

NSW INDEPENDENT TRIAL EXAMS – 2006

BIOLOGY – HSC TRIAL

MARKING GUIDELINES

Section I

Outcomes assessed: 1, 4, 6, 8, 9, 10.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	B	B	D	A	D	B	C	A	B	A	C	A	A	C

Section I – Part A

Question 16 Outcomes assessed: 6, 2

Suggested answers	Mark
a) Homeostasis is the maintenance of a constant internal environment.	1
b) Labelled diagram of feedback mechanism – labels must show how feedback helps to maintain homeostasis.	3

Question 17 Outcomes assessed: 6, 1

Suggested answers	Mark
a) Saliva, nasal secretions and tears produced by mucous membranes contain the chemical lysozyme that breaks down bacterial cell walls and so inhibits this kind of pathogen.	1
b) Defence adaptations such as above are barriers to the entry of pathogens whereas production of antibodies by B-lymphocytes is a specific response to pathogens that have breached these barriers.	2

Question 18 Outcomes assessed: 4, 7, 10

Suggested answers	Mark
a) Punctuated equilibrium refers to the sudden or rapid change in a species and then long periods of no change.	1
b) Punctuated equilibrium-relatively fast change then long periods of stability. Darwinian – gradual change over long periods.	2
c) Any modern example of natural selection e.g. insecticide resistance in malaria mosquitoes, antibiotic resistance in staphylococcus. 1 mark for correct example, and explanation of selection pressure and mechanism.	1

Question 19 Outcomes assessed: 6, 1

Suggested answers	Mark
a) Transgenic organisms contain a gene (transgene) from another species. This is achieved through recombinant DNA technology. This technology manipulates DNA by the use of restriction enzymes, ligases and PCR (polymerase chain reaction). Restriction enzymes cut DNA in specific places. Ligases are used to repair and strengthen DNA especially after it has been cut by restriction enzymes. PCR is used to produce many copies of the recombinant DNA formed by the previous processes. (2 marks) Once the recombinant DNA is produced there are processes used to insert the DNA into the host species. These processes include microinjection, Ti plasmid insertion, gene gun and electroporation.	4

Question 19(a) Suggested answers continue on the next page

Question 19(a) Suggested answers continued

Suggested answers	Mark
In microinjection a fine glass needle is used to insert the recombinant DNA into the nucleus of the host cell. Ti (tumour inducing) plasmid insertion uses a bacterium called <i>Agrobacterium tumefaciens</i> . These bacteria insert some of their own DNA into the host DNA. The gene gun blasts small metal pieces coated with DNA into the nucleus of the host cell. Electroporation uses electric pulses to create small pores in the nuclear membrane through which DNA is inserted. 1 mark for mention of some processes, 1 mark for explanation of 1 process.	4
b) Examples of transgenic species include genetically engineered salmon which have the gene coding for the protein, bGH (bovine growth hormone) producing larger faster growing fish and potato plants which have a pea gene for lectin inserted which prevents insect attack. (2 marks) In both instances food production is increased improving profits and feeding larger population numbers etc. (1 mark)	3
c) Ethical issues include some discussion of escape of gene modified organisms into the wild- we also do not know the consequences of eating genetically modified foods in the long term etc. Any valid argument. (2 marks)	2

Question 20 Outcomes assessed: 8, 13, 16, 14

Suggested answers	Mark
Vaccination gives artificially acquired immunity from a disease. Once common diseases, such as small pox, diphtheria and polio, are now uncommon because of successful vaccination programs. Smallpox was the first disease for which a vaccine was developed. Edward Jenner did this in 1796. The vaccination program that was started in the 1960s was so successful that the World Health Organisation (WHO) has declared it eradicated. Diphtheria vaccine is given as part of a triple antigen injection that protects against diphtheria, tetanus and whooping cough. In 1990, WHO stated that 80% of children had been vaccinated against this disease. There continues to be outbreaks of this disease and continued vaccination is recommended. It is no longer thought of as a major child killer. Polio caused thousands of children to become paralysed every year. A vaccine was introduced in 1955. It became available as an oral vaccine in the 1960s. Worldwide, the number of cases is down by 80%.	6

Question 21 Outcomes assessed: 2

Suggested answers	Mark
a) The trait is recessive because it is not visible in the parents, but the offspring (II-2) has it.	2
b) Individual III-1 will be Aa as parent II-2 must be aa and III-1 doesn't possess the trait.	2

Question 22 Outcomes assessed: 1, 9

Suggested answers	Mark
a) A gamete is a sex cell.	1
b) The offspring are receiving half their genetic information from each parent leading to variability	2
c) Gametes are formed during the process of meiosis. In meiosis there are two stages that lead to variability. These are: 1) random segregation of individual chromosomes i.e., different new combinations of the original maternal and paternal chromosomes. 2) crossing over where the maternal and paternal chromosomes of each pair may exchange segments of genes making new combinations of genes on the chromosomes.	2

