Grading Standards
Biology 3201
June 2009

Pre-Marking Appraisal

The examination was considered fair and had coverage of each unit of study and each level of cognitive learning as per the table of specifications.

Post Marking Report:

(a) Marking Standard and Consistency

Marker reliability was checked by obtaining a random sample of 50 examinations. These examinations were scored on separate back flaps with no physical markings on the original examinations and were held by the Chief Marker for recirculation throughout the marking period. These papers were corrected by the marking board again, and the initial and subsequent marks were compared. Any discrepancies in marking were reviewed and discussed with individual markers. Each marker also made on-going notes regarding partial marks and scoring for their particular question. Whenever a non-common error occurred, it was scored by consensus of the board and made note of, for scoring consistency.

(b) Summary

Overall performance in the Biology 3201 examination was lower in June 2009 than in June 2008 and was the lowest since 2005. It was noted that the constructed response results were lower than last year. The provincial average for the constructed response was below 50%. As in past years, performance was lower for items that assessed outcomes at higher cognitive levels. It is important that students be exposed to higher order activities and questioning regularly throughout the year, especially with constructed responses.

Teachers should encourage students to read questions carefully and critically. Very often on the provincial examination, errors occur because students fail to read the whole question. If they read the complete question or read it several times, they are less likely to misinterpret the item and are more likely to perform better.

(c) Commentary on Responses

Part I – Selected Responses – Total Value 75%

Item # 12: Students selected choice "A" nearly as many times as the correct answer "C". These students have not developed a strong understanding of the differences between steroid and non-steroid hormones at the cellular level.

Item # 19: Students selected choice "D" as often as the answer "B". This is a Level 3 question and requires the student to have a complete understanding of the concept of monoploid versus diploid cells to successfully arrive at the answer.

Item # 20: Students chose the correct answer, "C", most frequently; however, a large percentage chose "B". This is most likely due to students seeing the word "movement" and then pairing it with the "flagellum".

Item # 35: Most students incorrectly chose "A" instead of "C", the correct answer. The diagram is very clear and should have guided the student to choice "C". There is an obvious misunderstanding concerning the concepts of mitosis and meiosis.

Item # 49: Most students chose the correct answer, "A", but there was a noticeable percentage choosing "D". Unless students know the difference between transcription and translation in protein synthesis, they will have difficulty in making the correct decision.

Item # 55: There was an equal selection of choice "B" and "C". "B" is incorrect. Choice "B" does not pertain to this question since clones are genetically identical to their source (parent cell) and the environment will influence how the genes in the clone are expressed as it undergoes mitosis.

Item # 57: In general, students who did not perform well on the exam did not answer this question correctly. Students need to know the contribution of scientists in order to successfully answer a question like this.

Item # 59: Two correct answers were accepted: B and D.

Item # 61: Questions involving pedigree charts are generally not well answered because they require practice and understanding. Students who do not understand will tend to guess. In this question, choice "D", sex-linked, was a strong distracter for those students.

Item # 62: "C" was the strongest distracter for students who scored in the bottom 75% of the exam. The students who scored in the top 25% of the exam selected the correct answer, "A", much more frequently than any of the distracters.

Item # 75: This was a similar question type to #57. Students are not familiar with the contribution of scientists.

Part II – Constructed Responses – Total Value 25%

PART II

Total Value: 25%

3% ***76.(a) Some cell phones have ring tones with high frequencies that can be heard by adolescents but not by older adults.***

i) Explain two biological reasons for this difference.

ii) Most newer cell phones can be used as a personal listening device. Explain why the use of personal listening devices, played at high volumes for prolonged periods, should be discouraged in adolescents?

Answer:

i)

- Damage occurring to the cilia of the cochlea due to exposure to sound over many years, thus various frequencies are not picked up (nerve deafness).
- Damage occurring to the ossicles or ear drum due to aging over time which does not allow sound to get effectively to the choclea (conduction deafness).

