

NSW INDEPENDENT TRIAL EXAMS – 2007
BIOLOGY- HSC TRIAL EXAMINATION
MARKING GUIDELINES

Section I – Part A

Syllabus reference: 1, 2, 3, 4, 5, 6, 8, 9, 10

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

Section I – Part B

Question 16 Syllabus reference: 6, 2

Suggested answers	Mark
a) Enzymes are biological catalysts lowering the energy needed to start a chemical reaction.	1
b) Lock and key model-shape of the active site only allows a specific substrate to join.	2

Question 17 Syllabus reference: 6

Suggested answers	Mark
a) In hot conditions kangaroos may lick their paws; frilled dragon may opens their neck frill in the early morning.	2
b) Paws – evaporative cooling; frill- to expose greater surface area of vascularised skin to sun to warm up.	2

Question 18 Syllabus reference: 6, 7, 9

Suggested answers	Mark
a) Co-dominance or incomplete dominance.	1
b) Neither allele for colour is dominant so get a blend of phenotype.	2
c) Use punnet square to explain that co-dominance and incomplete dominance are possible.	3

Question 19 Syllabus reference: 3, 4

Suggested answers	Mark
- The difficulties of defining the terms health and disease include that: - It's possible for a person to be healthy and have a disease at the same time. i.e. symptoms may be manageable through diet and exercise.	3

Question 20 Syllabus reference: 6

Suggested answers	Mark
Active transport involves the use of energy on the part of the organism, usually because the substance is moving against the concentration gradient. Passive transport involves no expenditure of energy as the materials follow the natural concentration gradient. In the kidney, both active and passive transport processes occur. Passive transport: Once filtration has occurred in Bowman's capsule, water returns via the interstitial fluid from the tubule to the capillary in the process of osmosis. This occurs along the length of the tubule. Active transport: Depending on their concentration, the ions in the blood (Na^+, K^+, Cl^-, H^+ and HCO_3^-) can be transported to cells in the nephron tubule and then secreted by the cells into the tubule. Some poisons and certain drugs are eliminated from the body in this manner. (3 marks)	4

Question 21 Syllabus reference: 2, 14

Suggested answers	Mark
a) Recessive, because it skips a generation.	2
b) Pedigrees are important in determining if certain traits (favourable or unfavourable) are likely to arise in particular generations etc. also allows geneticists to establish lineages for certain traits.	3

Question 22 Syllabus reference: 6, 11, 16

Suggested answers	Mark
a) Vaccination is a way of exposing a person to a pathogen without causing disease. This can prompt the immune system to produce memory B cells which can attack the pathogen later very rapidly.	2
b) Ethical issues could include religious resistance to vaccination, less concern about the dangers of 'unsafe' sex, etc.	2
c) Benefits could include less females ultimately succumbing to cervical cancer, resulting in less medical resources being consumed, more people being productive for longer, etc.	3

Question 23 Syllabus reference: 8

Suggested answers	Mark
Pasteur disproved the idea of spontaneous generation and showed that microbes come from pre-existing microbes.	3

Question 24 Syllabus reference: 10

Criteria	Mark
a) When two unrelated species evolve to look outwardly similar through similar selection pressures from the environment.	1
b) The Tasmanian tiger and the dingo look outwardly similar because they both inhabited the same ecological niche and were subject to the same selection pressures from the environment. Could use examples like the shark and the dolphin, etc.	4

Question 25 Syllabus reference: 6

Suggested answers	Mark
a) Oxygen is needed for the cellular reaction of respiration.	1
b) The blood circulates in two systems: the pulmonary system and the systemic system. In the pulmonary system the blood carbon dioxide levels decrease and oxygen levels increase. In the systemic system, oxygen is delivered to the cells and carbon dioxide is added. Other waste like urea is also added.	2
c) Pulmonary circulation blood flows from the heart to the lungs, where gas exchange takes place, and back to the heart. System circulation blood flows from the heart to the rest of the body and ultimately the cells.	2

Question 26 Syllabus reference: 7

Suggested answers	Mark
Any four could include sunken stomates, leaves hanging vertically, thick cuticle, leaves reduced to spines etc. Need to explain how each helps to prevent water loss.	4

