

Page 1 of 8

1. D

Sensitivity in living organisms refers to their ability to respond to changes in their environment. When a lizard detaches its tail in response to a threat from a predator, it is demonstrating sensitivity by reacting to a potential danger to survive. This is an example of an organism's sensory and response system in action.

2. C

Cytoplasm is a fundamental component found in both plant and animal cells. It is a jelly-like substance that fills the cell, providing a medium in which organelles can float and function. The cytoplasm plays a crucial role in supporting cellular processes by helping in the movement of materials around the cell and housing enzymes that aid in breaking down waste and metabolizing nutrients. Thus, it is essential for both types of cells to maintain their structure and function.

3. C

Leaf is an organ, not a tissue. Tissues are groups of similar cells that perform a specific function, whereas organs are structures composed of two or more types of tissues that work together to perform a specific function.

4. C

The optimum pH is the point where the enzyme is most active, and the rate of reaction is at its highest. On the graph, this corresponds to the peak of the curve, where letter C is located.

5. B

The presence of starch in a sample is indicated by a blue-black color change when iodine solution is applied. The presence of protein is indicated by a purple color change when the Biuret reagent is used. Sample B is the only one that shows a blue-black color with iodine solution (indicating starch) and a purple color with Biuret reagent (indicating protein).

6. B

Iron is an essential component of hemoglobin in red blood cells, which is needed for transporting oxygen throughout the body.

7. B

Calcium is crucial for the development of strong cell walls in plants. A deficiency in calcium can lead to weakened cell walls.

8. A

Explanation: Oxygen produced during photosynthesis in the leaf cells diffuses out of the plant through the stomata, which are typically located on the underside of the leaf. Arrow **A** points outward from the leaf's internal structure, which is consistent with the diffusion pathway of oxygen exiting the leaf.

9. C

In parasitism, one organism (the parasite) benefits at the expense of another organism (the host). Since the tick benefits by obtaining nutrients from the dog's blood, and the dog suffers a loss of blood and potential diseases transmitted by the tick, this relationship is parasitic.

10. B

$$\text{Total teeth} = 2 \times ((x + 3) + (1 + 1) + (4 + 4) + (2 + 3)) = 42$$

$$2((x + 3) + 2 + 8 + 5) = 42$$

$$2((x + 3) + 15) = 42$$

$$2x + 36 = 42$$

Solve for x :

$$2x = 42 - 36 = 6$$

$$x = \frac{6}{2} = 3$$

11. B

Gastric juice is produced by the stomach, which is responsible for the digestion of food using acids and enzymes. In the provided diagram, the stomach is indicated by the label 'B'.

12. T

The gaseous exchange in the gills of a fish primarily takes place in the gill filaments and, more specifically, in the lamellae. The gill filaments are thin,

elongated structures that extend from each gill arch, and the lamellae are small, thin, plate-like structures arranged along each filament. These lamellae have a very high surface area and are richly supplied with blood capillaries, facilitating the efficient exchange of oxygen and carbon dioxide between the fish's blood and the surrounding water.

13. A

The stage in the life cycle of a mosquito that transmits pathogens is the adult stage. Specifically, it is the adult female mosquito that transmits pathogens when she bites to feed on blood, which she needs to develop her eggs. The pathogens are transmitted from the mosquito's saliva into the host's bloodstream during the feeding process.

14. D

Sensitisation refers to the process of educating people about HIV and AIDS, dispelling myths and misconceptions, and promoting understanding, acceptance, and support for those living with the condition. This can help reduce stigma and discrimination against people living with HIV and AIDS.

15. D

- Corm: A short, swollen underground stem that serves as a food storage organ, often with a papery covering (e.g., gladiolus).
- Rhizome: A long, underground stem that produces roots and shoots, often with nodes and internodes (e.g., ginger, iris).
- Tuber: A swollen, fleshy underground stem or root that serves as a food storage organ, often with "eyes" or buds (e.g., potato).

16. D

The blood group that can be donated to any person is O, often referred to as the universal donor, especially O negative, which is compatible with all blood types.

17. C

The valves in the human heart ensure blood flows in one direction, preventing backflow and maintaining efficient circulation. They act as:

- One-way doors, allowing blood to flow from:

- **Atria to ventricles (mitral and tricuspid valves)**
- **Ventricles to arteries (aortic and pulmonary valves)**

18. C

Urea is a waste product formed from the breakdown of proteins in the liver. The liver converts ammonia, which is toxic, into urea, which is less harmful. This urea is then released into the bloodstream and transported to the kidneys. The kidneys filter the blood and remove waste products, including urea, from the body. The urea is excreted from the kidneys in the urine, which is collected in the bladder before being expelled from the body. Thus, the liver is responsible for urea production, and the kidneys are responsible for its removal.

19. C

The part of the skin that releases sweat on a hot sunny day is the Sweat Glands (also known as Eccrine Glands). These glands are found in the dermis, the middle layer of skin, and produce sweat that is released onto the skin's surface through tiny pores. When the body temperature rises, the sweat glands are stimulated to produce sweat, which helps to cool the body through evaporation.

20. B

The salivary glands are not endocrine glands; they are exocrine glands because they release saliva into the mouth through ducts. Endocrine glands, on the other hand, release hormones directly into the bloodstream, and the pancreas, testes, and thyroid are all endocrine glands.

21. A

This order makes sense because the stimulus needs to be detected first, then transmitted to the CNS for processing, and finally, a response is generated and produced.