0.5% for damage to cilia.
0.5% for stating that the frequencies were not being picked up.
0.5% for damage to the eardrum/ossicles.
0.5% for stating that the physical vibrations were not transmitted as well to the cochlea.

ii)

- Loud music from personal listening devices damages cilia in the cochlea or damage is done to the eardrum/ossicles causing loss of hearing (conduction or nerve deafness).

0.5% for cause of damage due to loud sounds. Named the structures of the ear damaged.
0.5% for saying that the loud sounds caused hearing problems or deafness.

Commentary
Students did not answer part (i) well because the term "biological" was very important in constructing an answer. Students tended to use very general explanations without specific reference to biological components of the ear involved in hearing. Part (ii) was answered a little better though answers were very general.

Common Errors

i) Students did not relate the structural damage to the function of the ear parts involved in sound. Often, students stated that adults were getting old and that it caused deafness with no linkage to the structure/function on the parts of the ear involved in sound.

ii) Students said that hearing loss occurred, but did not explain why. They did not explain how loud noise over a period of time damaged structures of the ear.

2% ***(b) The abuse of steroid hormones, such as testosterone, by athletes can lead to problems with homeostasis. Explain how this abuse can have a negative impact on the body.***

Answer:

The abuse of steroids cause:

1. Decrease in sperm production
2. Shrinkage of the testicles
3. Prostate enlargement
4. Aggressive behaviour
5. Acne
6. Liver damage
7. Heart attacks due to over worked heart muscle
8. Changes in the menstrual cycle
9. Hair growth in females
10. Deeper voice in females

1% per cause listed above (any two for 2%).

Note: 0.5% for reference to negative feedback cycle

Commentary

This was a poorly answered question. In Level 3 questions, students are required to bring together information learned in the course and then synthesize a possible answer.

Common Errors

Students:

- restated the question without any substance.
- gave effects due to excess estrogen.
- talked about homeostasis without any reference to the question.
- stated that hormones go out of balance.

4% ***77.(a)*** ***Stem cell researchers in independent labs have made great strides in creating stem cells without using embryos. One group was able to reprogram mature skin cells in mice into pluripotent cells. The reprogrammed cells were indistinguishable from embryonic stem cells. Name and explain two benefits of this new technology for science and society.***

Answer:

- The non-use of embryonic stem cells and the ethical controversy that surrounds it is now a non-issue.
- The potential for cure for diseases and faster development of treatments.
- The greater availability of adult stem cells compared to embryonic stem cells.
- Potential use of self-stem cells which eliminates rejection issues.

2% for naming a benefit with an explanation (4% total).

Note: 1% for naming a benefit without an explanation.

Commentary
Students scored well in this question if they had read the STSE that pertained to this question.

Common Errors
Students:

- only gave one benefit.
- left out explanations.
- confused embryonic with adult stem cells.
- stated the cost would be less.
- stated it can be used for skin transplants.

3% ***(b)*** ***In some cases, pelvic inflammatory disease (PID) develops when chlamydia is untreated. Although chlamydia has no permanent side effects, PID can permanently scar the fallopian tubes. Explain how this can affect a woman's fertility and list two technologies that can be used to overcome this problem***.

Answer:

- Woman will become infertile due to sperm blockage from the scar tissue.
- Solutions are invitro fertilization, surrogate motherhood or surgery.

1% for saying that the woman will be infertile.
1% for a solution (2% total).

Commentary
This question was answered well.

Common Errors
Students:

- stated that infertility is caused by a failure to ovulate.
- listed methods to prevent transmitting Chlamydia.
- answered the first part of the question, but not the second.
- listed artificial insemination and adoption as solutions.

3% ***78.(a) A couple has a son with muscular dystrophy and two daughters, one with the condition and one without. All three children have a widow's peak. Neither parent has a widow's peak. Muscular dystrophy is a recessive sex-linked trait and the widow's peak is an autosomal recessive trait. Use a Punnett square to determine the genotype of both parents***.