Question 27 Syllabus reference: 1, 15

Suggested answers	Mark
Rosalind Franklin's work on x-ray diffraction showed DNA had a helix structure. Watson & Crick used this information to formulate their double helix model of DNA.	3

Question 28 Syllabus reference: 14, 15

Suggested answers	Mark
a) Any valid conclusion e.g. smoking past the age of 65 has a much higher risk of developing lung cancer.	1
b) Control group never smoked, used as a comparison vs smokers	2
c) risk of developing lung cancer is only slightly higher than one who never smoked.	2
d) These studies allow governments to determine 'cause and effect' for diseases as well as develop strategies to identify high risk sectors. These may then be targeted with education programs, intervention etc.	3

Section II

Question 29(a) Syllabus reference: 9.5.2

Criteria	Mark
Visible light (ie. 380-750nm).	2

Question 29(b) Syllabus reference: 9.5.3

Criteria	Mark
- Object is imaged at a slightly different distance to the fovea of each eye. - Image is combined in the cerebral cortex, allows for the perception of depth.	4

Question 29(c) Syllabus reference: 9.5.4

Criteria	Mark
- Rods and cones contain photosensitive chemical substances that change when they absorb light energy. - Cones concentrated in the central fovea. - Rods concentrated at the edge of the retina. - Rods allow for the detection of shape and movement and shades of light and dark. - There are three types of cones and each contains a different type of pigment (ie, blue, red, green) - Cones are not as sensitivity to light but can distinguish between colours.	5

Question 29(d) Syllabus reference: 9.5.6

Criteria	Mark
- e.g.: the tympanic membrane, known as the eardrum, is a thin membrane that separates the external ear from the middle ear. - Its function is to transmit sound from the air to the ossicles inside the middle ear.	4

Question 29(e) Syllabus reference: 9.5.7

Criteria	Mark
A neurone is a specialised cell that transmits electrical nerve impulses from one to the next.	2

Question 29(f) Syllabus reference: 9.5.7

Criteria	Mark
- Occipital lobe located above the cerebellum (at the back) divided into two parts. - The primary visual cortex, visual association area.	2

Question 29 continues on the next page

Question 29 continued

Question 29(g)(i) Syllabus reference: 9.5.7

Criteria	Mark
Provides a description of the procedures used to gather information about the structure of neurones and nerves.	2

Question 29(g)(ii) Syllabus reference: 9.5.7

Criteria	Mark
As experimental error may have occurred, the results are not important. If the student states their actual results they can be expected to receive a mark.	1

Question 29(g)(iii) Syllabus reference: 9.5.7

Criteria	Mark
The conclusion should relate to the results obtained. If the results were not what were expected, then the conclusion should address this.	3

Question 30(a) Syllabus reference: 9.6.1

Criteria	Mark
▪ Early societies collected seeds of wild plants and domesticated some species of wild animals. ▪ The selection of these wild plants and animals was based on desired characteristics.	2

Question 30(b) Syllabus reference: 9.6.4

Criteria	Mark
▪ RNA polymerase attaches to DNA upstream of the gene to be produced. ▪ A complementary strand of RNA is formed. ▪ The mRNA then moves across the nuclear membrane to the cytoplasm, where it directs protein synthesis.	4

Question 30(c) Syllabus reference: 9.6.5

Criteria	Mark
It is used for the exponential amplification of DNA. 1. initialization step , the PCR reaction is heated- 94-96°C for 1-9 minutes to ensure that most of the DNA template and primers are denatured. 2. annealing step , reaction temperature lowered so that the primers can attach to the single-stranded DNA template. 3. extension/elongation step synthesizes new DNA strands complementary to the DNA template strands. The extension time depends both on the DNA polymerase used and on the length of the DNA fragment to be amplified.	6

Question 30(d) Syllabus reference: 9.6.6

Criteria	Mark
▪ Answer could include a description of the production of a pharmaceutical from alga. ▪ The farming of a marine animal.	3

Question 30(e) Syllabus reference: 9.6.3

Criteria	Mark
Will depend on the fermentation process chosen.	4

Question 30(f)(i) Syllabus reference: 9.6.4

Criteria	Mark
A description of the procedures used to test the conditions that influence the rate of enzyme activity.	2

