1	
D	The characteristic of living organisms shown by this experiment is sensitivity. Sensitivity is the ability to respond to changes in both internal and external environments, and thus ensure that they maximize their chance of survival. In this experiment, wood lice move to the damp place for their survival.

2	
D	Two individuals belonging to the same genus and same species only can reproduce together and produce fertile offspring. If Prunella vulgaris breeds with Prunella modularis or Vespula vulgaris, it cannot produce fertile offspring.

3	
C	The body of myriapods consists of many segments. Each segment has jointed legs. So, they have many legs. Crustaceans are the arthropods with more than four pairs of jointed legs. Arachnids have four pairs of jointed legs. Insects are the arthropods with three pairs of jointed legs.

4

C

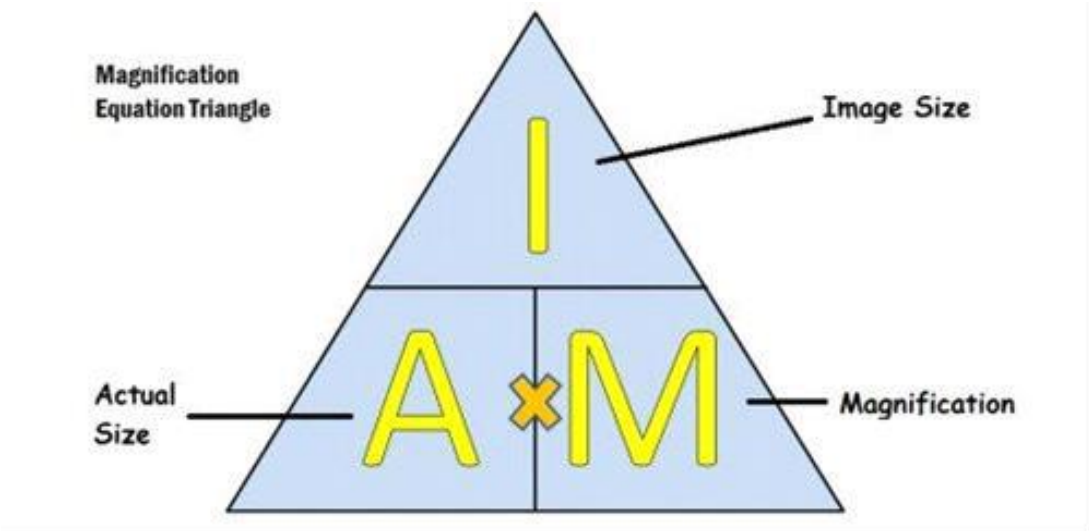
X = Two cell membranes
All cells have a cell membrane around the cell. In between two cells, they have two cell membranes. Only plant cells have cell wall, not animal cells.

5	
C	Plants absorb water through the roots from the soil. Root hair cells are adapted for taking up water and mineral ions by having a large surface area to increase the rate of absorption

6

D

Magnification is defined as the ratio of the size of the image to the size of the object.
Actual size = Image size / Magnification
1cm = 10000 µm (micrometers)
Length of structure on the diagram = 5 cm = 50000 µm
Magnification of the diagram = x 20000.
Actual length of M = 50000 /20000 = 2.5 µm

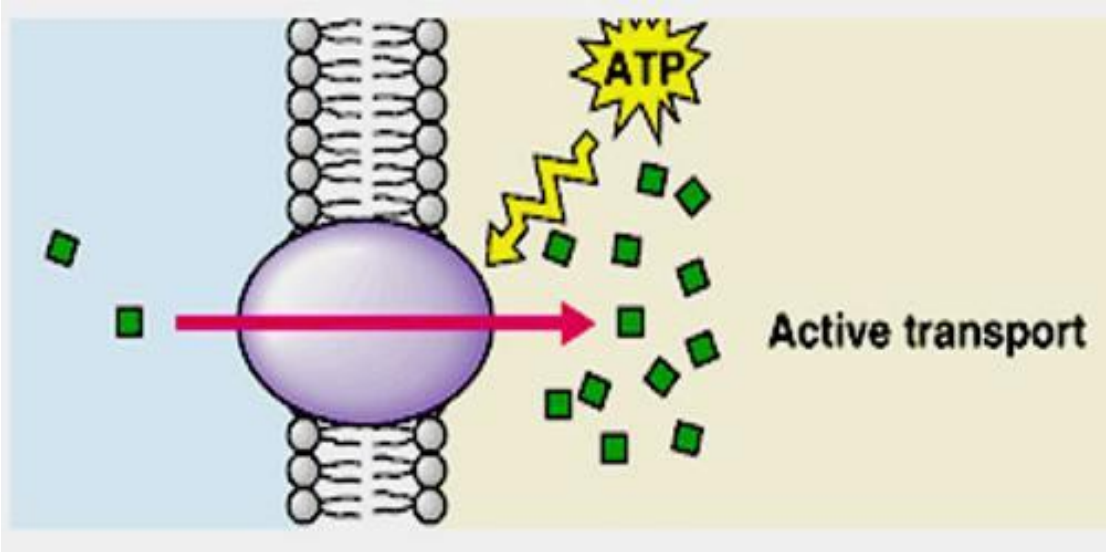


7	
A	Diffusion is the movement of substances from an area of higher concentration to an area of lower concentration by random movement of the molecules or ions of the substance. The movement continues till the concentration of the molecules becomes the same in all the available space. In this jar, diffusion has taken place both upwards and downwards

