

IGCSE Biology 0610 Paper 3 Practice Paper

(Core) - ANSWERS

Total: 80 marks · 1 hour 15 minutes · 6 questions · 33 parts

Part	Answer	Marking points	Marks
1(a)	Cell surface membrane (plasma membrane).	1 mark: cell surface membrane / plasma membrane.	1
1(b)	Magnification = image length / actual length = $30 / 0.06 = \times 500$.	1 mark: correct working (image / actual). 1 mark: answer $\times 500$.	2
1(c)	3 mm cube: surface area 54 mm ² , volume 27 mm ³ , ratio 2.0. 6 mm cube: surface area 216 mm ² , volume 216 mm ³ , ratio 1.0. The 3 mm cube has the larger ratio, so oxygen diffuses in faster.	1 mark: 2.0. 1 mark: 1.0. 1 mark: links the larger ratio to faster diffusion.	3
1(d)	The long extension gives a large surface area for faster osmosis and ion uptake; many mitochondria respire to release energy for active transport of mineral ions into the cell.	1 mark: long extension / large surface area. 1 mark: mitochondria / energy release. 1 mark: active transport of mineral ions.	3
1(e)	The net movement of particles from a region of higher concentration to a region of lower concentration, down a concentration gradient, without energy from respiration.	1 mark: higher to lower concentration. 1 mark: down a gradient / passive, no energy needed.	2
1(f)	Osmosis involves only water molecules moving through a partially permeable membrane; diffusion can involve any particles and needs no membrane. Osmosis moves water from the higher water potential (more dilute) side to the lower.	1 mark: osmosis is water only. 1 mark: needs a partially permeable membrane. 1 mark: higher to lower water potential.	3

2(a)	Enzymes are biological catalysts that speed up reactions and are not used up; they are proteins.	1 mark: biological catalyst / speeds up reactions. 1 mark: protein.	2
2(b)	Rate = $24 / 30 = 0.8 \text{ cm}^3 \text{ s}^{-1}$.	1 mark: $24 / 30$. 1 mark: 0.8 with unit.	2
2(c)	The acidic conditions at pH 2 change the shape of the active site (the enzyme is denatured). The substrate can no longer fit the active site, so no enzyme-substrate complexes form and the rate is close to zero; the change is not reversible.	1 mark: active site / enzyme shape changed. 1 mark: substrate cannot fit. 1 mark: denatured, rate near zero.	3
2(d)	Bile emulsifies fats into small droplets, increasing the surface area for lipase; bile also neutralises the acidic chyme from the stomach so the small intestine stays slightly alkaline for lipase and pancreatic enzymes.	1 mark: emulsifies fats / increases surface area. 1 mark: neutralises acidic chyme. 1 mark: links to faster lipase action.	3
2(e)	High temperature breaks bonds in the enzyme, so its three-dimensional shape and active site are permanently changed (denatured). Substrate can no longer bind and cooling does not restore the shape, so the rate stays at zero.	1 mark: boiling denatures the enzyme. 1 mark: active site permanently changed. 1 mark: cooling cannot reverse it.	3
3(a)	Carbon dioxide + water $\rightarrow$ (light energy, chlorophyll) glucose + oxygen.	1 mark: correct reactants. 1 mark: correct products and conditions.	2
3(b)	At 20 cm: $36 / 3 = 12$ bubbles per minute. At 40 cm: about 3 per minute, because light intensity limits the rate, so one quarter of the light gives about one quarter of the oxygen.	1 mark: 12. 1 mark: 3. 1 mark: light intensity limits the rate.	3
3(c)	Nitrate: to make amino acids and proteins. Magnesium: to make chlorophyll.	1 mark: nitrate / proteins. 1 mark: magnesium / chlorophyll.	2
3(d)	Rate = $18 / 4 = 4.5 \text{ g h}^{-1}$. More wind, higher temperature, lower humidity or brighter light all increase the rate.	1 mark: $18 / 4$. 1 mark: 4.5 g h^{-1} . 1 mark: any suitable condition.	3