Answer:

- Son - X^mY pp***
- Daughter with Muscular distrophy - $X^m X^m$pp**
- Daughter without Muscular distrophy – $X^M X^m$ pp*

- Father X^m Y Pp
- Mother $X\ ^MX^m$ Pp

Punnett Square

	X^M P	**X^M p**	**X^m P**	**X^m p**
X^m P	X^MX^m PP	X^MX^m Pp	X^mX^m PP	X^mX^m Pp
X^m p	X^MX^m Pp	X^MX^m pp*	X^mX^m Pp	X^mX^m pp**
Y P	X^MY PP	X^MY Pp	X^mY PP	X^mY Pp
Y p	X^MY Pp	X^MY pp	X^mY Pp	X^mY pp***

3.0% both genotypes correct and Punnett square done correctly.
2.5% showing both genotypes but only one genotype in the Punnett square.
2.0% showing both genotypes correctly or one genotype completed properly and one genotype of one parent for the other genotype.
1.5% showing three correct genotypes, one from the parent, two from the other or one trait from each parent plus the correct Punnett square.
1.0% showing two correct traits, two from one parent or one from other parent.
0.5% showing one correct genotype from one parent.

Commentary

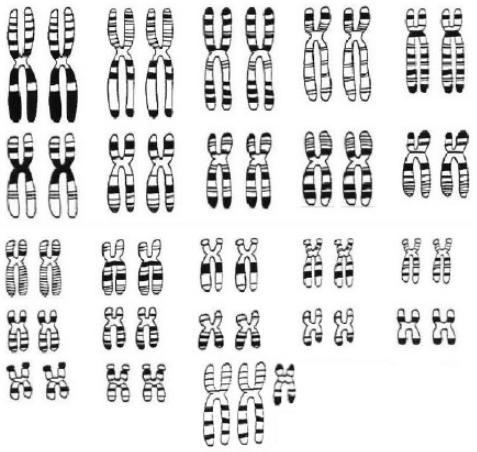
This question does require a working knowledge of Mendel's Law of Independent Assortment to be correctly answered. If students are not well versed in this law, they will have great difficulty in successfully completing this question. Consequently, it did not score well. When a random sample of 534 papers was selected, 19% of the students made no attempt to answer the question.

Common Errors

Students:

- did not show sex linkage for muscular dystrophy.
- presented unusual symbols with no explanation of what the symbols represent.
- used capital letters to represent a recessive trait.
- carried sex-linked alleles on the Y chromosome.
- constructed a pedigree chart.
- did not use a Punnett square to answer the question (explanation only).
- treated widows peak as a sex-linked trait.

2% ***78(b) Explain which genetic disorder is shown in the karyotype below.***



Answer:

- The genetic disorder is Klinefelter's Syndrome.
- The presence of the extra X-chromosome in the 23rd pair confirms the karyotype.

1% Klinefelter's Syndrome.
1% for indicating the extra X-chromosome in the 23rd pair.

Note: 0.5% if a student indicates an extra chromosome is present.

Commentary
This question did not score as well as expected. Students need to complete the karotype lab for all monosomy and trisomy conditions. This would have made this question score much better.

Common Errors
Students:

- selected Down's Syndrome.
- selected Jacob's Syndrome.
- selected Turner's Syndrome.
- selected Tripe X syndrome.