8

D

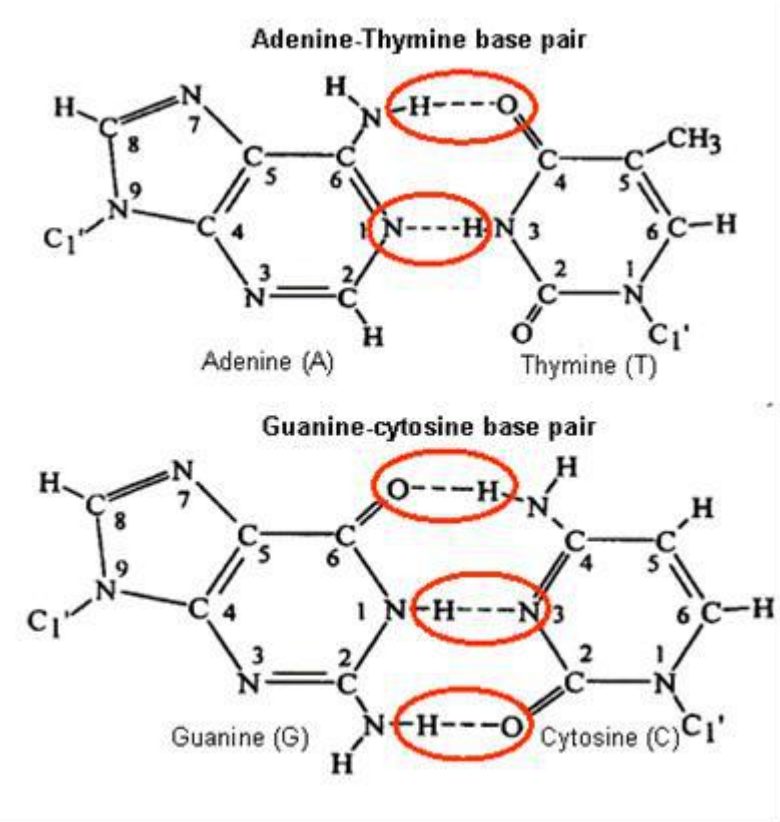
In active transport, molecules move from regions of low concentration to high concentration. The molecules move against the concentration gradient. The energy required in the process comes from respiration.



9

B

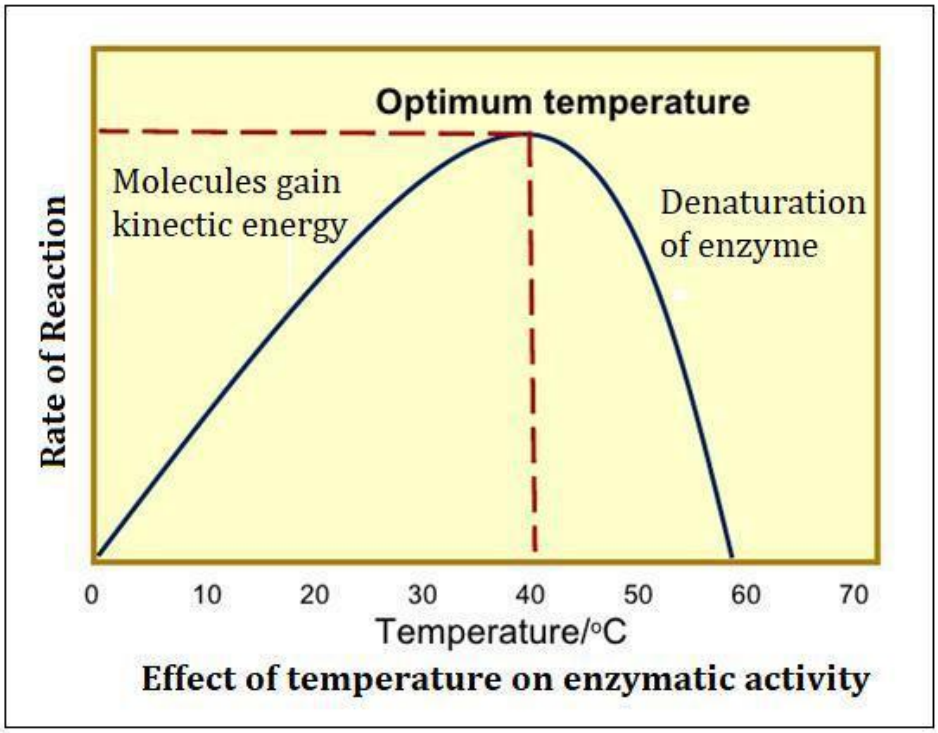
Purine of one polynucleotide chain will always pair with pyrimidine of the other polynucleotide chain. Adenine pairs with Thymine by double bond and Guanine pairs with Cytosine by triple bond. Both the chains of a DNA molecule are complementary to each other. The sequence of bases on the other strand will be GTCGA



10

B

Enzymes are particularly sensitive to temperature changes, due to their proteinaceous nature. Their activity is confined to a narrow temperature range. As the temperature rises, the collision frequency between substrate and enzyme increases between X and Y. However, the enzymes are damaged by very high temperatures. The shape of the active site is altered between Y and Z. There occurs denaturation of the enzyme.



