

O-Level Pure Biology Paper 1 practice set.

SET 1

1. Which organelle is the site of aerobic respiration in a cell?
 - A. Ribosome
 - B. Mitochondrion
 - C. Golgi body
 - D. Nucleus
2. Which structure is found in plant cells but NOT in animal cells?
 - A. Cell membrane
 - B. Mitochondria
 - C. Cell wall
 - D. Nucleus
3. Diffusion is best described as the movement of particles:
 - A. From low to high concentration, requiring energy
 - B. From high to low concentration, not requiring energy
 - C. Of water only, across a partially permeable membrane
 - D. Against a concentration gradient using a carrier protein
4. Osmosis is defined as the movement of:
 - A. Solute molecules across a partially permeable membrane
 - B. Water molecules from a region of lower to higher water potential
 - C. Water molecules from a region of higher to lower water potential across a partially permeable membrane
 - D. Any molecule using ATP energy
5. An enzyme's activity is most affected by changes in temperature and pH because these factors:
 - A. Change the substrate's chemical formula
 - B. Alter the shape of the enzyme's active site
 - C. Increase the number of enzyme molecules
 - D. Convert the enzyme into a substrate
6. Which test detects starch?
 - A. Iodine
 - B. Benedict's
 - C. Biuret
 - D. Ethanol emulsion
7. Which test detects protein?
 - A. Iodine
 - B. Benedict's
 - C. Biuret
 - D. Ethanol emulsion

8. Photosynthesis combines which raw materials to form glucose?
 - A. Oxygen and water
 - B. Carbon dioxide and water
 - C. Oxygen and carbon dioxide
 - D. Nitrogen and water
9. Which leaf structure allows gas exchange?
 - A. Cuticle
 - B. Stomata
 - C. Xylem
 - D. Palisade mesophyll
10. Which vessel transports manufactured food from leaves to other plant parts?
 - A. Xylem
 - B. Phloem
 - C. Cambium
 - D. Cortex
11. Which enzyme in saliva begins starch digestion?
 - A. Pepsin
 - B. Amylase
 - C. Lipase
 - D. Trypsin
12. Where is bile released into?
 - A. Stomach
 - B. Duodenum
 - C. Oesophagus
 - D. Large intestine
13. Villi increase absorption efficiency mainly by:
 - A. Producing more enzymes
 - B. Increasing surface area
 - C. Slowing food movement
 - D. Secreting HCl
14. Main function of red blood cells:
 - A. Fight pathogens
 - B. Clot blood
 - C. Transport oxygen
 - D. Transport digested food
15. Which heart chamber pumps oxygenated blood to the whole body?
 - A. Right atrium
 - B. Right ventricle
 - C. Left atrium
 - D. Left ventricle
16. Main advantage of a double circulatory system:
 - A. Blood passes through the heart once per cycle
 - B. Higher blood pressure and oxygen delivery to tissues

- C. Fewer blood vessels needed
 - D. Allows blood to bypass the lungs
17. Which vessel has the thinnest walls, allowing exchange with tissues?
- A. Artery
 - B. Vein
 - C. Capillary
 - D. Aorta
18. During inhalation:
- A. Diaphragm relaxes and moves up; ribs move down
 - B. Diaphragm contracts and moves down; ribs move up and out
 - C. Both remain stationary
 - D. Diaphragm contracts and moves up; ribs move in
19. Site of gas exchange in the lungs:
- A. Trachea
 - B. Bronchus
 - C. Alveolus
 - D. Bronchiole
20. Main excretory product removed by kidneys:
- A. Carbon dioxide
 - B. Urea
 - C. Bile
 - D. Glucose
21. Which part of the nephron performs ultrafiltration?
- A. Loop of Henle
 - B. Glomerulus and Bowman's capsule
 - C. Collecting duct
 - D. Distal convoluted tubule
22. Which hormone lowers blood glucose?
- A. Glucagon
 - B. Insulin
 - C. Adrenaline
 - D. Thyroxine
23. Which part of a neuron receives impulses?
- A. Axon
 - B. Dendrite
 - C. Myelin sheath
 - D. Synapse
24. Small gap between neurons where impulses cross chemically:
- A. Axon
 - B. Synapse
 - C. Node of Ranvier
 - D. Effector
25. Which eye structure controls light entering the eye?
- A. Cornea

