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CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2002

GCE Advanced Subsidiary Level

MARK SCHEME

MAXIMUM MARK : 60

SYLLABUS/COMPONENT :9700 /2

BIOLOGY
(STRUCTURED QUESTIONS (AS))

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

Question	Expected Answers	Marks
1 (a)	correct measurement of scale bar used as basis for finding magnification with appropriate working; A. 1.7 - 1.9 cm for length of scale bar e.g. $\frac{\text{xx mm x 1 000}}{10}$ = X xxxx; A. any fig. between x 1700 - 1900 N.B. award one mark if correct answer given without any working shown	2
(b)	movement of air / oxygen into alveoli; concentration gradient (between alveolar air and blood) / AW (for either oxygen or carbon dioxide); oxygen dissolves in film of liquid / surfactant fluid; diffusion; oxygen and carbon dioxide exchanged (idea of); squamous / alveolar / pavement epithelium; } A. alveolar/capillary endothelium (of capillary); } wall once red blood cell; ref to short diffusion distance into capillary / one cell thick / 2-3 μm; R. thin wall	4 max
(c)	B lymphocyte / B cell / plasma cell;	1
(d)	secretion of mucus by, goblet cells / glands; fluid leaks from capillaries; R. capillaries permeable contraction of (smooth) muscle / muscle spasm; congestion / blocking / narrowing / AW, of airways / bronchioles; increased resistance to air flow / air flow restricted;	3 max
		[Total : 10]

Question			Expected Answers	Marks
2	(a)	(i)	A glycerol; B fatty acid;	2
		(ii)	condensation / esterification / ester bond formation;	1
	(b)		more energy released / stored per gram / unit / given mass; R. per mole 37 kJ v 17 kJ; A. (37-40 kJ) v (15-17 kJ) A. equivalent calorific values if calculated fats are highly reduced; more hydrogens / fewer oxygens / higher carbon to hydrogen ratio / more CH bonds; release / yield more energy when respired / oxidised;	2 max
	(c)		20% or more above the recommended weight / mass for height / BMI / Body Mass Index / $\frac{\text{mass kg}}{(\text{height in m})^2}$ greater than 30; A. within range (30-40)	1
	(d)		diabetes; coronary heart disease / atherosclerosis / cardiovascular disease / stroke / AW; hypertension / high blood pressure; cancer; arthritis / joint problems; hernia; varicose veins; gallstones; increased risk during surgical operations;	2 max
				[Total : 8]

Question	Expected Answers	Marks
3 (a)	stomata (are open) for gas exchange / CO_2 / O_2 uptake / release (for photosynthesis and respiration); large surface area / many cell surfaces; in spongy mesophyll; (so) evaporation from (damp) walls (into air spaces); (and) diffusion / loss down a conc. gradient, of water vapour; to air / atmosphere via stomata;	3 max
(b)	ref cohesion / tension (in context of xylem); hydrogen bonds; through (freely permeable) cell wall / apoplast pathway; through partially permeable membrane / AW (in context of cell B); osmosis; down water potential gradient / high / less negative to low / more negative water potential / AW;	3 max
(c) (i)	**B** to **A** and **C**; **A** to **C**;	2
(ii)	from cell surfaces through air through stomata;	1
(d)	small leaves / small surface area / reduction of leaf surfaces / needle shaped leaves; R. spines rolled / curled leaves; R. folded shed leaves; sunken stomata / stomata in pits / crypts / grooves; stomata surrounded by hairs / hairy leaves; waxy / impermeable / thick, cuticle / thick leaves qualified;	2 max
		[Total : 11]

Question	Expected Answers	Marks
4 (a)	active site; specific shape / configuration / conformation (in ref to active site); complementary to substrate / exact / perfect fit (between substrate and active site); combine to form enzyme-substrate / ES complex; mould around substrate / substrate alters shape of active site (induced fit); R. induced fit unqualified ref to temporary bonds / named bond;	**3 max**
(b) (i)	EcoR1;	**1**
(ii)	sticky ends;	**1**
(c)	plasmid DNA cut with same restriction enzyme / endonuclease; DNA and plasmid mixed together / AW; R. inserted ref complementary / base pairing / C and G on sticky ends pair up; ref to hydrogen bonding; ligase forms bonds between sugar and phosphate / phosphodiester bonds;	**3 max**
		[Total : 8]

Question	Expected Answers	Marks
5 (a)	female, *Anopheles*, mosquito sucks blood from (infected) person; R. bites parasites / plasmodia / pathogens reproduce / multiply / form gametes (in mosquito); injects / inserts / pumps in / (saliva) with parasites / transmits / transfers parasite as feeds / in saliva (into uninfected person);	**2 max**
(b)	*malarial parasite has* nucleus / nuclear membrane / nuclear envelope; mitochondria; membranous organelles; R. ribosomes R. nucleolus	**2 max**
(c)	fewer red blood cells / number of r.b.cs. reduced; due to bursting / rupturing of r.b.c. / parasite destroys r.b.cs.; less haemoglobin; less oxygen transported / reduced ability to carry oxygen; waste excreted / toxins released (by parasite); symptom; A. one from - anaemia / fatigue / tiredness / muscular pain / headaches / nausea / fever / high temp. and sweating / inability to control temp. / shivering	**3 max**
		[Total : 7]

Question	Expected Answers	Marks
6 (a)	anaerobic; R. inaerobic, R. unaerobic lactate / lactic acid; liver; debt; R. deficit aerobic; resting;	**6**
		[Total : 6]

Total mark for paper = 50