

**Biology 3201
Grading Standards
June 2005**

Pre-Marking Appraisal

The June 2005 biology exam was considered a fair exam, well designed, and of reasonable length and difficulty
For item #4, both (B) and (C) were accepted as answers. The marking board felt the word “after” could have been interpreted two ways, after the situation has past (B), or after the initial shock (C).

Post Marking Report:

Marking Standard and Consistency

Marker reliability was checked by obtaining a random sample of 50 papers that went through the marker panel and marks were assigned to each question on a separate sheet of paper. The 50 exams were put back into the original stack of exams and corrected again when they appeared. The two values were compared and if there were discrepancies, the chief marker would review the scoring with the individual marker.

Throughout the marking process there were statistical analysis ran on item data to enhance reliability and consistency of marking.

Summary:

The provincial average of the June 2005 Biology 3201 exam increased from the 2004 exam. This increase was most likely due to students having more experience with higher order questions. The results of these types of questions on the June 2005 exam were improved from previous years.

Finally, a greater emphasis must be put on the Core Lab and Core STSE outcomes. Across the province students performed poorly on all items that measured the achievement of these outcomes.

PART II
Total Value: 25%

Constructive Response/Common Errors

Value

3% 76.(a) Due to a mutation, the sodium binding site on a sodium potassium pump has changed such that it now binds with chloride ions (Cl⁻). Sodium ions (Na⁺) remain inside the membrane. What happens to nerve transmission? Give two reasons to justify your answer.

Answer:

If the sodium binding site now binds with chloride ions and sodium ions remain inside the membrane, then nerve transmission will stop. Repolarization will not occur because sodium is not being pumped out, the outside of the membrane will be more negative or the inside of the membrane will be less negative.

(1½ mark) Nerve transmission stops.

(1½ mark) Repolarization does not occur because: (any two of the following)

- sodium is not being pumped out
- outside would be more negative
- inside would be less negative

Commentary on Response:

- There was no consistency in marks.

Common Errors:

- Students stated that nerve impulses speed up or slow down.
- Students stated that nerve impulse delayed.
- Students stated that the impulse is reversed.
- Students stated that the neuron continually fires/sends on impulse.

- 2% 76.(b) Which endocrine gland is most likely damaged in a female whose menstrual cycle has stopped and metabolism has slowed? Explain.

Answer:

If a female's menstrual cycle has stopped and metabolism has slowed then the pituitary gland (or anterior pituitary gland) is most likely damaged because it releases hormones that control these symptoms.

- (1 mark) Pituitary Gland (or Anterior Pituitary Gland)
 (1 mark) gland which releases hormones that control these symptoms

Commentary on Response:

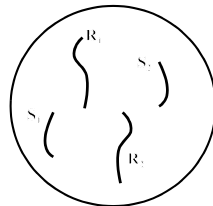
- This item was done poorly.

Common Error:

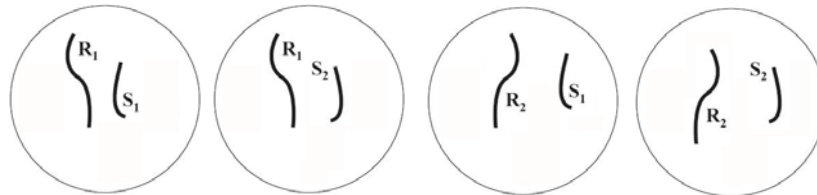
- Students incorrectly identified the correct gland.

Value

- 2% 77.(a) The diagram below shows a cell with two pairs of homologous chromosomes, (R_1 , R_2 and S_1 , S_2). Draw all possible daughter cells produced by the meiotic division of this cell. Label the chromosomes in each daughter cell.



(½ mark for each)



Commentary on Response:

- This item was omitted by a large number of students.

Common Errors:

- Students did not recognize R and S as chromosomes.
- Students drew four cells with one chromosome in each.
- Students drew two cells with mitotic division and the four chromosomes from the original cell.
- Students did not include R_1S_2 or R_2S_1 .

Value

2%

77.(b) Describe two ways in which the human population would most likely change if the only form of human reproduction was asexual?

Answer:

If the only form of human reproduction was asexual, then the human population would increase and there would be less variety among individuals, which could lead to the loss of gender. This could also lead to less desirable traits being more common in the population and therefore less adaptability by individuals.

(2marks) Any two of the following: (1 mark for each)

- less variety
- gender would disappear
- population would increase since only one individual required to produce offspring
- less desirable traits would be more common
- less adaptability

Commentary on Response:

- This item was done fairly well.

Common Errors:

- Students confused asexual reproduction with sexual self-fertilization and thus stated that there was a need for both sex organs.
- Students confused asexual reproduction with *invitro* fertilization and artificial insemination.

Value

2% 77.(c) Give two reasons why birth control pills can be used to treat menopause.

Answer:

Birth control pills can be used to treat menopause because they contain hormones that can replace the ones lost during menopause (or lessen the effects of menopause).

(1 mark) They contain hormones.

(1 mark) These hormones can replace the ones lost during menopause

OR:

These hormones lessen the effects of menopause.