- B. Iris
 - C. Retina
 - D. Lens
26. Homeostasis refers to:
- A. Growth of an organism over time
 - B. Maintenance of a constant internal environment
 - C. Gas exchange in the lungs
 - D. The process of reproduction
27. Which is a mitosis-related process?
- A. Formation of gametes with half the chromosome number
 - B. Growth and repair of body tissues
 - C. Genetic variation through crossing over
 - D. Random segregation of homologous chromosomes
28. Meiosis results in:
- A. Two identical diploid cells
 - B. Four genetically different haploid cells
 - C. Four identical diploid cells
 - D. Two genetically different diploid cells
29. Cross $Tt \times Tt$ gives what phenotype ratio (complete dominance)?
- A. 1:1
 - B. 1:2:1
 - C. 3:1
 - D. 9:3:3:1
30. A person with genotype $XXHh$ is a carrier for haemophilia. This tells us the allele is:
- A. On an autosome
 - B. Dominant
 - C. Recessive and sex-linked
 - D. Cannot be passed on
31. A mutation is best described as:
- A. The normal process of cell division
 - B. A change in the DNA base sequence
 - C. Pairing of homologous chromosomes
 - D. Transfer of pollen between flowers
32. In genetic engineering, the role of a plasmid is:
- A. To act as a vector carrying the desired gene into a host cell
 - B. To cut DNA at specific sequences
 - C. To join DNA fragments permanently
 - D. To translate mRNA into protein
33. Protein synthesis (translation) takes place at the:
- A. Nucleus
 - B. Ribosome
 - C. Mitochondrion
 - D. Golgi body

34. Main role of decomposers:
- A. Photosynthesise
 - B. Consume producers directly
 - C. Break down dead matter and recycle nutrients
 - D. Store energy as biomass
35. In a food chain, the arrow represents:
- A. Direction of predation
 - B. Flow of energy
 - C. Direction of nutrient absorption
 - D. Reproductive relationship
36. Why is only ~10% of energy transferred between trophic levels?
- A. Organisms only eat 10% of available food
 - B. Energy lost as heat via respiration; not all biomass eaten/digested
 - C. Decomposers absorb 90%
 - D. Producers store 90% underground
37. A species is defined as:
- A. Organisms living in the same habitat
 - B. Organisms that can interbreed to produce fertile offspring
 - C. Organisms sharing a common ancestor
 - D. Organisms with the same diet
38. Natural selection acts on variation primarily by:
- A. Creating mutations directly in response to need
 - B. Favouring individuals with advantageous traits, who survive and reproduce more
 - C. Ensuring equal reproduction for all
 - D. Eliminating all genetic variation
39. Germination is:
- A. Fusion of male and female gametes
 - B. Growth of a seed into a seedling under suitable conditions
 - C. Transfer of pollen from anther to stigma
 - D. Formation of a fruit from a fertilised ovary
40. In flowering plants, fertilisation occurs when:
- A. Pollen lands on the stigma
 - B. A pollen tube grows down the style
 - C. The male nucleus fuses with the female nucleus in the ovule
 - D. Petals fall off the flower

Answer key: 1-B, 2-C, 3-B, 4-C, 5-B, 6-A, 7-C, 8-B, 9-B, 10-B, 11-B, 12-B, 13-B, 14-C, 15-D, 16-B, 17-C, 18-B, 19-C, 20-B, 21-B, 22-B, 23-B, 24-B, 25-B, 26-B, 27-B, 28-B, 29-C, 30-C, 31-B, 32-A, 33-B, 34-C, 35-B, 36-B, 37-B, 38-B, 39-B, 40-C

SET 2

1. Which structure regulates what enters and leaves a cell?
 - A. Cell wall
 - B. Nucleus
 - C. Cell membrane
 - D. Vacuole
2. The nucleus of a cell mainly functions to:
 - A. Produce energy
 - B. Control cell activities and contain genetic material
 - C. Store water
 - D. Synthesise proteins
3. Active transport differs from diffusion because it:
 - A. Requires energy and can move substances against a concentration gradient
 - B. Only moves water molecules
 - C. Never requires a carrier protein
 - D. Only occurs in plant cells
4. If a plant cell is placed in a concentrated salt solution, water will move by osmosis:
 - A. Into the cell, causing it to swell
 - B. Out of the cell, causing plasmolysis
 - C. Neither in nor out
 - D. Into the vacuole only
5. Enzymes are best described as:
 - A. Fats that break down food
 - B. Biological catalysts made of protein
 - C. Types of carbohydrates
 - D. Waste products of respiration
6. A balanced diet should include all of the following EXCEPT:
 - A. Carbohydrates
 - B. Proteins
 - C. Vitamins
 - D. Only water
7. The main product of anaerobic respiration in muscle cells (humans) is:
 - A. Ethanol
 - B. Lactic acid
 - C. Carbon dioxide
 - D. Oxygen

