always harm their host.
7. The fusion of male gamete (sperm) with a female gamete (egg) is called fertilisation. This sexual reproduction leads to the formation of zygote, i.e. the product.

OR

The digestion of starch starts in the mouth where the enzyme salivary amylase (ptyalin) present in the saliva breaks down starch into maltose.

8. The name given to the process of using the absorbed food for producing energy is assimilation.
9. Genotype of father with blood group A are: $I^A I^O$, $I^A I^A$

OR

The transfer of pollen grains from anther to the stigma is called pollination.

10. Amylase is responsible for digestion of starch.
11. A few follicles begin to mature after puberty in females, every month at a regular interval of about 28 days. This is called menstrual flow or menstruation.

OR

The trachea is supported by cartilaginous rings which prevent the collapsing of the wind pipe even when there is not much air inside it.

12. Gene has a fixed position on a chromosome.
13.
 1. Before starting the experiment, the leaf must be distracted.
 2. The leaf must be covered with black paper properly to prevent the entry of light.
 3. Boiling the leaf in alcohol should be done in the water bath.
14. **(c)** A is false but R is true.
Explanation: A is false but R is true.
15. **(b)** Both A and R are true but R is not the correct explanation of the assertion
Explanation: Both A and R are true but R is not the correct explanation of the assertion
16. **(d)** A is true but R is false.
Explanation: A is true but R is false.

OR

(a) Both A and R are true and R is correct explanation of the assertion.

Explanation: Both A and R are true and R is correct explanation of the assertion.

17. i. (d) Nostrils → Pharynx → Larynx → Trachea → Alveoli

ii.	Bronchus	Bronchiole	Larynx	trachea
(d)	Z	Y	W	X

iii. (a) Amoeba

iv.	Diaphragm	Intercostal muscle
(d)	Yes	Yes

v. (c) Alveoli and capillaries

18. i. (a) gametes, zygote, embryo, seedling

ii.	Male gametes	Female gametes
(d)	3	5

iii. (b) The number of chromosomes in Pand Q is the same.

iv. (a) A-petal, B-anther, C-ovule, D-stigma, E-ovary

v. (b) Diana

19. i. (c) 2 and 4

ii.	Substance used up	Produced	Remain unchanged
(d)	Water	Oxygen	Chlorophyll

iii. (d) All of these

iv. (b) Point b

v. (b) At noon

20. i. (b) Female: male sex ratio is decreasing

ii. (a) Female sterilisation (tubectomy)

iii. (b) Asia and Latin America and Caribbean islands

iv. (c) Gonorrhoea and syphilis

v. (c) Kerala and Delhi

Section B

21. The components of human transport system include:

(a) Heart- receives and pumps the blood.

(b) Arteries- carry oxygenated blood away from the heart to various organs.

(c) Veins- Bring back deoxygenated blood back to the heart.

(d) Capillaries- exchange of various materials and gases between blood and tissues.

22. Placenta is a special organ that develops temporarily in pregnant female and helps the human embryo in obtaining nutrition from mother's blood via umbilical cord.

Placenta is a disc-like structure embedded in the uterine wall.

i. It contains hair like projections known as villi on the side of the embryo.

ii. It contains blood spaces, on mother's side, which surround the villi.

Functions

i. It provides a large surface area for glucose and O₂ to pass from mother's blood to the embryo.

ii. It also removes metabolic wastes from the embryo.

iii. It produces important hormone hCG (human chorionic gonadotropin).

iv. It helps in thermoregulation of foetus.

23. i. All offsprings were round yellow in F₁ - generation

ii. Round yellow - 9

Round green - 3

Wrinkled yellow - 3

Wrinkled green - 1

Therefore, the ratio of offsprings in F₂-generation is 9 : 3 : 3 : 1.

24. When body has sudden shortage of water, then nephron starts re absorbing more water from the filtrate .This is done to retain more water in the body.
25. The asexually reproducing organisms require only single parent and exact copies of DNA are present in daughter cells as well as the parent cell. So there is more chance of hereditary features.
26. Sexually transmitted disease caused due to
 1. Bacterial infection is gonorrhoea, and
 2. Viral infection is AIDS (Acquired Immune Deficiency syndrome). These disease can be prevented by responsible sexual behaviour such as use of condom during intercourse, etc.

OR

Following factors could lead to the rise of new species:

- (a) Changes in gene frequency in small breeding isolated populations.
- (b) Natural selection
- (c) Changes in number of chromosome.

Section C

27. The first step of breaking down glucose into pyruvate is the same in all.
Then, in the absence of oxygen, pyruvate changes into ethanol ,CO₂ , energy. Ex - yeast
When there is a lack of oxygen in our muscle cells, pyruvate changes into lactic acid and energy.
28. Mendel's work remained unnoticed for about three decades, but after its rediscovery, the laws are being used for the various branches of breeding. These are used for improving the varieties of fowls and their eggs, in obtaining rust resistance and disease resistant varieties of grains. Various new breeds of horses and dogs are obtained by cross breeding experiments. The science of eugenics is the result of Mendelism.