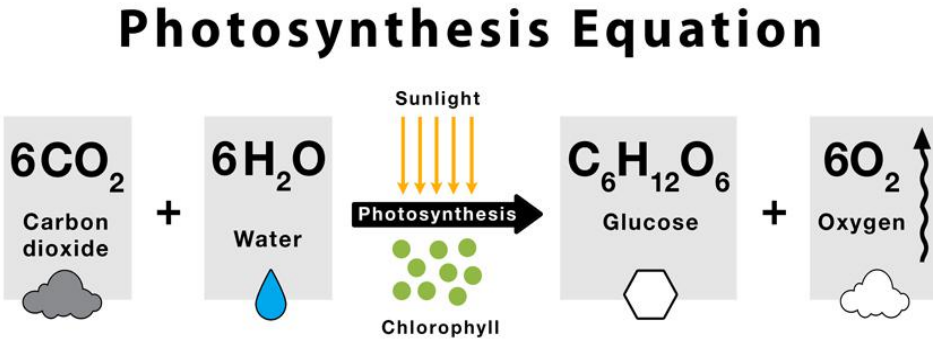
Effect of temperature on enzymatic activity

11	
B	Proteinaceous nature of enzymes makes them extremely sensitive to the pH of the medium. Most of the digestive enzymes have a maximal activity at pH around 7, which is the pH of most body fluids. A shift to acidic or alkaline side of the pH scale causes a drop-in activity.

12

D

Photosynthesis is a process by which green plants make the carbohydrate glucose from carbon dioxide and water using energy from sunlight. Oxygen is produced as a waste product in this process. Aerobic respiration requires the presence of oxygen. Anaerobic respiration does not use oxygen. The energy required for active transport comes from respiration.

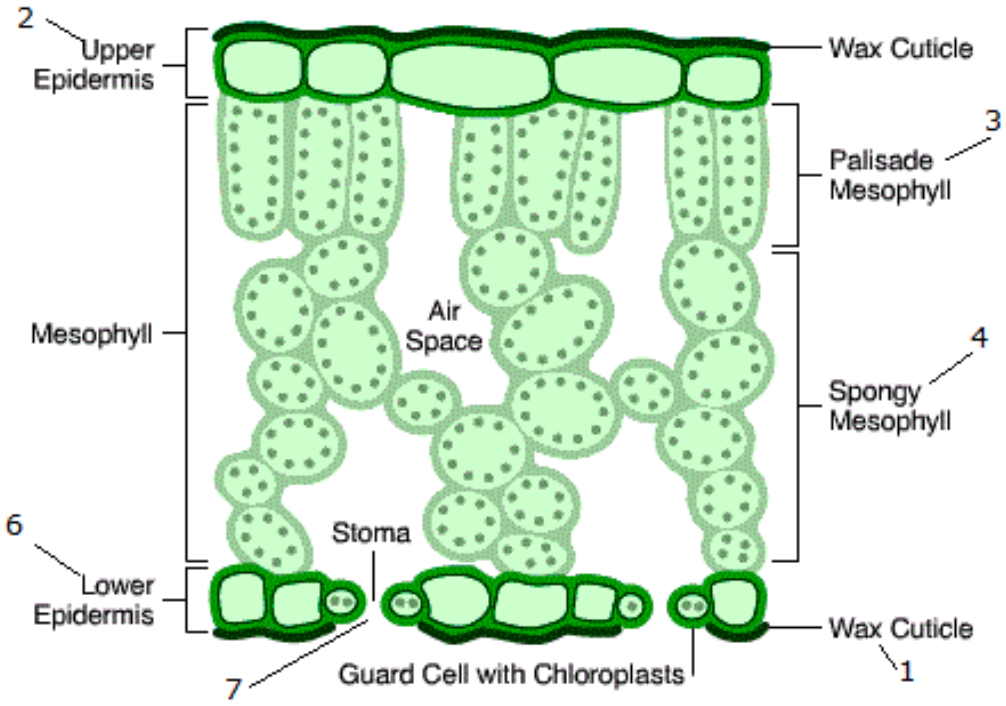


13

C

C = Spongy mesophyll

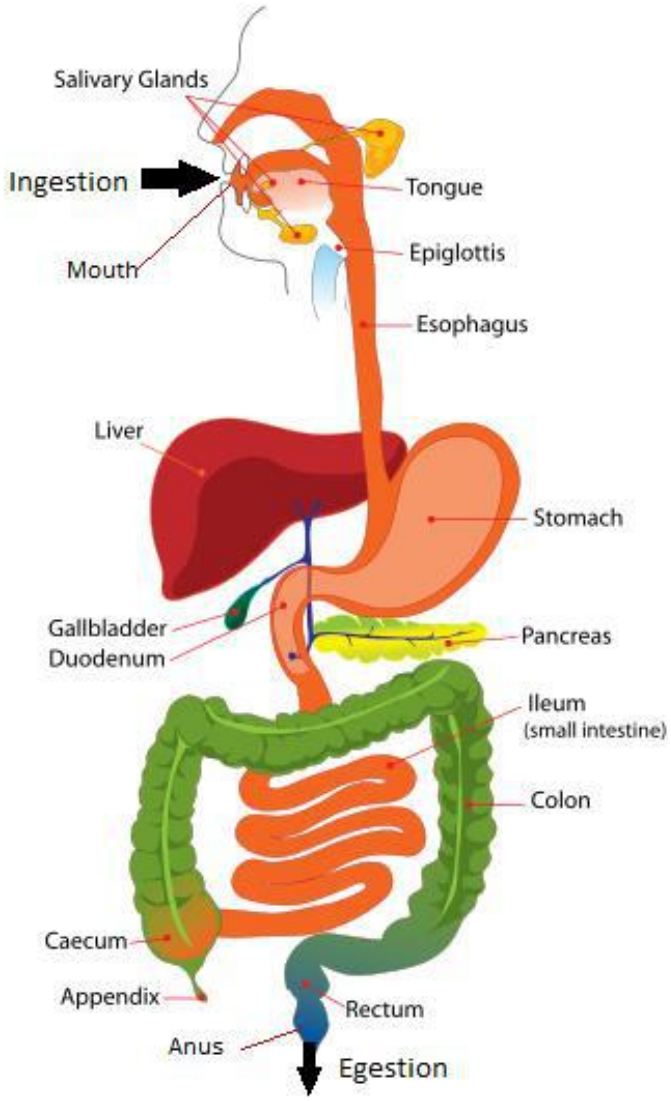
The spongy mesophyll consists of irregular and loosely arranged cells, enclosing large intercellular spaces. These air spaces are connected with the sub- stomatal chambers to maintain gaseous exchange with the outside through stomata.