8. Chlorophyll is mainly found in which cell structure?
 - A. Mitochondria
 - B. Chloroplast
 - C. Nucleus
 - D. Vacuole
9. Which factor is NOT required for photosynthesis to occur?
 - A. Light
 - B. Carbon dioxide
 - C. Oxygen
 - D. Chlorophyll
10. Guard cells regulate the opening and closing of:
 - A. Xylem vessels
 - B. Stomata
 - C. Lenticels
 - D. Root hairs
11. Peristalsis refers to:
 - A. Chemical breakdown of food by enzymes
 - B. Wave-like muscular contractions moving food along the gut
 - C. Absorption of nutrients in the small intestine
 - D. Storage of bile in the gall bladder
12. Which organ produces bile?
 - A. Gall bladder
 - B. Pancreas
 - C. Liver
 - D. Stomach
13. Lipase breaks down fats into:
 - A. Amino acids
 - B. Glucose
 - C. Fatty acids and glycerol
 - D. Maltose
14. Platelets are primarily involved in:
 - A. Fighting infection
 - B. Blood clotting
 - C. Oxygen transport
 - D. Nutrient transport
15. Veins differ from arteries mainly because veins:
 - A. Carry blood at higher pressure

- B. Have thinner walls and contain valves
- C. Always carry oxygenated blood
- D. Have no lumen

16. The septum in the heart functions to:

- A. Prevent mixing of oxygenated and deoxygenated blood
- B. Pump blood to the lungs
- C. Store blood
- D. Produce red blood cells

17. Haemoglobin combines with oxygen to form:

- A. Carbaminohaemoglobin
- B. Oxyhaemoglobin
- C. Myoglobin
- D. Fibrinogen

18. Which structure prevents backflow of blood in the heart and veins?

- A. Septum
- B. Valves
- C. Capillaries
- D. Atria

19. During exhalation, the volume of the thoracic cavity:

- A. Increases
- B. Decreases
- C. Stays the same
- D. Doubles

20. Which of these is NOT an excretory organ?

- A. Kidney
- B. Lungs
- C. Skin
- D. Stomach

21. ADH (antidiuretic hormone) helps the body by:

- A. Increasing water reabsorption in the kidney tubules
- B. Increasing blood glucose
- C. Lowering body temperature
- D. Breaking down urea

22. If blood glucose level rises after a meal, the pancreas responds by releasing:

- A. Glucagon
- B. Insulin
- C. Adrenaline

D. ADH

23. A reflex arc typically involves this sequence:

- A. Effector → receptor → relay neuron → motor neuron
- B. Receptor → sensory neuron → relay neuron → motor neuron → effector
- C. Motor neuron → receptor → effector
- D. Relay neuron → effector → receptor

24. Vasodilation of skin blood vessels helps the body to:

- A. Conserve heat
- B. Lose heat
- C. Retain water
- D. Produce more sweat

25. The retina of the eye functions to:

- A. Focus light
- B. Control the amount of light entering
- C. Contain light-sensitive receptor cells
- D. Protect the eye

26. Negative feedback in homeostasis works by:

- A. Amplifying a change in the body
- B. Reversing a change to restore the normal set point
- C. Ignoring any deviation from normal
- D. Increasing hormone production indefinitely

27. A gamete contains how many chromosome sets compared to a body cell?

- A. Double
- B. Half (haploid)
- C. Equal
- D. Triple

28. Which term describes an organism with two different alleles for a gene?

- A. Homozygous
- B. Heterozygous
- C. Haploid
- D. Recessive

29. Down syndrome in humans is caused by:

- A. A recessive allele
- B. An extra copy of chromosome 21
- C. A sex-linked mutation
- D. Environmental factors only

30. In DNA, the two strands are held together by:
- A. Peptide bonds
 - B. Hydrogen bonds between complementary bases
 - C. Ionic bonds
 - D. Covalent bonds between sugars
31. A codon on mRNA codes for:
- A. A single nucleotide
 - B. A specific amino acid
 - C. An entire protein
 - D. A single gene
32. In the production of human insulin using bacteria, the human insulin gene is inserted into:
- A. A human cell
 - B. A bacterial plasmid
 - C. A virus only
 - D. An animal egg cell
33. Which of these is an example of continuous variation?
- A. Blood group
 - B. Height in humans
 - C. ABO blood type
 - D. Presence/absence of a specific disease allele
34. A pyramid of biomass shows:
- A. The number of organisms only
 - B. The mass of living material at each trophic level
 - C. The energy flow only
 - D. The species diversity of an ecosystem
35. Which is a producer in a typical grassland food web?
- A. Grasshopper
 - B. Grass
 - C. Fox
 - D. Frog
36. Nitrogen-fixing bacteria are important because they:
- A. Convert atmospheric nitrogen into a usable form for plants
 - B. Break down dead organisms
 - C. Produce oxygen
 - D. Consume decomposers