Question 30(f) continues on the next page

Question 30(f) continued

Question 30(f)(ii) Syllabus reference: 9.6.4

Criteria	Mark
- As experimental error may have occurred, the results are not important. - If the student states their actual results they can be expected to receive a mark.	1

Question 30(f)(iii) Syllabus reference: 9.6.4

Criteria	Mark
- The conclusion should relate to the results obtained. - If the results were not what were expected, then the conclusion should address this.	3

Question 31(a) Syllabus reference: 9.7.6

Criteria	Mark
A trisomy is the presence of three, instead of the normal two, chromosomes of a particular type in an organism. eg Trisomy 21 (Down's Syndrome)	2

Question 31(b) Syllabus reference: 9.7.2

Criteria	Mark
- Skin colour: - Controlled by at least three genes (possibly more) - These three genes can be symbolised as A and a B and b and C and c. - We assume upper case symbolises dark pigment. - Each of the six alleles is incompletely dominant.	4

Question 31(c)(i) Syllabus reference: 9.7.6

Criteria	Mark
- Also known as jumping genes, are discrete segments of DNA. - They are able to move around among chromosomes.	2

Question 31(c)(ii) Syllabus reference: 9.7.6

Criteria	Mark
- Transfer a gene or a group of genes to unrelated areas of DNA, resulting in new DNA sequences and rearrangements of the chromosomes. - can turn off genes - can transfer genetic material from cell to cell.	3

Question 31(d)(i) Syllabus reference: 9.7.3

Criteria	Mark
100% RrYy.	2

Question 31(d)(ii) Syllabus reference: 9.7.3

Criteria	Mark
9:3:3:1 – ie 9 round and yellow, 3 round and green, 3 wrinkled and yellow, 1 wrinkled and green.	2

Question 31(e) Syllabus reference: 9.7.4

Criteria	Mark
- Student outlines the main benefits of the human genome project. - Understanding of taxonomic relations. - Prevention/early detection of genetic disorders/cancers	4

Question 31(f) Syllabus reference: 9.7.8

Criteria	Mark
Will depend on the secondary sources chosen by the student.	6

Question 32(a) Syllabus reference: 9.8.1

Criteria	Mark
Two organisms are said to be part of the same species if they can interbreed to produce viable offspring.	1

Question 32(b) Syllabus reference: 9.8.1

Criteria	Mark
▪ Opposable thumbs (that can touch another finger) ▪ Flattened nails instead of claws, ▪ Ridged finger pads (resulting in fingerprint), ▪ Grasping hands with an agile forearm (due to ability to twist radius and ulnar), ▪ Stereoscopic vision with both eyes facing forward, ▪ Relatively large brain.	4

Question 32(c) Syllabus reference: 9.8.4

Criteria	Mark
▪ Clinal gradation occurs as a result of interbreeding and intermediate environments. A cline is a gradual change in gene frequency in a population. This produces a gradual change in the phenotypic characteristics of a species over a geographical range. ▪ The clinal gradation that occurs is because of the existence of intermediate environments where different genetic factors have an advantage. ▪ eg. Human body shape: It is hottest at the equator, and coldest at the poles. ▪ Surface area to volume is a contributing factor in maintaining body heat. ▪ The environment provides a mode of genetic selection. The resulting cline is that people are tall and thin near the equator and get smaller and thicker as you approach the poles.	4

Question 32(d) Syllabus reference: 9.8.3

Criteria				Mark
Will depend on the species chosen:				6
	Body structure	Cranial capacity	Fossil ages and regional location	Inferred culture
Homo neanderthalensis	Prominent brow ridges; low forehead; flat skull; large nose; forward sloping face; short; very muscular limbs; brain slightly larger than modern humans.	approx 1250-1740cc	230 000yrs old -probably area now known as Iraq	Buried their dead (often in caves with tools worked objects and flowers), made stone tools
Homo sapiens	Large cerebral cortex ie forebrain; rounded, large cranium, flat face.	approx 1350cc	130 000yrs old, -mainly Africa	Early sapiens engraved and painted images, developed art, further refined tool making.

