

JUNE 2002

GCE Advanced Subsidiary Level

MARK SCHEME

MAXIMUM MARK : 60

SYLLABUS/COMPONENT : 9700 /2

**BIOLOGY
(STRUCTURED QUESTIONS (AS))**



| | | | |
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| Page 1 | Mark Scheme | Syllabus | Paper |
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| Question | Expected Answers | Marks |
|----------|---|-------|
| 1 (a) | M between zygote and young seaweed / between young seaweed and adult; | 1 |
| (b) | each chromosome contains two <u>chromatids</u> ; (genetically) identical / exact replica; daughter cells receive a copy of, each chromosome / DNA molecule / same genetic material / AW; | 2 max |
| (c) | each strand / polynucleotides, acts as a template / sense strand; for complementary, strand / polynucleotides / nucleotides / base pairing; new DNA contains half old, half new; | 2 max |
| (d) | <u>reduction division</u> ; gametes / sex cells / eggs and sperms, have half the chromosome number / haploid / n; <u>zygote</u> is diploid / has full number of chromosomes / 2n; chromosome number remains the same / does not increase with each generation; | 3 max |

[Total : 8]

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| Page 2 | Mark Scheme | Syllabus | Paper |
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| Question | Expected Answers | Marks |
|----------|---|-------|
| 2 (a) | all hydrogen peroxide broken down / no substrate left / substrate limiting; | 1 |
| (b) | Line below that at 20°C may reach same plateau or heading towards it; | 1 |
| (c) | no reaction / very little oxygen / gas collected / no oxygen / gas collected; <i>(1 mark)</i> | |
| | <i>max 2 for explanation</i> | |
| | catalase / enzyme, denatured; loss of tertiary structure / conformation / folding / shape / active site changes; breakage of bonds; named bonds (hydrogen, ionic); substrate no longer fits active site / no enzyme substrate complex formed; | 3 max |
| (d) | repeat using different concentrations of hydrogen peroxide / substrate; ref to (suitable) range / details of concentrations; fresh solution of catalase / enzyme each time; same concentration of catalase / enzyme; same temperature / same pH; repeat readings / replicates; calculate <u>initial</u> rate; method (e.g. volume in 15 seconds / gradient); | 4 max |

[Total : 9]

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| Page 3 | Mark Scheme | Syllabus | Paper |
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| Question | Expected Answers | Marks |
|-----------|--|-------|
| 3 (a) (i) | phospholipid; | 1 |
| (ii) | glycerol; 2 fatty acid(s) / hydrocarbon(s) (tails / chains); phosphate; | 3 |
| (iii) | <u>phospholipids</u> are, fluid / liquid / move about / diffuse within own monolayer; <u>proteins</u> (are separate pieces) 'floating' / moving about in liquid / AW; ref to pattern / arrangement of proteins; | 2 max |
| (b) | variable region / AW; different / particular, sequences of amino acids / primary structure; different, (3D) shapes / conformation / folding / tertiary structure; ref to R groups / side chains; complementary to / matches shape of antigen(s); | 3 max |

[Total : 9]

| | | | |
|--------|-----------------------------------|----------|-------|
| Page 4 | Mark Scheme | Syllabus | Paper |
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| Question | Expected Answers | Marks |
|----------|--|-------|
| 4 (a) | ventricle contracts / ventricular systole; blood forced through semi-lunar valve; into aorta; atrio-ventricular / bicuspid / mitral valve closed; | 2 max |
| (b) | ref to unidirectional valves / valves prevent backflow; blood pressure greater on one side of valve than the other; atrial systole / contraction forces open atrio-ventricular / bicuspid / mitral valve; ventricular systole / contraction closes atrio-ventricular / bicuspid / mitral valve; semi-lunar valve opens (in context of ventricular systole); semi-lunar valve closes (after ventricular systole); ref to role of tendons; ref to role of papillary muscles; | 3 max |
| (c) | (pressure falls to zero because) all blood expelled from ventricle / ventricle completely empties / AW; (blood pressure falls to 10kPa) because elastic fibres qualified / elasticity of arteries / elastic recoil; ref to <u>smooth</u> muscles qualified; narrow diameter of capillaries / arterioles / <u>small</u> arteries; resistance to flow; | 3 max |
| (d) | <u>nicotine</u> causes constriction of blood vessels; <u>nicotine</u> raises, blood pressure / heart rate; <u>nicotine</u> causes blood platelets to become 'sticky' forming blockage / 'clot'; <u>nicotine</u> / <u>carbon monoxide</u> , damages artery <u>lining</u> / endothelium; increased risk of atherosclerosis / thrombus; atherosclerosis described (e.g. ref to deposition of fatty material / atheroma / fatty plaque / cholesterol); <u>carbon monoxide</u> reduces oxygen transport / levels; | 3 max |

[Total : 11]

| | | | |
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| Page 5 | Mark Scheme | Syllabus | Paper |
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| Question | Expected Answers | Marks |
|----------|--|------------|
| 5 (a) | <p>decrease in response to drug / effects of drug become less intense;</p> <p>more drug taken to achieve same effect;</p> <p>increased rate of metabolism of drug;</p> <p>decrease in sensitivity of receptors / more receptors made;</p> <p>body cannot function without drug / drug becomes part of metabolism;</p> <p>ref <u>withdrawal</u> symptoms / abstinence syndrome;</p> | 3 max |
| (b) | <p>fatty liver / fat accumulates;</p> <p>hepatitis, inflammation (of liver);</p> <p>cells die;</p> <p>fibrous tissue / collagen (accumulates);</p> <p><u>nodules</u>, described (e.g. hard / no blood supply / disrupt arrangement of cells);</p> <p>cirrhosis;</p> <p>liver cancer;</p> | 4 max |
| | | [Total: 7] |

| Question | Expected Answers | Marks |
|-----------|--|------------|
| 6 (a) (i) | <p>A nitrogen fixation;</p> <p>B nitrification;</p> <p>C denitrification;</p> | 3 |
| (ii) | <p>legumes / green manure / compost / organic matter / humus / manure / AW ploughed into soil;</p> <p>decay / decomposition to release ammonium / (ions)</p> <p>ammonification / form nitrates;</p> <p>grow legumes for nitrogen fixation;</p> <p>crop rotation / intercropping / alley cropping;</p> <p>improve aeration / drainage (in context of favouring nitrification / reducing denitrification);</p> | 3 max |
| | | [Total: 6] |

Total mark for paper = 50