37. Which of these is an example of discontinuous variation?
- A. Height
 - B. Body mass
 - C. ABO blood group
 - D. Skin colour
38. An adaptation is best described as:
- A. Any random change in an organism
 - B. A feature that increases an organism's chance of survival and reproduction in its environment
 - C. A change that occurs only in one generation
 - D. A behaviour learned during an organism's lifetime
39. Pollination is defined as:
- A. Fusion of male and female gametes
 - B. Transfer of pollen from anther to stigma
 - C. Growth of a pollen tube down the style
 - D. Development of a seed into a seedling
40. A zygote is formed as a result of:
- A. Mitosis
 - B. Fertilisation (fusion of gametes)
 - C. Meiosis alone
 - D. Pollination alone

Answer key: 1-C, 2-B, 3-A, 4-B, 5-B, 6-D, 7-B, 8-B, 9-C, 10-B, 11-B, 12-C, 13-C, 14-B, 15-B, 16-A, 17-B, 18-B, 19-B, 20-D, 21-A, 22-B, 23-B, 24-B, 25-C, 26-B, 27-B, 28-B, 29-B, 30-B, 31-B, 32-B, 33-B, 34-B, 35-B, 36-A, 37-C, 38-B, 39-B, 40-B

SET 3

1. Which of the following is the correct order of biological organisation, from smallest to largest?
 - A. Organ → tissue → cell → organism
 - B. Cell → tissue → organ → organism
 - C. Tissue → organ → cell → organism
 - D. Organism → organ → tissue → cell
2. Which cell structure contains enzymes for breaking down and digesting materials within the cell?
 - A. Ribosome
 - B. Lysosome
 - C. Golgi body
 - D. Vacuole
3. A red blood cell has no nucleus mainly because this:
 - A. Prevents it from dividing
 - B. Allows more space for haemoglobin, increasing oxygen-carrying capacity
 - C. Makes it lighter for faster movement
 - D. Prevents disease
4. Which of the following would increase the rate of diffusion?
 - A. Decreasing temperature
 - B. Increasing surface area
 - C. Increasing particle size
 - D. Reducing concentration gradient
5. A solution that has the same water potential as a cell is described as:
 - A. Hypertonic
 - B. Hypotonic
 - C. Isotonic
 - D. Concentrated
6. Which nutrient is mainly needed for growth and repair of body tissues?
 - A. Carbohydrate
 - B. Protein
 - C. Fat
 - D. Vitamin C
7. Which vitamin deficiency causes scurvy?
 - A. Vitamin A
 - B. Vitamin C
 - C. Vitamin D

D. Vitamin B12

8. Which of these is a limiting factor of photosynthesis?
 - A. Light intensity
 - B. Soil pH only
 - C. Wind speed
 - D. Time of day only
9. In a variegated leaf (part green, part white), the white parts:
 - A. Photosynthesise faster
 - B. Lack chlorophyll and cannot photosynthesise
 - C. Absorb more carbon dioxide
 - D. Store more starch
10. Which structure anchors a plant and absorbs water/minerals?
 - A. Stem
 - B. Leaf
 - C. Root
 - D. Flower
11. The stomach produces which substance to begin protein digestion?
 - A. Amylase
 - B. Bile
 - C. Pepsin and hydrochloric acid
 - D. Lipase
12. Absorbed glucose and amino acids are transported from the gut to the liver via the:
 - A. Hepatic artery
 - B. Hepatic portal vein
 - C. Renal vein
 - D. Pulmonary vein
13. Egestion refers to:
 - A. Breakdown of food into small molecules
 - B. Removal of undigested food as faeces
 - C. Absorption of nutrients
 - D. Excretion of urea
14. Which blood component is involved in fighting infection by producing antibodies?
 - A. Red blood cells
 - B. Platelets
 - C. Lymphocytes
 - D. Plasma