Question 32 continues on the next page

Question 32 continued

Question 32(e) Syllabus reference: 9.8.2

Criteria	Mark
Describes One type of evidence, eg, Physical, behavioural, genetic sequence etc.	4

Question 32(f) Syllabus reference : 9.8.6

Criteria	Mark
Will depend on the secondary sources chosen by the student.	6

Question 33(a) Syllabus reference: 9.9.2

Criteria	Mark
That photosynthesis is a two step process (ie light-dark).	1

Question 33(b) Syllabus reference: 9.9.4

Criteria	Mark
▪ Photosystem 2 feeds photosystem 1. ▪ Photosystem 1 needs longer wavelength light (most efficient with light around 700nm). ▪ Photosystem 2 is active when exposed to shorter wavelengths (wavelengths of around 680nm). ▪ Photosystem 1 traps energy which causes the release of an electron to another pigment. This electron gets passed down a chain of pigments to eventually reduce NADP. ▪ Photosystem 1 is now in an oxidised state that cannot receive an electron from further up the chain until photosystem 2 gathers enough energy and passes an electron into the chain.	4

Question 33(c)(i) Syllabus reference: 9.9.5

Criteria	Mark
C^{14} ; O^{18} .	2

Question 33(c)(ii) Syllabus reference: 9.9.5

Criteria	Mark
▪ Plants cannot distinguish between radioactive isotopes and the normal element. ▪ Radioactive C^{14} can be incorporated into the metabolism of a plant via respiration. The time of release and exposure is controlled. ▪ The experiment is stopped and the compounds that contain the isotope are identified.	3

Question 33(d) Syllabus reference: 9.9.7

Criteria	Mark
▪ It is the energy currency of all cells. ▪ It provides energy for metabolic processes.	2

Question 33(e) Syllabus reference: 9.9.8

Criteria: 1 mark per correct label (4 maximum)	Mark
	4

Question 33(f) Syllabus reference: 9.9.8

Criteria	Mark
eg. Flattened hollow discs with chlorophyll dissolved in the lipid layers of the membrane.	3

Question 33(g)(i) Syllabus reference: 9.9.3

Criteria	Mark
A description of the procedures used to determine the effect of light intensity and temperature on gas production in a suitable pond weed.	2

Question 33(g)(ii) Syllabus reference: 9.9.3

Criteria	Mark
As experimental error may have occurred, the results are not important. If the student states their actual results they can be expected to receive a mark.	1

Question 33(g)(iii) Syllabus reference: 9.9.3

Criteria	Mark
- The conclusion should relate to the results obtained. - If the results were not what were expected, then the conclusion should address this.	3

MAPPING GRID – BIOLOGY TRIAL EXAMINATION 2007

Question	Mark	Outcome tested	Syllabus reference	Target performance bands
1	1	6	9.2.1	3
2	1	10	9.3.2	2
3	1	6	9.2.3	3
4	1	8	9.4.2.	2-3
5	1	4,9	9.3.5	3
6	1	4,10	9.4.4	3
7	1	6	9.3.3	2
8	1	6	9.4.1	3
9	1	10	9.3.1	4
10	1	6	9.2.2	3
11	1	8	9.3.4	4
12	1	1,2	9.4.3	4
13	1	8	9.4.7	2
14	1	10,3	9.3.5	3
15	1	5	9.4.6	3
16	3	6,2	9.2.1	3-4
17	4	6	9.2.1	3
18	6	6,7,9	9.3.3	4-5
19	3	3,4	9.4.1	3
20	4	6	9.2.3	4
21	5	2,14	9.3.2	3-4
22	7	6,11,16	9.4.5	5-6
23	3	8	9.4.3	3
24	5	10	9.3.1	4-5
25	5	6	9.2.2	4-5
26	4	7	9.2.3	3
27	3	1,15	9.3.4	3
28	8	14,16	9.4.6	5-6
29	25	12,13,14	9.5	2-6
30	25	12,13,14	9.6	2-6
31	25	12,13,14	9.7	2-6
32	25	12,13,14	9.8	2-6
33	25	12,13,14	9.9	2-6
Outcomes and marks for options are included with the marking guidelines/suggested answers				

The Trial HSC examination, marking guidelines/suggested answers and 'mapping grid' have been produced to help prepare students for the HSC to the best of our ability.

Individual teachers/schools may alter parts of this product to suit their own requirement.