

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2002

GCE Advanced Subsidiary Level

MARK SCHEME
MAXIMUM MARK : 60
SYLLABUS/COMPONENT :9700 /2 BIOLOGY (STRUCTURED QUESTIONS (AS))

Question	Expected Answers	Marks
1 (a)	<p>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</p> <p>e.g. $\frac{xx \text{ mm} \times 1\,000}{10}$ = X xxxx; A. any fig. between x 1700 - 1900</p> <p>N.B. award one mark if correct answer given without any working shown</p>	2
(b)	<p>movement of air / oxygen into <u>alveoli</u>; concentration gradient (between alveolar air and blood) / AW (for either oxygen or carbon dioxide); oxygen <u>dissolves</u> 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 <u>once</u> red blood cell; ref to short diffusion distance into capillary / one cell thick / 2-3 μm; R. thin wall</p>	4 max
(c)	<u>B</u> lymphocyte / <u>B</u> cell / plasma <u>cell</u> ;	1
(d)	<p>secretion of <u>mucus</u> by, <u>goblet</u> cells / glands; <u>fluid</u> 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;</p>	3 max
[Total: 10]		

Page 2	Mark Scheme	Syllabus
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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 <u>gram</u> / unit / given <u>mass</u> ; 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 <u>respired</u> / <u>oxidised</u> ;	2 max
(c)	20% or more above the recommended weight / mass for <u>height</u> / BMI / Body Mass Index / <u>mass kg</u> greater than 30; (height in m) ² A. within range (30-40)	1
(d)	diabetes; <u>coronary heart disease</u> / 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]

Page 3	Mark Scheme	Syllabus
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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 <u>spongy mesophyll</u> ; (so) evaporation from (damp) walls (into air spaces); (and) diffusion / loss down a conc. gradient, of water <u>vapour</u> ; 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, <u>cuticle</u> / thick leaves qualified;	2 max

[Total: 11]

Page 4	Mark Scheme	Syllabus	Number
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Question	Expected Answers	Marks
4 (a)	active site; <u>specific</u> 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 <u>same</u> restriction enzyme / endonuclease; DNA and plasmid mixed together / AW; R. inserted ref <u>complementary</u> / <u>base pairing</u> / C and G on sticky ends pair up; ref to hydrogen bonding; ligase forms bonds between <u>sugar</u> and <u>phosphate</u> / phosphodiester bonds;	3 max

[Total : 8]

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

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

Total mark for paper = 50