14

D

Egestion is the elimination of undigested waste food materials from the body. Indigestible food, bacteria, and some dead cells from the inside of the alimentary canal forms the faeces. They are passed out at regular intervals through the anus.



15

C

P = Oesophagus
Q = Ileum

The fat globule is bigger in the oesophagus. Oesophagus takes the food down to the stomach. The fat globules are smaller in ileum, because of the action of digestive enzymes. Digestion and absorption are completed in the ileum.

16	
C	Amylase hydrolyses starch to simple sugars. Lipase hydrolyses fats into glycerol and fatty acids. Proteins are broken down into amino acids by protease.

17

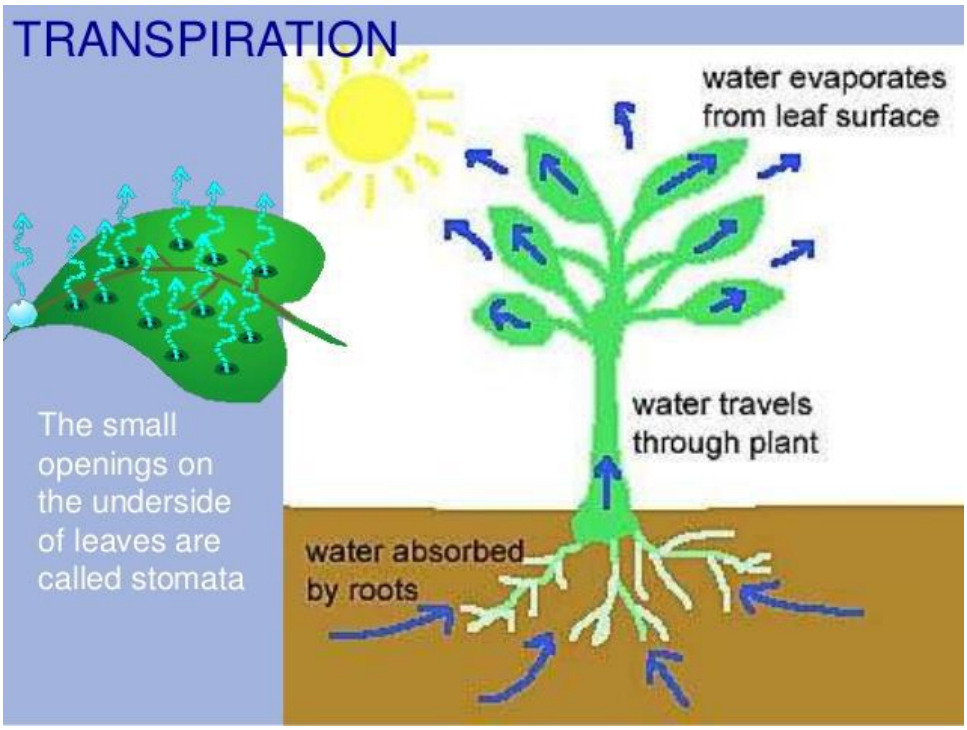
B

Xylem is primarily concerned with the conduction of water and minerals and also provides mechanical support to the plant. It is not the only transport tissue in the plant. It carries water to the leaves.

18

A

The loss of water in the form of vapours from the aerial parts of plants is known as transpiration. Loss of water vapour occurs through the stomata. But, an increase in the surface area of the cell surfaces inside the leaf increases the rate of transpiration.



19

C

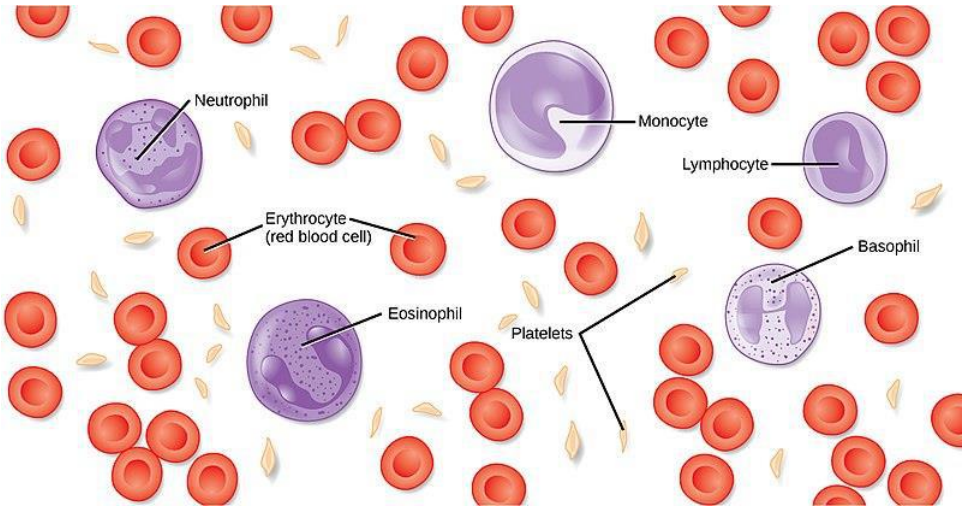
The capillaries are closely wrapped around the outside of the alveoli in the mammalian lungs. Blood is pumped to the lungs along the pulmonary artery. The walls of alveoli are the gas exchange surface. The blood is then taken back to the heart in the pulmonary vein.