29.	Autotroph		Heterotroph	
	These organisms make their own food.		These organisms take food from other organisms.	
	Green plants and some bacteria are examples of autotrophs. They contain chlorophyll pigment which can absorb sun light and synthesize their food through photosynthesis.		Animals and fungi are examples of heterotrophs.	
30.	Parents	RRYY	x	rryy
		Round, yellow		wrinkled, green
	F ₁ —	Rr Yy	x	Rr Yy
		Round, yellow		Round, yellow

The given cross is a dihybrid cross that shows the inheritance of two different traits simultaneously. In the given question, when pure breeding dominant parent plant (RRYY) crossed with pure breeding recessive parent plant (rryy), it gives heterozygous dominant progeny in the F₁ generation. All progeny in this cross will have genotype RrYy and exhibit round yellow. Self-cross of F₁ progeny will give F₂ generation.

31. The lack of water causes stomata to open very little or even remain closed. Therefore, CO₂ (a raw material for photosynthesis) cannot enter into the leaves and thus lack of water slows down the rate of photosynthesis.
32. Variations that confer an advantage to an individual organism may or may not survive in the population depending on the social behaviour of the organism. But there are several other variations which, though do not provide an advantage to the organism in if present condition, survive and are inherited to the next generation . Such non-advantageous variations may become advantageous in future when the environmental conditions change.A variation in a social animal like ant may not survive in a population while a variation in an animal like a leopard may survive.

OR

The tracheal wall is supported by 'C' - shaped cartilaginous rings because they prevent the trachea from collapsing.

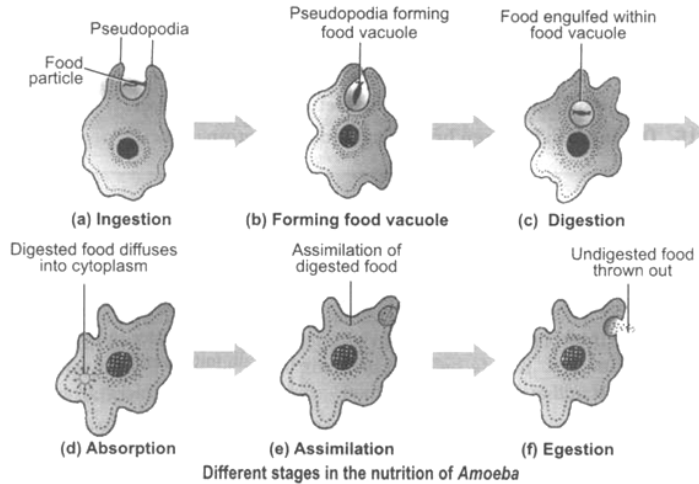
33. In mammals and birds the blood goes through the heart twice during each cardiac cycle. This is known as double circulation.

Deoxygenated blood which enters right auricle and then it enters the right ventricle from where it is pumped to lungs for oxygenation. From lungs after oxygenation it comes to left auricle and then enters left ventricle from where it is pumped to various parts of body.

Such system of circulation does not allow mixing of oxygenated and deoxygenated blood which allows efficient supply of oxygen to the body.

Section D

34. The mode of nutrition in Amoeba is holozoic.



The various steps involved in the process of nutrition are:

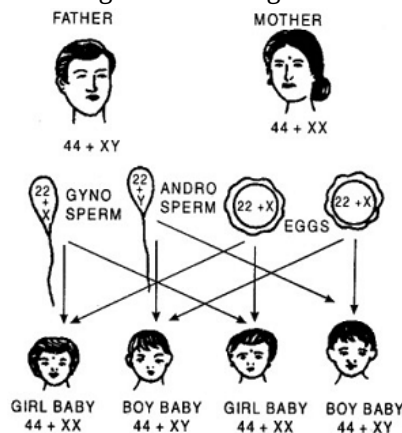
- Ingestion:** Amoeba ingests food with the help of its finger-like extensions, called pseudopodia. When Amoeba approaches a food particle, it forms pseudopodia around it and forms a food vacuole inside the Amoeba.
- Digestion:** Various enzymes from the cytoplasm enter into the food vacuole and break them down into simple soluble molecules.
- Absorption:** The simple soluble food is absorbed by cytoplasm of Amoeba from food vacuoles through the process of diffusion.
- Assimilation:** Amoeba cell obtains energy from the absorbed food through respiration. This energy is utilised by Amoeba for its growth and repair of the body.
- Egestion:** When a considerable amount of undigested food gets collected inside Amoeba, its cell membrane ruptures and throws out the undigested food.

OR

Determination of the sex of child. Sex chromosomes determine sex in human beings. In males, there are 44 + XY chromosomes, whereas, in female there are 44 + XX chromosomes. Here X and Y chromosomes determine sex in human beings.