Question 23 Outcomes assessed: 6, 1

Suggested answers	Mark
a) Entantioztasis is the maintenance of metabolic and physiological functions in response to variations in the environment.	1
b) Organisms experience huge fluctuations in salinity due to tidal movement of fresh and salt water in estuaries. Organisms may be osmoconformers where their osmotic concentrations vary with the environment eg invertebrates: or osmoregulators where osmotic concentration remains stable independent of the environment e.g. most fish.	4
c) Exude salt through roots, special glands in leaves which concentrate salt then leaf drops etc.	2

Question 24 Outcomes assessed: 1, 3, 4

Suggested answers	Mark								
a) <table border="1"> <thead> <tr> <th>Product extracted from donated blood</th><th>How this product is used</th></tr> </thead> <tbody> <tr> <td>Red blood cells</td><td>Replace cells lost through bleeding etc</td></tr> <tr> <td>Platelets</td><td>Treat bleeding in diseases where platelets are not formed properly e.g. haemophilia</td></tr> <tr> <td>Plasma</td><td>Used where massive transfusions are needed</td></tr> </tbody> </table>	Product extracted from donated blood	How this product is used	Red blood cells	Replace cells lost through bleeding etc	Platelets	Treat bleeding in diseases where platelets are not formed properly e.g. haemophilia	Plasma	Used where massive transfusions are needed	3
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Plasma	Used where massive transfusions are needed								
b) Artificial blood could be stored for long periods of time. It could be manufactured on a large scale dropping the price and making it more readily available to poorer countries. It would be sterile reducing the risk of contagious diseases. There would no longer be a problem with cross matching etc. It could be carried by emergency personnel and administered at accident scenes saving time and lives.	4								

Question 25 Outcomes assessed: 1, 2, 11

Criteria	Mark
a) i) Use a meat extract cube to make a clear broth. ii) Use two conical. Fit the flasks with one-holed stoppers. Use glass tubing bent into an S-shape to replace Pasteur's swan-necked flask. Place a straight piece of glass tubing in the other flask. iii) Put some broth into both flasks and boil gently for 20 minutes. iv) Leave both flasks at room temperature for several weeks. Every two or three days compare the contents of the two flasks. Look for cloudiness, scum, bubbles and mould colonies. Record your results.	3
b) Safety risks-Bunsen flame, hot liquid, glassware fragile, bacterial contamination etc.	2
c) Safe work practice must minimise risk.	1
d) Independent variable - the apparatus swan neck flask/open closed etc. Dependent variable – microbial growth/contamination of broth.	2

Question 26 Outcomes assessed: 7

Criteria	Mark
a) Correctly identifies endotherm e.g. kangaroo and ectotherm e.g. bearded dragon.	1
b) One adaptation or response-must relate to named organism in (a).	2

Section II

Question 27 Outcomes assessed: 9.5.1, 9.5.2, 9.5.3, 9.5.4, 9.5.6, 9.5.7

Criteria	Mark
a) i) A receptor is a specialised cell responsible for detecting a stimulus or any change in an organisms environment. A response through a muscle, nerve or gland is usually produced. ii) Function of three of the structures listed e.g. sclera-protects, maintains shape, optic nerve-sends message from the eye to the brain, cornea-thinner than sclera, first part of focusing mechanism.	4
b) i) Myopia-short sightedness. Person can see objects that are close but distant objects are a blur. Hyperopia long sightedness. Person can see objects that are distant but can't focus on objects close up. ii) Two marks for description of technology and two for the discussion of implications for society. e.g. E.C.C.E and P.C.I.O.L Intra ocular lens implant.	6
c) Colour is used by animals in a variety of ways. e.g. to hide from predators, mating rituals, mimicry, etc. Fish, amphibians, birds and reptile have well developed colour vision, but only primates and Humans can see colour out of all the species of mammals. The ability to use colour to communicate is dependent on the ability of the recipient to receive it. (Give specific examples)	7
d) i) 2 marks for all 3 correct areas identifies. 1 mark for 2 areas. ii) Range detected by Humans is 20Hz-23,000Hz.(1 mark)-2 marks for figures for two mammals iii) Organisms need to respond appropriately to changes in their surroundings. The CNS is responsible for producing the correct response (nervous or chemical) to a variety of stimuli. For example, coordination of the body in space is determined by the interpretation of information from pressure receptors in the soles of the feet, impulses from receptors in the eyes, ears, centre of balance in the brain etc. The brain (cerebrum) interprets these impulses and sends messages along neurones to effectors (muscles and glands)	8