20

A

A = Neutrophils

Neutrophils are the most abundant and most active type of white blood cell. They collect in large numbers at the site of infection. They carry out the process of phagocytosis.



21

A

Vaccines are dead or attenuated organisms, and are injected into the body of an individual. The vaccination stimulates the multiplication of lymphocytes, and induces the production of antibodies against the antigen. Memory cells are produced. When the body is exposed to the same antigen, antibodies destroy the antigen, providing long term immunity.

22

C

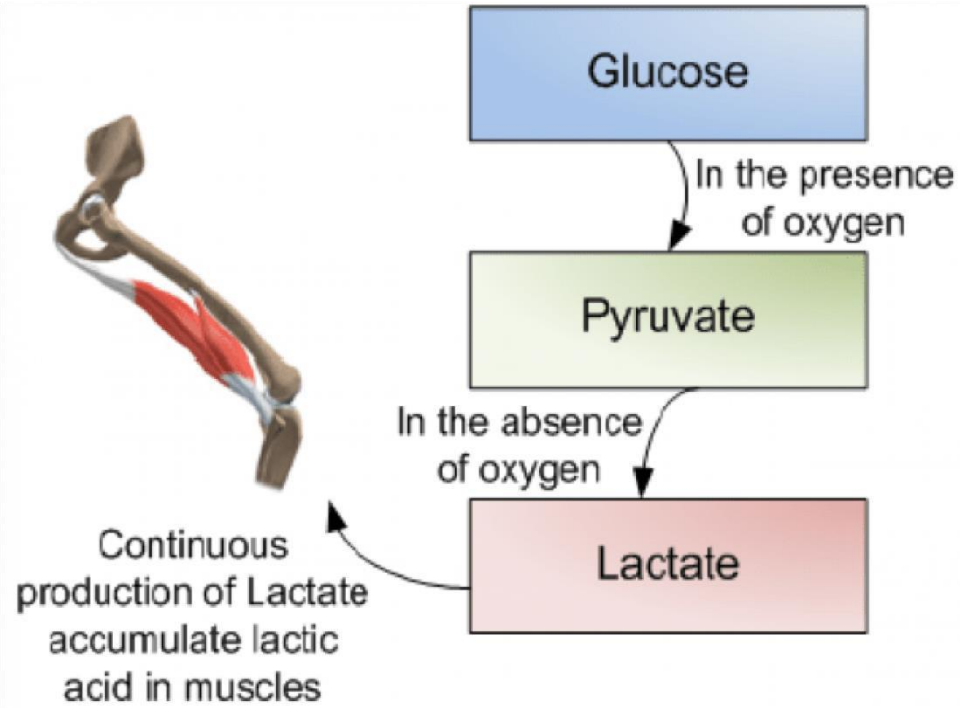
The approximate percentage of oxygen contained in the air breathed out of the lungs is 16% and carbon dioxide is 4%, but the amount of inhaled air contains 21% of oxygen and 0.04% carbon dioxide. This is because our cells use oxygen from the inhaled air to release energy and give out carbon dioxide as a by-product.

	Inhaled air	**Exhaled air**
Oxygen	Contains 21% oxygen (**more oxygen** than exhaled air)	Contain 16% oxygen (**less oxygen** than inhaled air)
Carbon Dioxide	Contain 0.03% carbon dioxide (less carbon dioxide than exhaled air)	Contains about 4% carbon dioxide (more carbon dioxide than inhaled air)
Water vapour	Contain less water vapour	Contain more water vapour

23

C

After running a fast race, the muscles in legs are using up a lot of energy. The extra energy is produced by anaerobic respiration. The glucose is broken down to lactic acid in the absence of oxygen. Lactic acid accumulates in muscles and in blood, which causes pain.



24

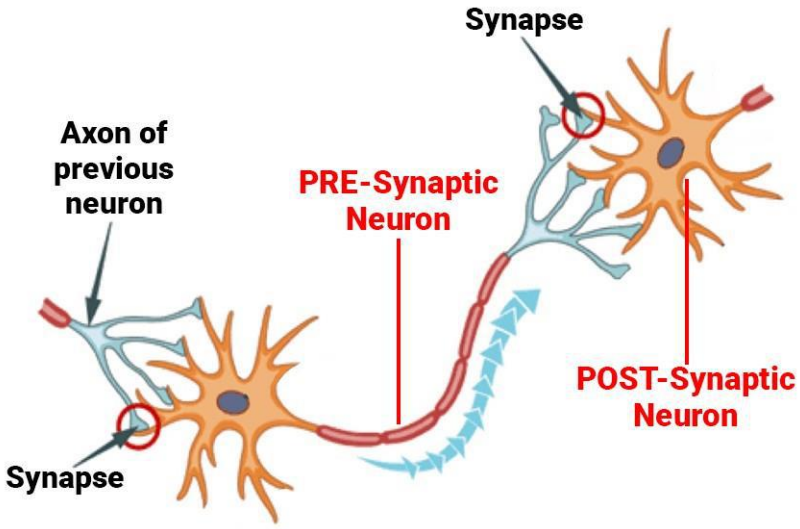
C

During aerobic respiration, carbon dioxide and water are formed. The carbon dioxide produced is expelled through the lungs during exhalation. The liver deaminates the excess and unwanted amino acids, producing ammonia, which combines with carbon dioxide to form urea. Urea is eliminated by the kidneys.

25

B

Synapse is the junctional region between two neurons, where information from one neuron is transmitted to another neuron. The neural messages travel in only one direction. The membrane of the sending cell is called presynaptic membrane and that of the receiving cell is postsynaptic membrane. The fluid filled gap is called synaptic cleft.



