ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCE

Biology B

Unit BYB7/A

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334
Registered address: Addleshaw Booth & Co., Sovereign House, PO Box 8, Sovereign Street, Leeds LS1 1HQ
Kathleen Tattersall: *Director General*

Section A

Question 1

(a) plasmid;
capsule; 2

(b) energy in light;
glucose / sugar / ATP produced by photosynthesis;
glucose / sugar respired;
energy released for / ATP used by flagella;
3 max

Total 5

Question 2

(a) (i) absorbed / transmitted light is proportional to the number of cells;
(*not more growth*) 1

(ii) lag phase / no (measurable) cell division for 1 hour;
exponential phase / rapid cell division after this /
no limiting factors; 2

(b) haemocytometry / dilution plating; 1

(c) 2.2×10^6 / 2.2 million;
multiply by 5; (*award 2 marks for 11 million*) 2

Total 6

Question 3

(a) virus replication does not occur / virus destroyed in vaccinated people;
virus only spread between non-vaccinated / susceptible people;
non-vaccinated people not likely to come in contact / herd effect; 2 max

(b) for the principle that capsids are protein;
(award only if no other marks achieved – max 1)

transcription (in the nucleus);
translation (in cytoplasm); } *(must be in correct context)*

(host cell supplies - must be in correct context to achieve marks)
enzymes for transcription;
(RNA) nucleotides (for transcription);
tRNA;
ribosomes;
amino acids;
energy / ATP for (peptide) bond formation; 4 max

Total 6

Question 4

(a) endotoxins produced from the breakdown of bacteria (cell walls);
(allow burst / lyse – do not allow decompose)
exotoxins secreted / released (from living cells) (*not produced);*
endotoxins are lipopolysaccharides;
exotoxins are protein; 2 max

(b) (i) high numbers of bacteria in blood / faeces / urine;
number of bacteria in <u>faeces</u> remains (high) for several weeks /
when no symptoms are present;
other people likely to be contaminated by faeces / urine
(in water / food); 2 max

(ii) line drawn from a concentration of <u>zero</u> to a peak;
line constant / falls but <u>not</u> back to zero in
the 7 week period; (*lose this mark if two peaks shown*) 2

(b) involvement of kidneys; *(allow this if context is correct)*
cells in blood;
toxin causes damage to kidneys;
bacteria pass into urine through nephrons / kidney tubules
/ Bowman's capsule; 3 max

Total 9

Question 5

(a) inhibition of cell wall synthesis;
inhibition of protein synthesis / translation;
inhibition of DNA synthesis;
increased permeability of cell membranes; 1 max

(b) (i) antibiotics destroy / inhibit bacteria; 1

(ii) principle of diameter / area divided by concentration of antibiotic;
5 from diameter / 11.25 from length of clear zones /
10 from total area / 17.8 from area of clear zones; 2

(*allow max 1 if correct use of the principle but incorrect measurements or invalid method is used*)

Total 4

Question 6

(a) rhesus antigens stick / attach / bind to rhesus antibodies; 1
(*reject antigen - antibody complex on its own*)

(b) (i) antigens attach to macrophages / antigen presenting;
T lymphocytes activated by antigens;
helper T lymphocytes activate;
B lymphocytes;
specific cells (activated);
divide (by mitosis) / clone;
plasma cells / lymphocytes secrete antibodies;
(*accept T cells/ B cells as alternatives throughout*) 5 max

(ii) memory (T) cells / lymphocytes;
activate <u>B</u> cells / lymphocytes <u>quickly</u>;
or
memory (B) cells / lymphocytes;
in (large) numbers; (*do not allow antibodies produced quickly)* 2

(b) less haemoglobin;
less oxygen is carried (in blood);
(*allow 2 marks for a reference to less oxyhaemoglobin)*
stimulates the respiratory centre in the medulla; 2 max

Total 10

Question 7

(a) the principle that immobilised enzymes are not lost
do not contaminate the product / can be used over and over again
so costs are reduced / better productivity;

OR

the principle that immobilised enzymes are more stable
(to changes in temperature and pH);
so product formed even when conditions are extreme; 2

(a) (i) red pigment produced when either heroin or morphine is present;
because enzyme B is active with both; 2

(ii) enzymes tertiary structure / active site / are specific shapes;
only heroin / morphine will fit; 2

(iii) EITHER
morphine and codeine are similar in structure;
they compete for the active site / competitive inhibition;
of enzyme B;
red colour does not form when codeine occupies the active site;

OR

morphine and codeine are different in structure;
codeine fits away from the active site / non-competitive inhibition;
of enzyme B;
red colour does not form because morphine unable to enter
the active site;

(*maximum 1 mark for comparison of codeine and heroin if the type of inhibition is accurately described*)
4

Total 10