Commentary on Response:

- This item was generally done well.

Common Errors:

- Students did not mention that the pills contain hormones.

Value

3% 78.(a) In guinea pigs, black hair (B) is dominant to white hair (b) and straight hair (S) is dominant to curly hair (s). Two guinea pigs are crossed. The male parent produces only one gamete, BS, and the genotypes of the offspring are BBSs and BbSs only. Determine the genotype and phenotype of each parent. Show your workings.

(1 mark) Punnett Square workings:

		female gametes	
		Bs	bs
male gametes	BS	BBSs	BbSs

(2marks) ½ mark for each parent genotype and phenotype

father's genotype: BBSS mother's genotype: Bbss
father's phenotype: black straight mother's phenotype: black curly

Commentary on Response:

- Students that attempted to answer the question usually received full marks.

Common Errors:

- Students did not clearly distinguish between lower case S and upper case.
- Students listed two alleles for a genotype (e.g. BS instead of BBSS).
- Students confused phenotype with genotype.
- Students completed a double heterozygous.
- Students incorrectly labelled genotypes.

Value

3% 78.(b) The following mutation occurred.

original DNA strand: ACA TGA TCT ACC ATA TGG ...,

mutated DNA strand: ACA TGA TTA CCA TAT GG....,

- (i) What type of gene mutation caused this change? _____
- (ii) Explain two ways how this mutation specifically affects the proteins produced?

(1 mark) (i) *frameshift, or deletion, or point*

(2 marks) (ii) *This mutation specifically affects the proteins produced because it will result in a different protein being produced since different amino acids are coded.*

Commentary on Response:

- This item was done well.

Common Errors:

- Students stated missense, nonsense, translocation, or inversion mutations.
- Students referenced protein synthesis (tRNA and mRNA) but not that the protein was affected.

Value

- 2% 78.(c) Explain two ways how the work done by Newfound Genomics is different from the work done by the Human Genome Project?

Answer:

The work done by Newfound Genomics is different from the work done by the Human Genome Project because Newfound Genomics only uses information from the human population in Newfoundland and Labrador whereas the Human Genome Project uses information from the population of the entire world. The sample sizes are quite different. Another reason is that Newfound Genomics is a private component that is attempting to make a profit from its work, whereas the Human Genome Project is a non-profit government funded science project.

- (2marks) Any two of the following:
- sample size
- profit vs. medicine
Any other reasonable response

Commentary on Response:

- This item was done poorly (vast majority received no marks).
- Many students wrote nothing. This item assessed an STSE outcome.

Common Errors:

- Students focused on one project only but never showed how they were different.
- Students used the founder effect to explain the difference.

Value

- 2% 78.(d) How can genetic engineering be used to meet the increased demands of the human population for low carbohydrate, high protein diets?

Answer:

Genetic engineering can be used to meet the increased demands of the human population for low carbohydrate, high protein diets by creating genetically modified organisms with these characteristics. This will increase the number of organisms with these characteristics (e.g., fish).

OR:

Genetic engineering can be used to meet the increased demands of the human population for low carbohydrate, high protein diets by producing genetically modified food with these characteristics. This will increase the production of food with these characteristics (e.g., corn).

- (1 mark) G.M.O. or G.M.F.

- (1 mark) G.M.O. increase the production of organisms with these characteristics (e.g., fish)
OR
G.M.F. modify and increase the production of crops with these characteristics (e.g., corn)

Commentary on Response:

- This item was done poorly.

Common Errors:

- Students did not identify that there must be a way to mass produce GMF'S/GMO's.
- Students concentrated on the genetic engineering of the human body as opposed to the food/dietary requirements.
- Students confused genetic engineering with genetic counseling.

Value

- 2% 79.(a) Explain, using evolutionary theory, why the scientific community is concerned about the increasing use of pesticides?

Answer:

The scientific community is concerned about the increasing use of pesticides because due to natural selection, a population of pests that are immune to the pesticide will eventually be created and the pesticides will become ineffective.

- (1 mark) Natural selection will result in creating a population of pests that are immune to the pesticide.

- (1mark) Eventually pesticides will become ineffective.

Commentary on Response:

- This item was poorly done.

Common Errors:

- Students did not link the response to evolutionary theory.
- Students concentrated on the environmental aspects of pesticide use, not the evolutionary.
- Students confused herbicide and pesticide.
- Students mentioned co-evolution as evolutionary theory, but co-evolution occurs between two species.
- Students stated that they (pests) would acquire immunity to pesticide (i.e., Lamarck vs. Darwin).
- Students stated that there was a “build up” of tolerance to the pesticide.

Value

2% 79.(b) Imagine that the first human mission to Mars was a tremendous success. A self-sustaining colony was established consisting of three females and six males, all of reproductive age. Give two reasons as to why this population would not remain in genetic equilibrium, according to the Hardy-Weinberg Principle.

Answer:

According to the Hardy-Weinberg Principle, this population would not remain in genetic equilibrium because the population size is too small so mating is not random.