26

C

Hormone action is slow, long lasting and wide spread. Hormones are the chemical messengers, which move through the blood stream and can reach every cell in the body. The nervous system transmits its messages by means of electrochemical impulses, which travel quickly to the muscles and glands.

27

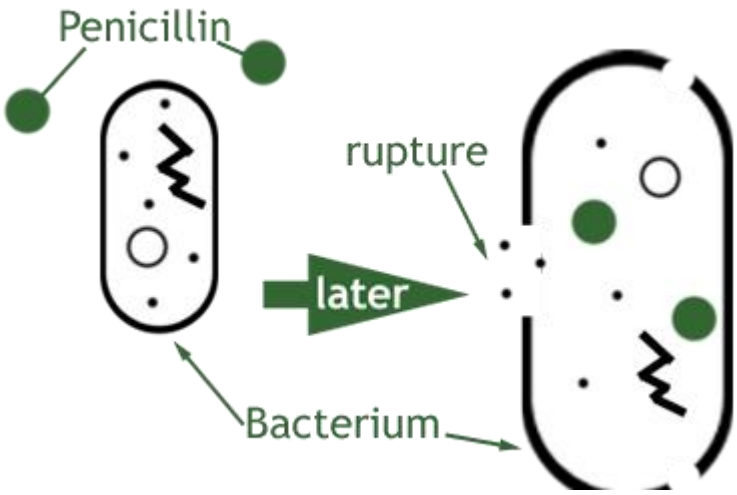
D

Auxin is a growth hormone made in the shoot tip, and is specifically required for elongation process. The highest concentration of auxin is present in growing tips of coleoptiles, leaves and roots. Auxin accumulates in the side where sunlight is not present, causes the plant to bend towards the sunlight.

28

A

Some antibiotics kill bacteria, by damaging the cell wall. Antibiotic inhibitors of cell wall synthesis block the production of peptidoglycan, the main component of the cell wall. A bacterial cell with a damaged cell wall cannot undergo binary fission and is thus certain to die. For example, when a person infected with bacteria is treated with penicillin, the bacteria are unable to grow new cell walls, and they burst open.



29

A

In asexual reproduction, a single organism is capable of producing its own kind. The offspring produced are genetically identical. The term clone is used to describe such morphologically and genetically similar individuals.

30

A

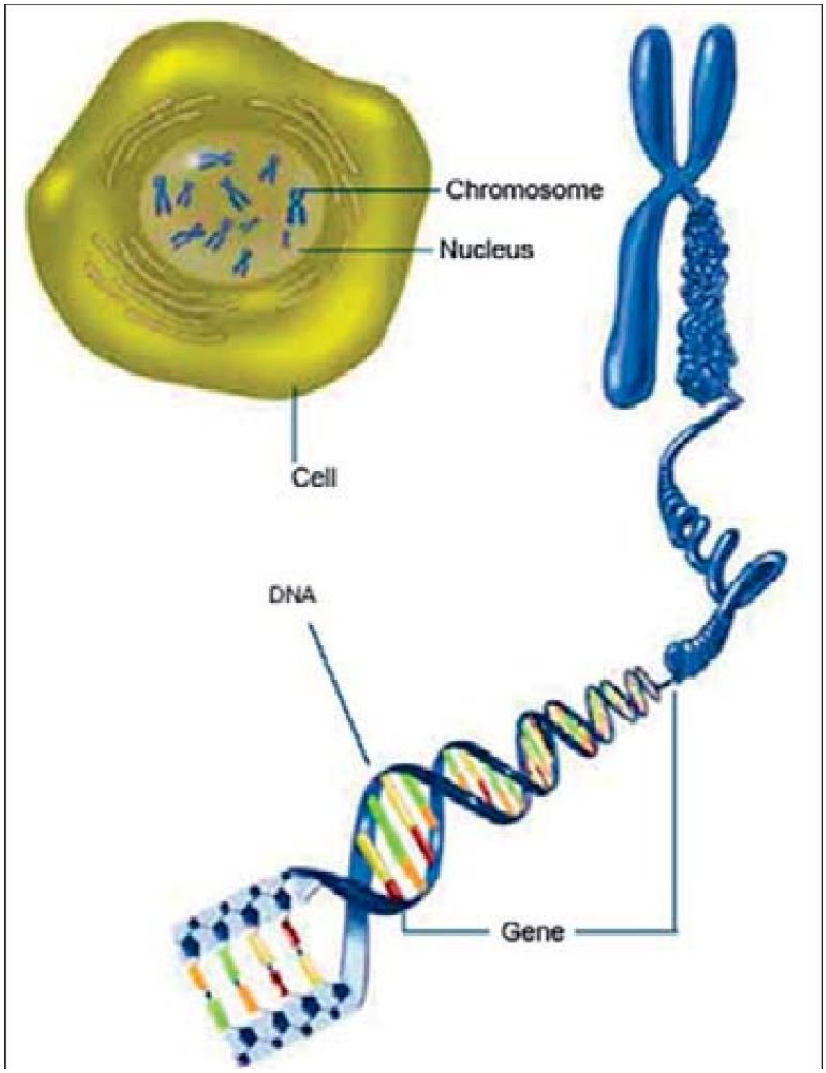
AIDS is caused by a retrovirus, HIV (Human immune deficiency virus). AIDS is transmitted by blood transfusions, and sexual intercourse. It is not transmitted by touch, saliva or non- sexual contact.

31	
B	Contraceptive pill works by preventing an egg from being released. Condom works by putting a barrier between the eggs and the sperm. In vasectomy, the tube which carry sperms from the testes are cut and tied.