3(e)	Transpiration from the leaves lowers the water potential there, creating a transpiration pull; cohesion between water molecules keeps a continuous column that is pulled up the xylem.	1 mark: transpiration pull. 1 mark: cohesion / continuous column.	2
3(f)	The lower surface is shaded, so less water is lost by transpiration, while gas exchange of carbon dioxide and oxygen can still take place.	1 mark: reduces transpiration / water loss. 1 mark: gas exchange still occurs.	2
4(a)	Arteries carry blood away from the heart; veins contain valves.	1 mark: artery. 1 mark: vein.	2
4(b)	Cardiac output = $70 \times 65 = 4,550 \text{ cm}^3 \text{ min}^{-1} = 4.55 \text{ dm}^3 \text{ min}^{-1}$.	1 mark: 70×65 . 1 mark: $4,550 \text{ cm}^3 \text{ min}^{-1}$. 1 mark: $4.55 \text{ dm}^3 \text{ min}^{-1}$.	3
4(c)	Ventilation = $12 \times 0.45 = 5.4 \text{ dm}^3 \text{ min}^{-1}$.	1 mark: 12×0.45 . 1 mark: $5.4 \text{ dm}^3 \text{ min}^{-1}$.	2
4(d)	Very many alveoli give a large surface area for faster diffusion; the wall is one cell thick so the diffusion distance is short; a moist lining and a dense capillary network keep a steep concentration gradient.	1 mark: large surface area. 1 mark: thin wall / short diffusion distance. 1 mark: moist lining / rich blood supply maintains gradient.	3
4(e)	The left ventricle pumps blood around the whole body, which needs a higher pressure; the right ventricle only pumps blood to the lungs, a shorter distance needing lower pressure.	1 mark: body-wide pumping needs higher pressure. 1 mark: right ventricle only pumps to the lungs.	2
4(f)	Red blood cells contain haemoglobin and carry oxygen; plasma transports glucose, carbon dioxide, hormones and waste.	1 mark: red blood cells / oxygen transport. 1 mark: plasma / transport of dissolved substances.	2
5(a)	The maintenance of a stable internal environment, such as body temperature, blood glucose and water content, despite changes inside and outside the body.	1 mark: keeps the internal environment stable. 1 mark: despite external changes.	2
5(b)	Stimulus → receptor → sensory neurone → spinal cord (coordinator) → motor neurone → effector (muscle) → response. The pathway does not pass through the brain for a decision, so the response is faster and injury is reduced.	1 mark: receptor → sensory neurone. 1 mark: spinal cord → motor neurone → effector.	3

		1 mark: no brain decision, so faster.	
5(c)	More sweat is produced: evaporation of sweat removes latent heat. Blood vessels near the skin surface dilate (vasodilation): more blood flows near the surface, so more heat is lost.	1 mark: more sweating. 1 mark: evaporation removes heat. 1 mark: vasodilation / more heat lost.	3
5(d)	Insulin, secreted by the pancreas, makes the liver and muscles convert glucose to glycogen and increases glucose uptake by cells, so blood glucose falls.	1 mark: insulin. 1 mark: pancreas. 1 mark: glucose to glycogen / more uptake.	3
5(e)	Negative feedback triggers the opposite response whenever a value moves away from normal (for example, high glucose triggers lowering), bringing it back into range and preventing harmful extremes.	1 mark: opposite response when values drift. 1 mark: returns values to the normal range.	2
6(a)	Gametes: Tt gives T and t; tt gives only t. Offspring genotypes Tt : tt = 2 : 2, i.e. 1 : 1; 50% are tall (Tt).	1 mark: Tt : tt = 1 : 1. 1 mark: 50% tall. 1 mark: supported by gametes or a Punnett square.	3
6(b)	Tall = $400 \times \frac{3}{4} = 300$; short = $400 \times \frac{1}{4} = 100$.	1 mark: 300. 1 mark: 100.	2
6(c)	Per square metre = $12 / 0.5 = 24$ plants; in 500 m ² = $24 \times 500 = 12,000$ plants.	1 mark: $12 / 0.5$. 1 mark: 24 per m ² . 1 mark: 12,000 plants.	3
6(d)	Only about one tenth of the energy passes to the next level, the rest being lost in respiration, excretion and undigested material, so there is too little energy to support more levels.	1 mark: energy is lost at each level. 1 mark: too little energy for more levels.	2
6(e)	Brightly coloured petals attract insects; nectar and scent attract insects to feed.	1 mark: brightly coloured petals. 1 mark: nectar / scent.	2