15. Coronary arteries function to:
- A. Supply oxygenated blood to the heart muscle itself
 - B. Carry blood to the lungs
 - C. Return blood to the right atrium
 - D. Carry blood to the kidneys
16. The pulmonary vein carries:
- A. Deoxygenated blood to the lungs
 - B. Oxygenated blood from the lungs to the heart
 - C. Deoxygenated blood to the body
 - D. Oxygenated blood to the kidneys
17. Which feature of alveoli helps efficient gas exchange?
- A. Thick walls
 - B. Large surface area, thin walls, moist lining, good blood supply
 - C. Low blood supply
 - D. Small surface area
18. Tar in cigarette smoke mainly affects the lungs by:
- A. Increasing cilia activity
 - B. Damaging cilia and causing mucus build-up
 - C. Increasing oxygen absorption
 - D. Strengthening alveoli walls
19. The trachea is kept open by rings of:
- A. Muscle
 - B. Cartilage
 - C. Bone
 - D. Fat
20. Selective reabsorption in the nephron occurs mainly at the:
- A. Glomerulus
 - B. Bowman's capsule
 - C. Proximal convoluted tubule
 - D. Ureter
21. If the body is dehydrated, the pituitary gland releases more ADH, which results in:
- A. More dilute urine
 - B. Less water reabsorbed
 - C. More concentrated urine, less water lost
 - D. Increased urination
22. Which structure connects the kidney to the bladder?
- A. Urethra

- B. Ureter
- C. Renal artery
- D. Renal vein

23. A motor neuron carries impulses from the:

- A. Receptor to the CNS
- B. CNS to the effector
- C. One receptor to another
- D. Effector to the receptor directly

24. Which gland releases adrenaline in response to stress?

- A. Pancreas
- B. Adrenal gland
- C. Thyroid gland
- D. Pituitary gland

25. Accommodation of the eye refers to:

- A. The eye's ability to focus on objects at different distances by changing lens shape
- B. Control of pupil size
- C. Production of tears
- D. Colour perception

26. Shivering helps the body to:

- A. Lose heat
- B. Generate heat through muscle contraction
- C. Lower metabolic rate
- D. Increase sweat production

27. Chromosomes are made up mainly of:

- A. RNA and lipids
- B. DNA and protein
- C. Carbohydrates
- D. Only protein

28. If an organism's genotype is "tt", it is described as:

- A. Heterozygous dominant
- B. Homozygous recessive
- C. Homozygous dominant
- D. Heterozygous recessive

29. Sex-linked genes are typically located on which chromosome in humans?

- A. Y chromosome only
- B. Any autosome
- C. X chromosome

D. Chromosome 21

30. In protein synthesis, tRNA molecules function to:
- A. Store genetic information permanently
 - B. Carry specific amino acids to the ribosome, matching codons to anticodons
 - C. Cut DNA at specific sites
 - D. Copy DNA into new DNA
31. A base substitution mutation involves:
- A. Loss of an entire chromosome
 - B. One DNA base being replaced by another
 - C. Fusion of two genes
 - D. Duplication of an entire gene
32. Which of these is a potential application of genetic engineering?
- A. Producing human insulin using bacteria
 - B. Random mutation of wild populations
 - C. Meiosis in gamete formation
 - D. Natural selection in changing environments
33. A Punnett square is used to:
- A. Measure enzyme activity
 - B. Predict the possible genotypes and phenotypes of offspring
 - C. Determine blood pressure
 - D. Identify mutations directly
37. Which of these best describes competition in an ecosystem?
- A. Organisms cooperating to share resources
 - B. Organisms competing for limited resources such as food, light, or space
 - C. Predators avoiding prey
 - D. Decomposers breaking down waste
38. The carbon cycle is maintained partly through which two opposing processes?
- A. Digestion and excretion
 - B. Respiration and photosynthesis
 - C. Fertilisation and pollination
 - D. Mitosis and meiosis
39. Which factor is most likely to directly limit population growth?
- A. Abundant food supply
 - B. Availability of resources such as food, space, and water
 - C. Absence of predators
 - D. High birth rate only

40. Variation within a population is important because it:
- A. Allows for natural selection to act, enabling adaptation to changing environments
 - B. Prevents any evolution from occurring
 - C. Makes all individuals identical
 - D. Has no effect on survival
41. Vegetative propagation is an example of:
- A. Sexual reproduction
 - B. Asexual reproduction
 - C. Fertilisation
 - D. Pollination
42. In seed dispersal, an advantage of dispersing seeds away from the parent plant is:
- A. Reduced competition for light, water, and nutrients
 - B. Faster germination only
 - C. Prevents pollination
 - D. Increases self-fertilisation
43. Self-pollination differs from cross-pollination in that self-pollination:
- A. Increases genetic variation
 - B. Involves pollen transfer within the same flower or plant
 - C. Always produces stronger offspring
 - D. Requires two different plant species

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