32

B

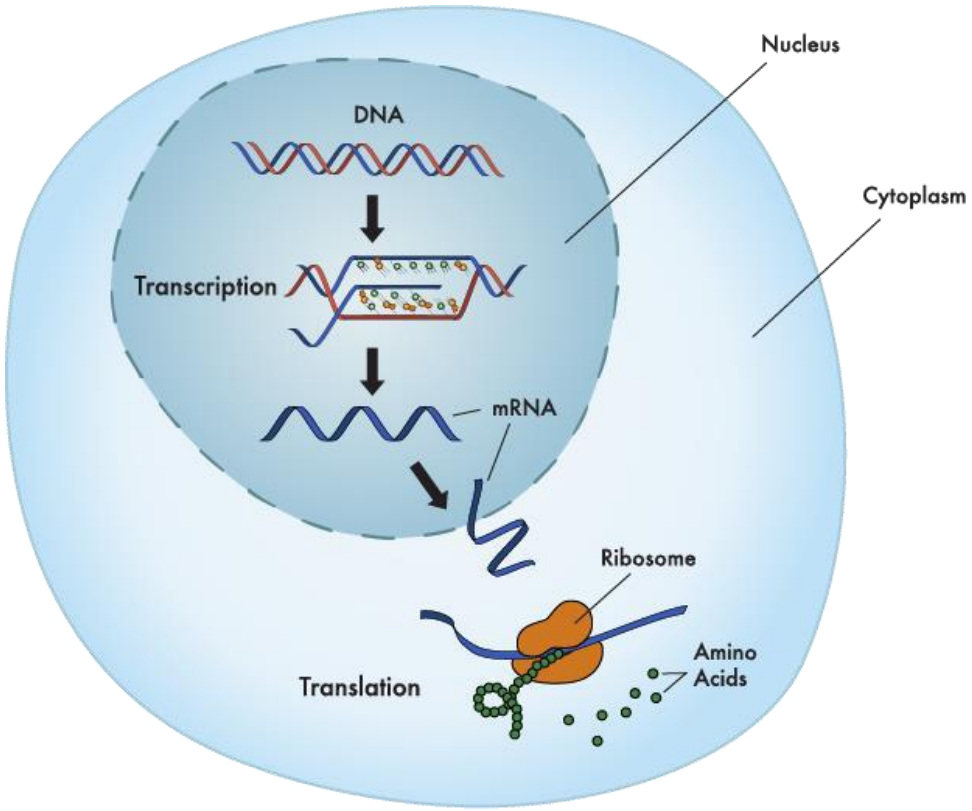
Chromosome is a thread-like structure of DNA, located inside the nucleus. The function of Chromosomes is to carry genetic information from one cell generation to another in the form of genes. The chromosomes become distinct only during cell division.



33

C

The gene coding for a protein is copied in the nucleus. Copies of the gene are carried to the cytoplasm as mRNA molecules. The mRNA molecules pass through ribosomes. Each ribosome assembles amino acids into a protein molecule.



34

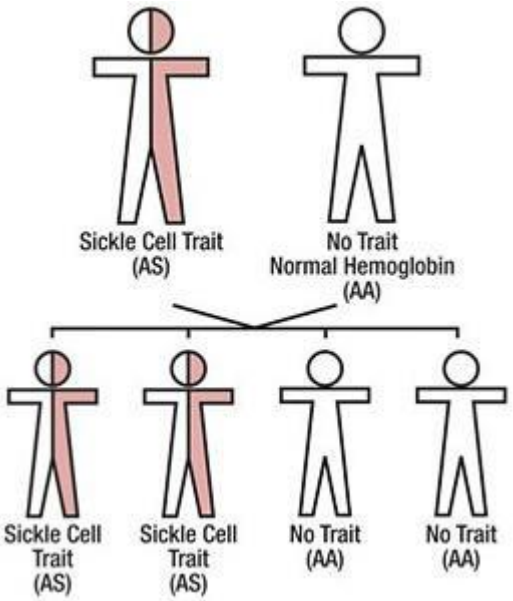
B

A sunflower has 17 chromosomes in each pollen nucleus. These nuclei are produced by the process of meiosis in the anthers. They are genetically different from all the pollen nuclei produced by those anthers. After fertilisation the resulting zygote will have 34 chromosomes.

35

C

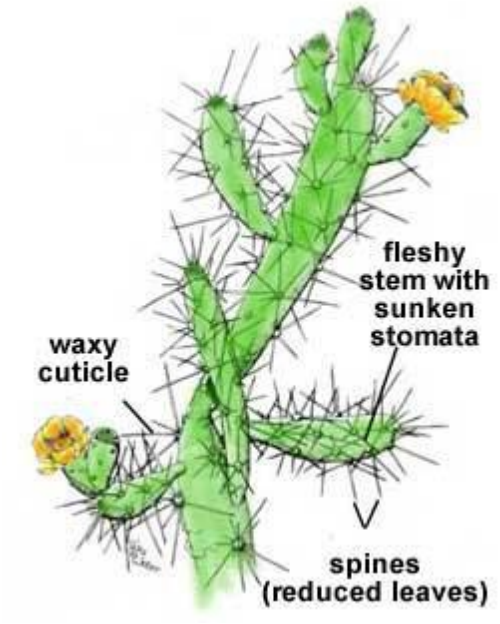
Sickle cell anaemia is a genetic disorder caused by a variant form of hemoglobin in red cells. If a man heterozygous for the sickle cell anaemia allele, Hb^SHb^A, has children with a woman who is homozygous for the normal haemoglobin allele, Hb^AHb^A , the first child will have 50% chance of having a sickle cell anemia allele, Hb^SHb^A. Individuals heterozygous for the sickle cell anaemia allele, Hb^SHb^A are more resistant to malaria. The probability that the first child will be resistant to malaria is 0.5.