22. B

The lens shown in the diagram is a converging lens, which is also known as a convex lens, it's used to correct hyperopia, or long-sightedness. This condition is characterized by difficulty focusing on nearby objects because

the eye focuses images behind the retina. A convex lens converges light rays before they enter the eye, helping to focus the image directly on the retina for clear near vision.

23. A

The bone labeled 'W' in the diagram is the fibula which is the smaller of the two bones in the lower leg and, like the tibia, is part of the internal framework of the body.

24. A

Given that the shoot is pointing upwards after one week, the type of tropism exhibited is negative geotropism. Negative geotropism, also known as negative gravitropism, is the growth of plant parts away from the force of gravity. In this case, the shoot of the plant grows upwards, which is characteristic of the growth pattern for most plant shoots as they reach for light and against the pull of gravity.

25. A

From the diagram, we can see that plant P is smaller and plant Q is larger. This change in size indicates that the plant is growing, which involves both cell division and development. Cell division in plants occurs by mitosis, which allows the plant to increase the number of cells. Development involves the differentiation of these cells into various tissues and organs that allow the plant to increase in size and complexity.

Therefore, both mitosis and development are occurring as the plant grows from stage P to stage Q

26. D

Seed germination typically requires a suitable temperature and moisture. The temperature should be warm enough to stimulate the enzymes that facilitate the growth process, and moisture is essential for the seed to absorb water, which is necessary to begin metabolism and sprouting.

The seeds in Dish 4, which are in a warm and wet environment, would germinate most rapidly as these conditions are optimal for most seeds to begin germination.

27. A

The diagram shows a unicellular organism splitting into two separate cells. This process is called binary fission, which is a type of asexual reproduction commonly found in prokaryotes such as bacteria. During binary fission, the cell replicates its genetic material and then divides into two equal sized daughter cells, each with a copy of the original DNA.

28. C

The method depicted in the diagram involves removing a ring of bark from a stem and covering this area with moist material until roots develop, after which the stem can be cut below the rooted part and planted. This method is called layering.

Layering involves encouraging roots to form on a branch or stem while it is still attached to the parent plant. Once the roots have formed, the new plant can be severed from the parent plant and transplanted.

29. C

In the parts of a flower, male gametes are produced in the pollen, which is created in the anthers. The anthers are typically held up by filaments, together forming the stamen, which is the male reproductive part of the flower.

30. B

The fruit that is described as lightweight and has a wing is the one adapted for wind dispersal. The wing-like structure helps the seed to be carried away by the wind, allowing it to cover larger distances from the parent plant, which aids in the spread of the species.

31. A

Fertilization occurs when a sperm cell successfully meets an ovum (egg) and merges with it, which typically happens in the fallopian tubes of the female reproductive system. The fallopian tubes connect the ovaries, where ova are produced, to the uterus. After ovulation, the ovum enters the fallopian tube, where it may encounter sperm that have traveled up from the uterus. If fertilization occurs, the fertilized ovum, now called a zygote, will continue to travel down the fallopian tube to the uterus, where it can implant and develop into an embryo.

32. A

Family planning pills are a type of hormonal method of birth control, which use hormones to prevent ovulation and thicken cervical mucus to prevent sperm from reaching the egg.

33. D

The mother with blood group O has the genotype $I^O I^O$ and can only pass on the I^O allele to her children. The father with blood group AB has the genotype $I^A I^B$ and can pass on either the I^A or the I^B allele to his children.

Because the O blood group is recessive, any child from this parentage would have to inherit an O allele from the mother and either an A or a B allele from the father, resulting in either blood group A (from the genotype $I^A I^O$) or blood group B (from the genotype $I^B I^O$).

Therefore, none of the children will have the same blood group as either parent, which are O (from the mother) or AB (from the father).

34. C

Mutation can be beneficial in agriculture by creating polyploid plants, which can exhibit increased vigor, fertility, and resistance to disease. Polyploidy can also lead to increased crop yields and improved crop quality. This is a beneficial application of mutation in agriculture.

35. C

Fish are ectothermic (or cold-blooded) animals that do not maintain a constant body temperature, they do not have external ears, and many have scales. Some fish lay eggs that are jelly-covered to provide protection in the water. So the characteristics of fish typically include jelly-covered eggs and scales.

36. C

A decrease in food supply can lead to a decrease in population size as individuals may struggle to survive and reproduce due to limited resources.

37. D

The arrow marked X, pointing from "Plants," to "Carbon dioxide" represents respiration. In the process of respiration, plants (as well as

animals) convert glucose back into energy, releasing carbon dioxide as a byproduct.

38. D

Deforestation leads to the removal of tree roots that hold soil in place, resulting in increased soil erosion and landslides. Trees also help absorb rainfall, and without them, the soil can become saturated, leading to increased runoff and erosion.

39. C

Excess fertiliser (2) and untreated sewage (4) can lead to an increase in nutrients such as phosphorus and nitrogen in water bodies, causing an overgrowth of aquatic plants, known as eutrophication.

Discarded household rubbish (1) and industrial chemicals (3) can pollute water bodies, but they do not typically cause increased growth of aquatic plants.

40. B

Game keeping is a sustainable use of resources because it involves managing wildlife populations and their habitats in a way that maintains their health and stability, while also allowing for controlled hunting and harvesting. This approach ensures that the resource (wildlife) is not depleted and can continue to thrive for future generations.