4% **78.(c)** ***Students were given two samples of DNA and asked to cut them between C and G in each CCGG sequence in sample X. In sample Y, they were asked to cut between the A's in TAAT sequences. Both sets of fragments were then arranged on a paper model demonstrating gel electrophoresis.***

DNA Strip Samples

Sample X:

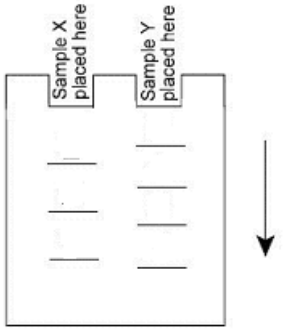
1	2	3
ATTCC	GGTAATCCCGTAATCC	GGATATGC

Sample Y:

4	5	6	7
GATTCCGGTA	ATCCCGTA	ATTTGCCTTTGCTA	AT

i) ***What is used in the process of cutting the DNA samples?***

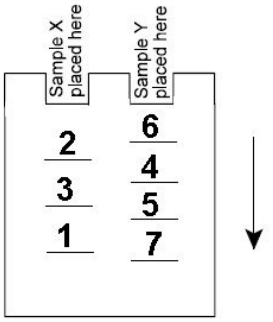
ii) ***Place the numbers of the fragments from the sample strips in the correct order on the blanks in the diagram of the gel electrophoresis plate below.***



Answer:

i) Restriction endonucleases, endonucleases, or restriction enzymes

ii)



1% given for any one of the three choices in (i).
3% given for the correct order in (ii) (0.5% deducted if each number that was in the incorrect position).

Note: 1.5% was given if students had the numbers in exact opposite order.

Commentary
This question scored very low. In a random sample of 534 papers, almost 9% of students made no attempt to answer the question.

Common Errors
Students:

- wrote helicase, vectors (bacterial or viral vectors), or enzyme for part (i).
- wrote down 1, 2, 3 for "X" and 4, 5, 6, 7 for "Y" for part (ii).

2% ***79.(a) Selective breeding has been used to obtain desirable traits within a species. Explain how selective breeding could be used to improve the racing ability of horses.***

Answer:

- Selective breeding is when two members of the same species are chosen by humans to be mated for their characteristics.
- Selective breeding could improve the racing ability of horses because the breeder will only choose horses that can produce offspring that run fast through traits such as: longer legs, bigger hearts, greater lung capacities and stronger muscles.

1% explaining selective breeding.
1% explaining how the selected traits make the horse faster.

Commentary
This question was answered very well because students understood selective breeding and could relate it to developing better race horses.

Common Errors
Students explained the concept of recombinant DNA technology.

2% ***(b)*** ***Explain how global warming could cause directional selection in polar bears***.

Answer:

- Directional selection involves the prevalence of one extreme trait. Therefore, with respect to polar bears responding to global warming, they will have to adapt to a warmer environment. This may result in polar bears that become smaller in size, swim longer distances, have thinner coats, have coat colours that change, and develop adaptations to different food sources.

  0.5% discussion of directional selection.
  0.5% description of traits that may occur.
  0.5% discussion of adaptations to the new environment.
  0.5% reasons for the change to the new traits.

Commentary
Students did not score well on this question. This question required the student to understand directional selection and then develop possible outcomes for the polar bear as the result of global warming. In a random sample of 534 papers, 5% of the students made no attempt to answer the question.

Common Errors
Students:

- stated that polar bears will not adapt and will go extinct.
- stated that polar bears will migrate to a new habitat without any change in their physical appearance.
- stated that a polar bear moves in a certain direction.
- explained the effects of global warming without any reference to the polar bear or directional selection.

BIOLOGY 3201 ITEM ANALYSIS
SELECTED - RESPONSE (PART I)

Item	Answer	Responses			
		A	B	C	D
		%	%	%	%
1	A	66.5	22.1	8.3	3.1
2	B	15.7	47.7	29.8	6.8
3	B	3.0	72.2	4.0	20.7
4	D	1.6	12.5	24.7	61.2
5	D	9.7	8.7	5.2	76.2
6	A	46.4	11.4	28.4	13.7
7	B	4.4	77.9	11.6	6.1
8	D	15.3	6.5	23.9	54.1
9	C	11.2	12.9	64.7	11.1
10	D	11.1	17.4	18.7	52.6
11	C	1.1	6.0	83.1	9.8
12	C	35.1	13.0	37.7	14.1
13	B	11.4	62.6	13.0	12.8
14	B	2.8	87.2	5.4	4.6
15	C	1.6	26.1	49.5	22.8
16	B	13.4	74.4	9.3	2.9
17	B	2.4	42.5	39.8	15.3
18	C	16.9	1.5	77.4	4.3
19	B	11.7	32.9	22.3	33.0
20	C	18.0	33.2	40.3	8.4
21	D	2.8	18.5	2.0	76.5
22	A	60.2	17.1	10.0	12.6
23	C	27.5	14.3	52.0	6.3
24	C	23.4	13.4	61.5	1.6