36

A

Xerophytes are adapted to grow in dry habitats. They undergo structural modifications to reduce the rate of transpiration. Some of them are sunken stomata, thick cuticle, deep or widespread roots and the presence of rolled leaves. xerophytes have tiny hairs on their surfaces These hairs slow down the rate transpiration and this protects the stomata from harsh winds.



T

37

D

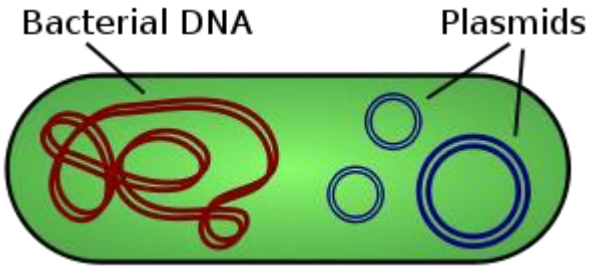
X is the exponential phase or log phase where population grows at a rapid rate. The reproduction rate is greater than the death rate. It shows an increase in population size. It proceeds till enough food is available. Y is the stationary phase. The growth reaches a plateau as the reproduction rate equals the death rate. Z is the death phase,and is characterized by a decrease in the number of organisms.

38

D

X = Plasmid

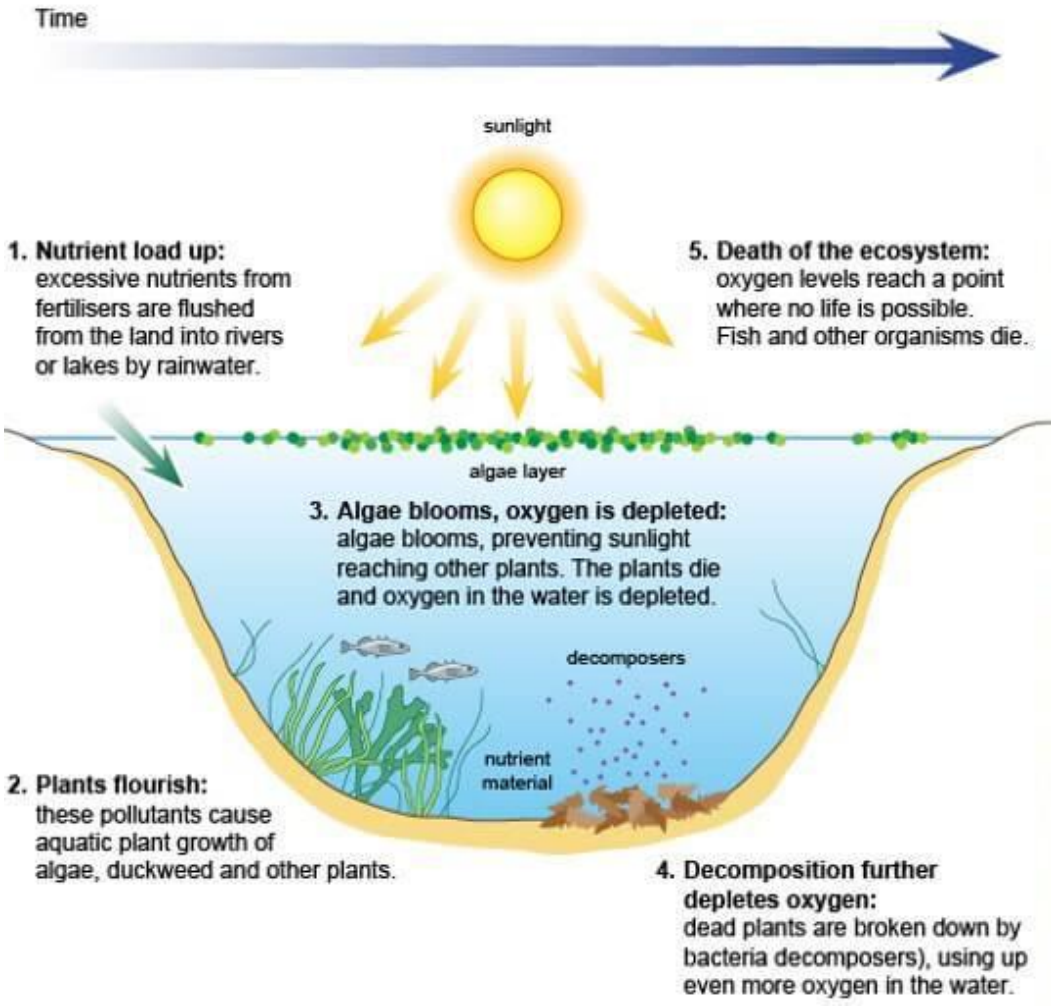
Plasmids are extrachromosomal hereditary determinants. A plasmid is a ring of DNA, found in bacteria, which is able to reproduce itself inside other living cells. Bacterial plasmids can be manipulated and can be used as carriers of recombinant DNA into cells.



39

D

When nitrates enter a lake, they cause rapid growth of algae on the surface of the water. They block out the light for plants growing beneath them. Producers die and decomposition increases. Aerobic respiration in decomposers increases. The concentration of dissolved oxygen in the water decreases. Fish and other aquatic animals die.



40

B

Denitrifying bacteria convert nitrates or ammonium compounds into free nitrogen. It causes a decrease in the nitrate content in the soil. Nitrogen fixing bacteria have the ability to take free nitrogen from the atmosphere and convert to soluble nitrates, Nitrifying bacteria convert ammonia into nitrates. They increase the nitrate content in the soil.