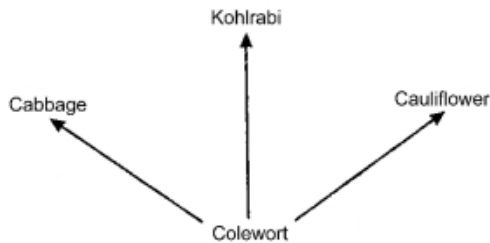
Two types of gametes are formed in male, one type is having 50% X-chromosome, whereas, other type is having Y-chromosome. In female, gametes are of one type and contain X-chromosome.

The females are homogametic. If male gamete having Y-chromosome (androsperm) undergoes fusion with female gamete having X-chromosome the zygote will have X Y chromosomes and this gives rise to male child.



If male gamete having X-chromosome undergoes fusion with female gamete having X-chromosome, the zygote will be having XX-chromosome and this gives rise to female child.

35. A close parallelism exists between natural selection and artificial selection. Artificial selection is done by man exactly in the same way as nature does. The criteria for selections are based on human interest. Man in breeding experiments on useful animals, selects individuals with desired traits and separates them from those which do not possess such traits. After repeating this process for a few generations a new breed of animals is formed. In this way man has been able to produce several varieties of domesticated animals like cows, horses, sheep, dogs etc. from their wild ancestors. Other examples of organisms produced by man through artificial selection are kohlrabi, cabbage, cauliflower, all these are obtained from common ancestor, colewort.



Different breeds of pigeons have been obtained from wild Rock Pigeon through artificial selection. If man can produce new varieties of breeds in a short period of time, nature with its vast resources and long period can produce vast varieties of organisms.

OR

Digestive gland: These are also considered to be exocrine glands which have ducts to drop their secretions into the target organ directly. The secretions of the digestive glands help in the process of digestion. These glands include salivary glands, gastric glands, intestinal glands, liver and pancreas.

Digestive glands of Man

a) Salivary glands secrete saliva along with enzymes. Ptyalin is the starch hydrolysing enzyme secreted by salivary glands in human beings. It is also called as salivary amylase. Ptyalin secreted in the mouth brings about digestion of starch in the mouth itself. It hydrolyses starch into disaccharaides like maltose and isomaltose and other small dextrins called as limit dextrins. Ptyalin hydrolyses at about 30 percent of the starch in the mouth itself.

b) Gastric glands secrete HCL, pepsinogen, mucous. Gastric juice is a secretion of gastric glands located in the lining of the stomach. It is mainly made up of electrolytes, mucus, enzymes, hydrochloric acid, intrinsic factor etc. HCl secreted by parietal cells provides acidic medium for many enzymes to get activated. Neck cells secrete mucus which lubricated the passage of the food. Chief cells secrete pepsinogen which helps in the digestion of proteins after getting activated into pepsin by HCL. Enzymes of the gastric juice bring about digestion of different components of the food. Gastric lipase helps in emulsification of lipids in the stomach. Partially digested food in the stomach is called as chyme and this passes on into small intestine

c) Intestinal glands are present in the inner lining of small intestine. These secrete various enzymes which aid in the process of digestion of all the components of food. Maltase, sucrase and lactase bring about digestion of carbohydrates. Peptidases help in digestion of proteins. Enterokinase helps in the activation of other enzymes

d) Liver is the largest gland in our body. The liver secretes a yellowish green watery fluid called bile. It is temporarily stored in a sac called the gall bladder. Bile provides an alkaline environment for many enzymes to get active. It also reduces the acidity of chyme. Bile plays an important role in the digestion of fats. Bile is sent into duodenum through a narrow tube-like structure called the bile duct. Bile breaks the larger fat molecules into tiny droplets, thereby increasing their surface area, which helps in the digestion of fats easily.

e) Pancreas is the mixed gland. It acts as both endocrine and exocrine gland. The pancreas secretes the pancreatic juice that helps to digest carbohydrates, proteins and fats. The pancreatic juice converts carbohydrates into simple sugars and glucose, proteins into amino acids, and the lipids into fatty acids and glycerol. Trypsin and chymotrypsin help in the digestion of proteins.

36. Each species face many forces that reduce the number of individuals constantly. Some of them are namely struggling for survival, competition.

For natural rescors, prediction, the natural cycle of aging and death, any natural calamity, etc. All these natural forces reduce the number of individuals per species.

Reproduction is the process of production of own kind. It includes the production of offspring having both similarities and variations among themselves and from parents. Further, the process of DNA replication and its inheritance to offspring ensure production of own kind only.

Therefore, reproduction not only restores the number of individuals removed from the species by (competition) natural forces but also maintain heredity of genetic character and introduction of variations, as needed for continuity and stability of species. Without it all of the existing species will diminish soon life will come to an end.

OR

a. Genotype of man: Bb (Heterozygous)

Genotype of mother: bb
(homozygous recessive)

b. Possible genotype of his father: Bb (Heterozygous) or BB (homozygous dominant)

c. Cross between heterozygous man and homozygous recessive blue-eyed woman Bb x bb 50% Blue-eyed 50% Brown eyed.

The ratio obtained is 1 : 1 it is an example of test cross also.