Item	Answer	Responses			
		A	B	C	D
		%	%	%	%
25	D	0.3	5.3	2.0	92.3
26	B	2.5	64.8	10.0	22.7
27	D	4.1	4.9	3.7	87.3
28	C	1.0	21.6	63.9	13.5
29	A	66.7	12.3	9.9	11.1
30	C	6.3	21.2	61.0	11.6
31	D	6.5	4.1	12.0	77.4
32	A	61.5	8.0	14.8	15.7
33	A	62.8	2.9	5.0	29.3
34	B	7.6	66.1	6.5	19.7
35	C	43.7	21.9	22.7	11.7
36	B	4.9	68.8	17.6	8.7
37	A	76.1	1.5	20.9	1.5
38	A	57.9	20.1	1.3	20.4
39	A	69.0	7.1	14.6	9.2
40	D	16.3	10.6	10.3	62.8
41	D	3.3	4.4	1.0	91.3
42	B	7.1	81.4	5.5	5.9
43	B	17.0	65.0	11.7	6.2
44	C	14.1	9.8	64.3	11.7
45	A	70.0	8.9	9.7	11.3
46	D	13.3	15.5	15.8	55.3
47	D	5.9	10.8	15.0	68.3
48	C	5.4	11.6	71.7	11.2
49	A	49.1	13.1	6.7	31.1
50	C	4.1	7.5	83.7	4.6

Item	Answer	Responses			
		A	B	C	D
		%	%	%	%
51	A	48.3	20.9	17.7	13.0
52	C	4.5	16.5	67.9	10.7
53	A	53.4	3.7	27.0	15.7
54	D	5.8	20.5	10.7	62.9
55	C	11.1	37.2	37.4	14.3
56	D	5.0	8.1	4.6	82.2
57	B	25.0	33.6	15.1	26.1
58	C	14.6	13.7	56.9	14.7
59	D	8.3	21.8	19.0	50.6
60	D	7.2	6.9	17.4	68.3
61	B	15.7	29.2	22.1	33.1
62	A	26.1	25.4	25.9	22.4
63	A	73.6	8.1	9.5	8.8
64	A	59.1	12.2	14.2	14.5
65	D	5.0	3.8	6.4	84.7
66	A	73.3	5.9	9.9	10.8
67	B	31.5	55.9	4.3	8.2
68	B	17.2	55.9	11.3	15.5
69	A	39.8	15.8	24.0	20.4
70	B	5.6	60.0	14.4	19.9
71	D	15.1	6.6	19.4	58.8
72	B	4.0	90.6	2.8	2.4
73	C	22.7	2.2	56.5	18.5
74	B	13.2	36.0	24.3	26.3
75	A	27.7	20.9	33.8	17.1

NOTE: Percentages may not add to 100% due to rounding.

BIOLOGY 3201 ITEM ANALYSIS
CONSTRUCTED RESPONSE (PART II)

Item	Number of Students Completing Item	Value	Average
76 (a)	3082	3	1.4
76 (b)	3082	2	0.6
77 (a)	3082	4	2.4
77 (b)	3082	3	2.0
78 (a)	3082	3	1.1
78 (b)	3082	2	1.2
78 (c)	3082	4	0.9
79 (a)	3082	2	1.8
79 (b)	3082	2	0.4