

CIE A-Level Biology 9700 Paper 1 Practice

Paper (Multiple Choice) - ANSWERS

Total: 40 marks · 1 h 15 min · 40 multiple-choice questions

Q	Answer	Reasoning	marks
1	A	$45 \text{ mm} = 45,000 \text{ }\mu\text{m}$; magnification = image / actual = $45,000 / 0.50 = 90,000$.	1
2	C	$1.4 \text{ mm} = 1,400 \text{ }\mu\text{m}$; $1,400 / 20 = 70 \text{ }\mu\text{m}$.	1
3	C	Surface area = $6 \times 2.0^2 = 24 \text{ }\mu\text{m}^2$; volume = $2.0^3 = 8 \text{ }\mu\text{m}^3$; ratio = $24 / 8 = 3.0 \text{ }\mu\text{m}^{-1}$ (a $4.0 \text{ }\mu\text{m}$ cube gives only $1.5 \text{ }\mu\text{m}^{-1}$).	1
4	C	Chloroplasts carry out photosynthesis and occur only in plant cells; mitochondria, ribosomes and Golgi apparatus occur in both.	1
5	C	$200 \text{ nm} / 0.5 \text{ nm} = 400$ times; the smaller the resolution limit, the finer the detail visible.	1
6	D	Centrifugation separates by size and density: the largest, densest nuclei pellet at the lowest speed, ribosomes need the highest.	1
7	A	Membrane proteins move laterally and mix in the fused membrane, showing that lipids and proteins are mobile: the fluid mosaic model.	1
8	B	Prophase: chromatin coils into short thick chromosomes, the nucleolus disappears and the spindle starts to form; pole movement is anaphase and envelope re-forming is telophase.	1
9	D	Both are polymers of alpha-glucose, but glycogen is far more branched than starch, so it can be hydrolysed rapidly.	1
10	B	Primary = amino acid sequence; secondary = helix or sheet; tertiary = 3D fold of one chain; quaternary = more than one chain (haemoglobin has 4, each with a haem group holding Fe^{2+}).	1
11	A	Enzymes provide an alternative route with a lower activation energy, so more molecules have enough energy to react; the overall energy change is unchanged.	1
12	B	$Q_{10} = (\text{rate}_2 / \text{rate}_1)^{(10 / \Delta T)} = (5.0 / 2.0)^{(10 / 10)} = 2.5$.	1
13	D	When substrate is saturating every active site is occupied, so the rate is limited by enzyme concentration; doubling the enzyme doubles the number of active sites and roughly doubles the rate.	1
14	A	A competitive inhibitor competes with the substrate for the same active site; raising substrate concentration lets the substrate out-compete it, restoring the maximum rate.	1

15	B	Phospholipids are amphipathic: a hydrophilic phosphate head and two hydrophobic tails. The most stable arrangement in water is a tail-to-tail bilayer, the basis of the cell membrane.	1
16	B	Biuret turns from blue to purple in the presence of peptide bonds; a brick-red precipitate is the Benedict test for reducing sugar.	1
17	D	Cardiac output = heart rate x stroke volume = $72 \times 68 = 4,896 \text{ cm}^3 \text{ min}^{-1} = 4.90 \text{ dm}^3 \text{ min}^{-1}$.	1
18	D	Alveolar ventilation = (tidal volume - dead space) x breathing rate = $(500 - 150) \times 14 = 4,900 \text{ cm}^3 \text{ min}^{-1}$; 7,000 without the dead space is pulmonary ventilation.	1
19	B	Evaporation from stomata creates a water potential gradient and cohesion between water molecules transmits the pull up the xylem; root pressure contributes only a little.	1
20	C	Drought triggers ABA synthesis; it reaches the leaves, guard cells lose potassium and water, turgor falls and the stomata close to cut water loss.	1
21	D	CO ₂ forms carbonic acid and lowers pH, and temperature rises; both reduce haemoglobin affinity, shifting the curve right (Bohr effect) so active tissues gain more oxygen.	1
22	D	Transpiration rate = $12 \text{ g} / 5 \text{ min} = 2.4 \text{ g min}^{-1}$ (144 g per hour).	1
23	A	Arteries withstand the high pressure from the heart, so thick elastic walls stretch and recoil to maintain diastolic pressure; valves and wide lumens characterise veins.	1
24	B	At the arteriole end hydrostatic pressure exceeds that of tissue fluid and forces water and small solutes out; at the venule end the osmotic effect of plasma proteins draws water back in.	1
25	A	The F ₂ ratio is 9 : 3 : 3 : 1, so A_B_ is 9/16; $9/16 \times 1,600 = 900$.	1
26	C	Aa x Aa gives 1 AA : 2 Aa : 1 aa; AA and Aa both show the dominant phenotype, so the phenotypic ratio is 3 : 1 (1 : 2 : 1 is the genotypic ratio).	1
27	B	A = T = 32%, together 64%; G + C = $100 - 64 = 36\%$, so G = C = 18%.	1
28	D	$900 / 3 = 300$ codons; one is a stop codon that codes for no amino acid, giving 299 amino acids.	1
29	B	q = 0.3 and p = 0.7, so carriers = $2pq = 2 \times 0.3 \times 0.7 = 0.42$, i.e. 42%.	1
30	C	Only mutation creates new alleles; selection, gene flow and meiotic reassortment merely change the frequencies or combinations of alleles already present.	1
31	A	Males are hemizygous (XY): one copy of the gene, so one recessive allele is enough. Females need the allele on both X chromosomes.	1
32	C	Resistance mutations already arise at random; the antibiotic acts as a selection pressure, so resistant cells survive and multiply and the allele frequency rises.	1

33	C	$\text{NPP} = \text{GPP} - \text{respiration} = 3,600 - 1,200 = 2,400 \text{ kJ m}^{-2} \text{ yr}^{-1}$, the energy available to the next trophic level.	1
34	B	10% of 2,400 = 240 $\text{kJ m}^{-2} \text{ yr}^{-1}$; the other 90% is lost in respiration, excretion and undigested material.	1
35	D	Photosynthesis fixes CO_2 , while respiration (including decomposers breaking down organic matter) oxidises organic carbon back to CO_2 ; burning fossil fuels is another major source.	1
36	A	$\text{Population} = (\text{marked in first sample} \times \text{size of second sample}) / \text{marked in second sample} = (40 \times 200) / 8 = 1,000$.	1
37	B	B lymphocytes stimulated by antigen divide into plasma cells, which synthesise and secrete specific antibodies; neutrophils carry out phagocytosis.	1
38	B	A vaccine presents antigens (killed, weakened or fragments), giving a primary response and memory B and T cells; a later infection triggers a faster, stronger secondary response.	1
39	A	Energy flows one way and is not recycled: about 90% is lost per transfer, so the energy pyramid must be upright. Numbers depend on body size, so they can invert.	1
40	B	Neutrophils and macrophages recognise surface antigens, engulf the pathogen into a vesicle that fuses with a lysosome, and hydrolyse it: a non-specific defence.	1