

NSW INDEPENDENT TRIAL EXAMS – 2010
BIOLOGY TRIAL HSC EXAMINATION
MARKING GUIDELINES

Section I – Part A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
D	D	D	B	B	A	C	A	C	B	A	B	A	D	C	B	A	C	B	B

Section I – Part B

Question 21

Criteria/Suggested Answer	Mark
<ul style="list-style-type: none"> Correctly constructs table. Must include columns and rows as well as headings at the top of columns. (3 marks) Any named ectotherm e.g. bluetongue lizard, but not “snake” or “lizard”. Endotherm could include red kangaroo, koala, etc. Response should include behavioural and physiological adaptations. eg. reptile curls up & metabolism/temperature drops; mammals shiver to maintain body temp. etc. (4 marks) 	7

Question 22(a)

Criteria/Suggested Answer	Mark
<ul style="list-style-type: none"> Outlines an investigation that would be undertaken to determine the effect of increasing carbon dioxide levels on the pH of water. For example: <ul style="list-style-type: none"> Perform the investigation, making sure you take readings of the initial pH of the distilled water. Basic procedure – using a data logger with a pH probe, take readings of the change in pH of 100 mL of distilled water as exhaled air is bubbled through it over a two-minute period. This experiment can also be performed using universal indicator paper and an indicator colour chart to estimate the pH at various stages of the experiment. 	4

Question 22(b)

Criteria/Suggested Answer	Mark
Describes ONE possible risk in this investigation and ONE precaution needed to reduce risk. eg. laboratory technique	2

Question 22(c)

Criteria/Suggested Answer	Mark
Identifies the control used e.g. separate 100 ml distilled water without exhaled air bubbled through.	1

Question 22(d)

Criteria/Suggested Answer	Mark
Outlines any trends obtained in the data collected e.g. pH decreases as carbon dioxide levels increase.	1

Question 22(e)

Criteria/Suggested Answer	Mark
Explains ONE way of improving the reliability of the results e.g. repeat experiment/collate classroom results.	1

Question 23(a)

Criteria/Suggested Answer	Mark
<p>Compares the difference in urine concentration of a marine fish and a freshwater fish. For example:</p> <ul style="list-style-type: none"> Marine fish excrete small quantities of isotonic urine. This helps conserve water and excrete the excess salt they gain from highly saline water. Freshwater fish excrete large quantities of dilute urine, which also has a very low salt concentration. This helps to remove excess water they gain. 	2

Question 23(b)

Criteria/Suggested Answer	Mark
Explains how this difference in concentration is related to the environment in which each organism lives. For example: <ul style="list-style-type: none"> The environment in which marine fish live is hyperosmotic to their internal environment, i.e. there is a higher salt concentration in the water than inside their cells. This causes water to be lost from the fish to the environment while ions are gained by diffusion. Freshwater is hypo-osmotic to the internal environment of fish, i.e. there is a lower salt concentration in the water than inside their cells. This results in water gained by the fish from the environment without drinking and salts lost through diffusion. 	2

Question 24

Criteria/Suggested Answer	Mark
Uses an appropriate pictorial representation to show how a change in DNA sequence can affect cell activity. For example: <ul style="list-style-type: none"> Flow chart or similar to show how a change to the sequence of bases in DNA will ultimately result in changes to amino acid sequence at ribosome. Must link initial change in base sequence to ultimate change in amino acid sequence at ribosome. 	6

Question 25(a)

Criteria/Suggested Answer	Mark
Defines the term <i>transgenic species</i> e.g. a transgenic animal is one that carries a foreign gene that has been deliberately inserted into its genome.	1

Question 25(b)

Criteria/Suggested Answer	Mark
Outlines ONE method used to produce a transgenic species. There are three basic methods of producing transgenic animals (only need 1): DNA microinjection, retrovirus-mediated gene transfer, embryonic stem cell-mediated gene transfer (need method name and a brief explanation).	2

Question 25(c)

Criteria/Suggested Answer	Mark
<ul style="list-style-type: none"> Discusses TWO ethical issues arising from the development and use of transgenic technology. Answers could include the release of "super species" into the natural environment that outcompete native species causing extinction etc/the unintentional release of genes into pest species offering resistance to pesticides etc/ or the unintentional production of harmful chemicals in crops or food species. 	2

Question 25(d)

Criteria/Suggested Answer	Mark
<ul style="list-style-type: none"> Names ONE genetically altered plant and describes the effect reproduction technology has had on its genetic diversity. Reproduction technologies tend to reduce the genetic diversity because of the selection of desirable characteristics. It is possible to argue that genetic diversity can be increased through the introduction of genes from other species. 	2

Question 26(a)

Criteria/Suggested Answer	Mark
Analyses the structure of the forelimbs from the different mammals shown in the diagram e.g. each limb has a basic pentadactyl plan. This suggests that they may have arisen from a common ancestor. (1 mark for identifying relationship, 1 mark for implication)	2

