1. C. Nutrition

Nutrition involves the intake of food (ingestion), the absorption of nutrients, and the assimilation of those nutrients into the body.

2. C. Mitochondrion

The mitochondrion is known as the powerhouse of the cell and is responsible for cellular respiration, where energy is produced in the form of ATP.

3. C. It occurs against a concentration gradient.

Active transport requires energy to move particles against their concentration gradient, from an area of lower concentration to an area of higher concentration.

4. B. Enzyme, Substrate, Active site, Product

The enzyme binds to the substrate at the active site, leading to the formation of products.

5. C. Caterpillars

Caterpillars are not typically considered a good source of lipids compared to avocados, castor seeds, and cheese.

6. D. Roughage

Roughage, or dietary fiber, promotes peristalsis by adding bulk to the stool and aiding in its movement through the digestive tract.

7. B. Pregnant women

Pregnant women require more iron to support the increased blood volume and the needs of the developing fetus.

8. A

The epidermal cells are typically the outermost layer of cells in a leaf, providing protection and often involved in gas exchange.

9. C. Rhizopus

Rhizopus is a fungus that obtains nutrients by decomposing organic matter, which is characteristic of saprophytic nutrition.

10. A Canine, for tearing flesh.

Amino acids are the end products of protein digestion, which occurs along the alimentary canal.

11. A. Amino acids

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. A. Contracts, Contracts

During deep inhalation, both the diaphragm and the external intercostal muscles contract to increase the volume of the thoracic cavity, allowing air to flow into the lungs.

13. D. Glucose → lactic acid + energy

In humans, anaerobic respiration produces lactic acid and energy when oxygen is scarce.

14. D. Sensitisation

Sensitisation helps to educate and inform the public, reducing stigma and misconceptions about HIV and AIDS.

15. A. Epidermis, Phloem, Xylem.

- Epidermis (1): This is the outermost layer of cells in the root, providing protection and aiding in water and nutrient absorption.
- Phloem (2): This tissue is responsible for transporting sugars and other metabolic products downward from the leaves.
- Xylem (3): This tissue transports water and dissolved minerals upward from the roots to the rest of the plant.

16. D. A and O

Jane, with blood group A, can receive blood from individuals with blood group A (same type) and blood group O (universal donor). Blood group O does not have A or B antigens, making it compatible with her blood group.

17. A

The **Lymph Capillary** is the part of the lymphatic system that collects

interstitial fluid from tissues. Lymph capillaries are small, thin-walled vessels that are designed to absorb fluid that leaks out of blood capillaries. They play a crucial role in maintaining fluid balance and immune function by transporting lymph, which contains waste products and immune cells, to larger lymphatic vessel

18. B. Carbon dioxide

The lungs excrete carbon dioxide, a waste product of cellular respiration, during exhalation

19. B. Liver, kidney and skin

These organs play crucial roles in maintaining homeostasis. The liver regulates metabolism, the kidney filters blood and regulates fluid balance, and the skin helps regulate temperature and protect against external factor

20. A.

The **pancreas** is the gland that produces insulin. Specifically, insulin is produced by the **beta cells** in the **islets of Langerhans**, which are clusters of cells in the pancreas. Insulin is a hormone that helps regulate blood sugar levels by allowing cells to take in glucose from the bloodstream for energy.

21. C

Relay neurons, also known as interneurons, facilitate communication between sensory neurons and motor neurons. They process and transmit signals within the central nervous system, playing a crucial role in reflex actions and complex neural pathways. These neurons do not typically have long axons; instead, they form intricate networks that allow for the integration and modulation of neural signals.

22. B

Long sight defect, also known as hypermetropia or hyperopia, is a common vision condition where distant objects can be seen more clearly than nearby objects. This occurs because the light entering the eye focuses behind the retina instead of directly on it. This can be due to the eyeball being too short or the cornea having too little curvature.

Hypermetropia is corrected using **convex lenses**. These lenses are thicker in the center and thinner at the edges. They help to converge the light rays

before they enter the eye, ensuring that the light focuses directly on the retina, thereby improving near vision.

23. B. Axial skeleton

The bones of the skull, ribs, sternum, and vertebral column collectively form the axial skeleton. This part of the skeleton provides the central framework for the body, supporting and protecting vital organs and structures.

24. D. Positive phototropism, Negative phototaxis

- **Positive phototropism** is exhibited by the plant shoot, which grows towards the light source.
- **Negative phototaxis** is exhibited by the invertebrates, which move away from the light source.

25. D. Sclerenchyma

Sclerenchyma cells are thickened with lignin and provide structural support to the stems and other parts of plants. They are characterized by their thick, rigid cell walls, which make them strong and durable.

26. A. Epigeal because cotyledons are carried above ground.
In epigeal germination, the cotyledons are pushed above the soil surface as the seedling grows. This is evident from the diagram where the cotyledons are shown above the ground, indicating that the germination type is epigeal.

27. B. Budding

Yeast reproduces asexually through budding, where a small bud forms on the parent cell, grows, and eventually detaches to become a new individual.

28. C. Runner
The diagram represents natural propagation through runners. Runners are horizontal stems that grow along the ground and produce new plants at nodes, as shown by the parent plant and daughter plant in the diagram.

29. D. Stigma

The stigma is the sticky, receptive tip of the pistil (female part) of a flower, where pollen grains land and germinate. It's essentially the "landing pad" for pollen.

30. D. Short filaments

The short filaments keep the anthers well below the stigma, making it very difficult for pollen to reach the stigma of the same flower. This flower is structured to encourage *cross-pollination* (pollination from another flower) rather than self-pollination.

31. A.

- The **prostate gland** produces fluid that helps sperm mobility (enabling them to swim effectively).
- The **seminal vesicles** produce a nutrient-rich fluid (particularly containing fructose) that provides energy for the sperm.

32. D. Rhythm

The rhythm (or calendar) method involves tracking a woman's menstrual cycle and abstaining from intercourse on days when fertility is likely. It does not involve any artificial devices or chemicals, hence it is considered a natural method of birth control.

33. C. Trait
A **trait** is a genetically determined characteristic or condition that is expressed in an organism, such as flower color, height, or blood type.

34. C. Metaphase

During **metaphase**, the nuclear membrane has already disappeared, and the chromosomes line up at the cell's equator. They are also attached to spindle fibers at their centromeres.

35. D. Kingdom

In the hierarchical classification system (Kingdom, Phylum, Class, Order, Family, Genus, Species), the **kingdom** level includes the largest and most diverse group of organisms among the listed options.

36. C Humus

When crop remains are burnt, the organic matter in the soil (humus) is lost. Humus consists of decomposed organic material that helps retain nutrients and moisture in the soil.

37. A.

Energy always moves from producers at the broad base of the pyramid (lowest trophic level) up through the higher-level consumers at the top. Therefore, **A** correctly shows the energy flow moving from bottom to top.

38. C. Immigration

Immigration directly increases population because it involves individuals moving **into** a population.

39. C. Non-biodegradable materials

Non-biodegradable materials contribute to land pollution since they do not break down naturally and can accumulate in the soil.

40. C. Equilibrium of organisms in a given locality

The **equilibrium of organisms in a given locality** is a key importance of biodiversity because it helps maintain stable ecosystems where species interact and support one another.