(1 mark each) Any two of the following:

- small population size
- non-random mating
- mutations may occur
- natural selection

Commentary on Response:

- This item was done fairly well.

Common Errors:

- Students stated the Hardy-Weinberg formula but did not know the conditions necessary.
- Students “made up” numbers and put them into the Hardy-Weinberg formula to perform incorrect calculation.

**BIOLOGY 3201 ITEM ANALYSIS
SELECTED - RESPONSE (PART I)**

Item	Answer	Responses			
		A	B	C	D
		%	%	%	%
1	A	97.1	1.0	1.2	0.7
2	A	68.3	22.7	5.6	3.3
3	A	43.6	6.6	25.1	24.6
4	B & C	1.5	39.4	54.1	5.0
5	B	11.9	83.2	3.4	1.5
6	B	6.1	49.7	30.0	14.3
7	B	21.5	50.4	15.4	12.4
8	A	72.9	4.2	6.5	16.4
9	A	75.4	5.0	13.5	5.8
10	A	39.9	25.6	11.8	22.6
11	A	62.4	13.8	17.7	6.0
12	D	15.6	24.2	24.4	35.4
13	B	0.6	94.8	2.5	2.1
14	A	46.1	47.1	5.4	1.3
15	D	9.7	3.1	12.8	74.1
16	B	15.4	55.7	21.1	7.7
17	A	64.8	14.9	11.4	8.9
18	B	12.5	74.6	10.0	2.9
19	C	2.9	2.6	92.3	2.2
20	D	3.9	3.5	28.6	63.7
21	A	87.3	5.4	3.6	3.6
22	D	15.7	2.5	3.4	78.3
23	C	9.2	19.0	67.4	4.3

Item	Answer	Responses			
		A	B	C	D
		%	%	%	%
24	D	16.5	5.8	17.5	60.1
25	A	41.9	34.5	18.4	5.0
26	D	18.0	1.5	6.0	74.4
27	B	27.5	61.3	8.8	2.4
28	A	62.4	5.6	20.7	11.1
29	A	43.5	7.0	6.4	43.0
30	D	9.8	12.0	48.8	29.3
31	D	3.3	8.4	7.0	81.3
32	A	94.4	3.5	0.4	1.7
33	B	10.8	59.6	9.2	20.2
34	B	0.3	96.1	0.4	3.1
35	A	67.4	12.8	16.1	3.6
36	B	14.6	78.5	6.0	0.8
37	C	0.9	0.4	86.4	12.2
38	D	0.2	9.0	16.9	73.9
39	B	12.3	76.1	4.6	6.8
40	C	19.0	8.8	64.0	8.3
41	B	5.7	43.5	49.5	1.3
42	D	18.3	24.2	10.9	46.3
43	D	8.9	5.1	22.6	63.3
44	D	7.0	17.0	3.7	72.2
45	A	56.5	17.8	8.1	17.5
46	B	11.0	63.8	13.7	11.4
47	A	71.5	10.8	11.3	6.4
48	B	39.1	51.3	3.4	6.1
49	A	38.6	14.1	37.8	9.3

Item	Answer				
		A	B	C	D
		%	%	%	%
50	C	11.1	54.8	22.0	11.8
51	A	70.1	6.1	17.8	5.7
52	B	23.5	31.5	6.3	38.5
53	D	1.4	17.8	6.7	74.0
54	C	18.2	15.2	37.3	29.1
55	C	3.7	13.3	81.9	1.0
56	D	12.3	22.6	26.7	38.2
57	B	3.1	53.9	27.4	15.4
58	D	22.8	10.0	33.7	33.2
59	B	10.4	70.9	7.7	10.9
60	C	10.5	6.1	80.7	2.6
61	D	6.9	13.3	24.3	55.3
62	A	84.1	7.8	1.1	6.8
63	D	39.5	15.5	6.5	38.4
64	C	14.5	18.1	66.3	1.0
65	B	7.5	67.0	13.1	12.3
66	A	91.9	5.1	1.1	1.9
67	D	9.3	26.0	44.5	20.1
68	D	3.5	16.7	23.9	55.5
69	C	37.0	5.3	35.3	22.2
70	B	21.6	39.3	17.6	20.9
71	A	61.4	12.2	23.4	2.8
72	C	15.7	1.7	79.6	2.9
73	C	26.9	37.3	28.0	7.6
74	A	42.4	35.2	15.4	6.7
75	D	28.8	3.7	10.0	57.1

NOTE: Percentages may not add to 100% due to multiple answers or missing values.

**BIOLOGY 3201 ITEM ANALYSIS
CONSTRUCTED - RESPONSE (PART II)**

Item	Number of Students Completing Item	Value	Average
76 (a)	3639	3	0.9
76 (b)	3639	2	0.5
77 (a)	3639	2	0.9
77 (b)	3639	2	1.2
77 (c)	3639	2	1.4
78 (a)	3639	3	1.7
78 (b)	3639	3	1.8
78 (c)	3639	2	0.3
78 (d)	3639	2	0.6
79 (a)	3639	2	0.4
79 (b)	3639	2	0.6

Biology 3201 Provincial Results June 2005