Question 26(b)

Criteria/Suggested Answer	Mark
Explains how the Darwin/Wallace theory of evolution by natural selection is supported by this example. For example: this supports the theory because selection pressures have caused divergence over time but still hints at a common ancestor.	2

Question 27(a)

Criteria/Suggested Answer	Mark
Names the type of pathogen that causes malaria i.e. Protozoan (Plasmodium is acceptable).	1

Question 27(b)

Criteria/Suggested Answer	Mark
Accounts for the global incidence of malaria shown on the map. For example: <ul style="list-style-type: none"> • Much higher incidence in tropical/subtropical regions. Disease is spread by vector (mosquito) which is much more common in these regions due to higher temperatures water availability. OR • Many of these countries are 3rd world-cannot provide adequate health care/eradication programs, etc. 	2

Question 27(c)

Criteria/Suggested Answer	Mark
Outlines how Koch's postulates could be used to determine if a particular pathogen caused malaria in Humans, for example: <ul style="list-style-type: none"> • The pathogen must be present in every case of malaria. • The pathogen must be isolated from the human with malaria and grown in pure culture. • Malaria must be reproduced when a pure culture of the pathogen is inoculated into a healthy human. • The pathogen must be recoverable from the experimentally infected human. 	4

Question 27(d)

Criteria/Suggested Answer	Mark
Explains why it would be difficult ethically to justify the use of Koch's postulates to determine if a particular parasite caused malaria in humans e.g. ethically it would be very difficult to infect a healthy human with the malaria pathogen & observe onset of disease.	1

Question 28(a)

Criteria/Suggested Answer	Mark
Identifies the main components of the immune response i.e. antibodies, T cells, B cells.	2
Identifies one of the above.	1

Question 28(b)

Criteria/Suggested Answer	Mark
Explains how vaccination prevents infection e.g. vaccination stimulates the body to produce memory B-cells by introducing the appropriate (harmless) antigen into the body.	1

Question 28(c)

Criteria/Suggested Answer	Mark
Justifies the statement "Sir Macfarlane Burnett is one of the founders of modern immunology." For example: Sir MacFarlane Burnett's work contributed to our understanding of how lymphocytes identify and destroy antigens. He was awarded the Nobel prize in Medicine for his work on immunological tolerance which had major implications for organ transplant technology. He also developed a method of growing influenza viruses in fertilised chicken eggs allowing the development of vaccines. This work has greatly improved our knowledge of how the immune system works and has led to the development of vaccines saving millions of lives.	2

Question 29(a)

Criteria/Suggested Answer	Mark
<ul style="list-style-type: none"> • Uses the data provided to draw an appropriate graph. • Marks allocated for correct axes, correct scale, correct plotting of data, labels, correct graphs (note both sets of data must be plotted). 	4

Question 29(b)

Criteria/Suggested Answer	Mark
Identifies any correct trend seen in the graph e.g. incidence of new lung cancers is increasing in the female population or alternatively relatively decreasing in the male population.	1

SECTION II COMMUNICATION

Question 30(a)

Criteria	Mark
Explains the role of stimulus, receptor, messenger and effector in generating a response.	5 – 6
Explains the role of TWO or THREE of the terms.	3 – 4
Explains the role of one of the terms or provides some relevant information.	1 – 2

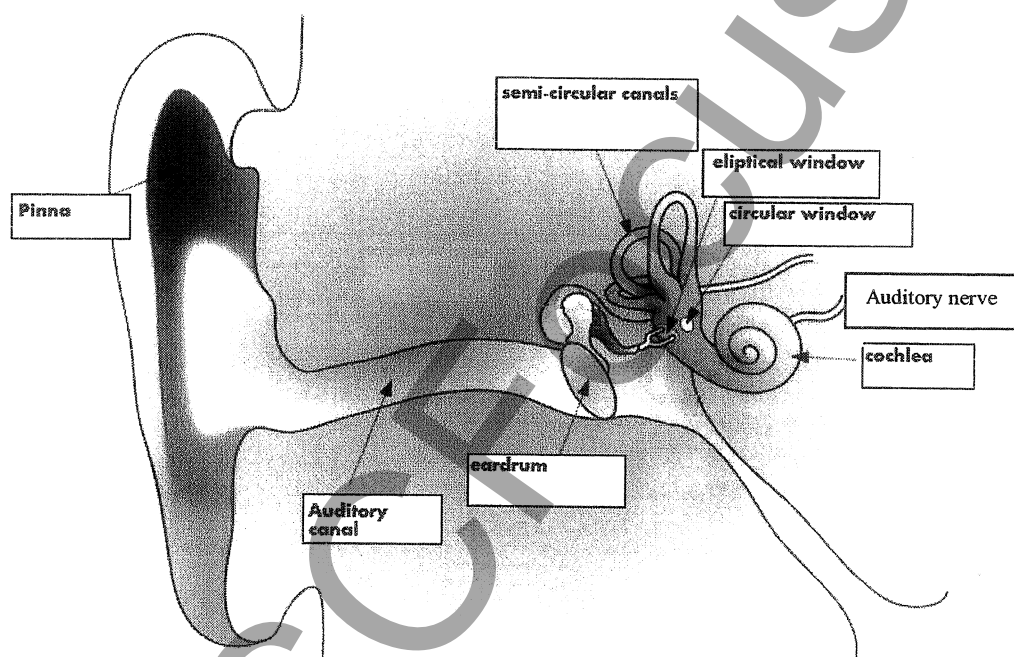
Answer may include:

- **Stimulus** – A change in the external environment that can be detected.
- **Receptor** – A sensory receptor is a sensory nerve ending that recognises a stimulus in the internal or external environment of an organism. In response to stimuli the sensory receptor initiates sensory transduction. Each type of sensor receptor is responsible for detecting a certain type of stimulus e.g. smell, sound, taste, light, cold, heat, pressure.
- **Messenger** – Receptors convert energy from the stimulus into energy that starts a nerve impulse. The nerve impulse is the messenger
- **Effector** – The organ that receives the message from the nerve impulse and carries out the response

Question 30(b)(i)

Criteria	Mark
Accurately labels any SIX parts of the ear.	3
Accurately labels any FOUR or FIVE parts of the ear.	2
Accurately labels THREE or less part of the ear.	1

Answer may include:



Question 30(b)(ii)

Criteria	Mark
Provides a comprehensive description of the function of ONE of the parts of the ear labelled in (b)(i).	3
Provides a basic outline of the function of ONE of the parts of the ear labelled in (b)(i).	1 – 2

Answer will vary. For example, the pinna collects sound. It acts as a funnel, amplifying the sound and directing it to the auditory canal. While reflecting from the pinna, sound also goes through a filtering process which adds directional information to the sound. The filtering effect of the human pinna preferentially selects sounds in the frequency range of human speech.

Question 30(b)(iii)

Criteria	Mark
Identifies the role of the eustachian tube.	2
Provides some relevant points.	1

Answer may include: It can be open so as to equalise the pressure between the middle ear and the atmosphere. Mucus drainage from the middle ear.

Question 30(c)(i)

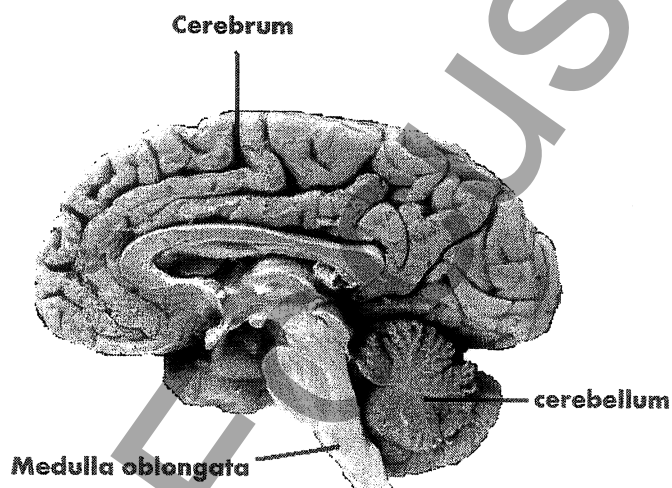
Criteria	Mark
<ul style="list-style-type: none"> Provides a comprehensive explanation of why some stimuli go unnoticed. Provides appropriate justification. 	3 – 4
Provides some relevant information.	1 – 2

Answer may include: Nerve threshold – this is the minimum stimulus required to create a response in the nerve cell. If the stimulus is below the minimum threshold, an action potential will not be generated. If there were no minimum threshold, nerves would respond much too readily to all incoming stimuli.

Question 30(c)(ii)

Criteria	Mark
Correctly labels all THREE parts of the brain.	3
Correctly labels TWO of the parts of the brain.	2
Correctly labels ONE part of the brain.	1

Answer may include:

**Question 30(d)**

Criteria	Mark
Provides a comprehensive description of the finding of the analysis.	3 – 4
Provides some relevant information.	1 – 2

Answer may include:

- Accommodation – This is the process where the lens changes shape to focus images from objects that are different distances away on the retina. The fovea has the greatest density of cones and is responsible for the detail we see. The light from the object needs to fall on the fovea and accommodation of the lens achieves this.
- Light rays from distant objects tend to be parallel and therefore need less refraction than light from close objects.
- The lens is more curved when it focuses on closer objects and flatter when focusing on distant objects. This allows for the appropriate level of refraction.
- When focusing on close objects the ciliary body squeezes so that the lens is short, dense and more curved. This increases the refractive power of the lens.