Biology 3201 Grading Standards
June 2008

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 specs.

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 slightly lower in June 2008 than in June 2007. It was noted that in the selected responses, the average was consistent with June 2007 but the constructed responses were slightly lower than last year. 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 throughout the year.

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 # 2: A higher percentage of students chose "D" instead of the answer "A". Students may have missed the word "from" in the stem of the question.

Item # 10: Students chose "B" slightly more frequently than "D". This is incorrect since corneal transplants refer to the cornea, not the lens. The lens is the site for cataracts.

Item # 40: This item was a three allele cross. Students that chose "C" may have misinterpreted the genotype as a trihybrid cross which, if done in class, does produce 8 gametic combinations.

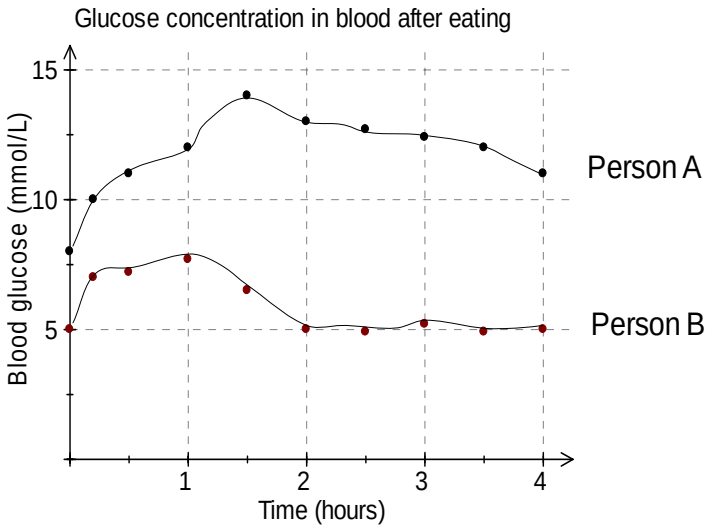
Part II – Constructed Responses – Total Value 25%

Item #79(b): The phrase "development of life on Earth" could be interpreted to include mutations as a plausible answer. This was not considered in the answer key. As a result, this item was used in calculating an exam mark only if it benefited the student.

PART II

Total Value: 25%

3% **76.(a) Following a meal, blood glucose levels are monitored in two people over a period of 4 hours and the results are graphed below. Which person has diabetes mellitus? Explain.**



Scoring

3%

The student would have to state the following:

1. Person A
2. Person A's blood glucose level is higher and remains higher than Person B over the four hour period.
3. Person A's blood glucose does not return to a lower level after four hours in comparison to Person B.

2.5 %
The student chose Person A and then stated that Person A's blood glucose was very high after eating and stayed high for the whole time period. It did not return to normal.

2%
The student chose Person A and stated that person A had high blood glucose.

1.5%
Person A had diabetes. People with diabetes have higher levels of glucose in their blood after eating. There was no reference to the graph or to Person A on the graph.

1.0%
The student chose Person A only or they spoke about the lack of insulin causing the problem.

0.5%
Student chose Person B but gave some vague reference to Person A's high glucose levels.

Commentary on Response

This question was attempted by the majority of students with many students achieving full marks. Students who did not attain full marks failed to make the comparison to the other person on the graph.

Common Errors

Students chose Person B because the blood glucose level was low or the student did not distinguish between Person A and B.

2% **76(b) State one way prescription drugs can be beneficial to society and one way they can be harmful to society.**

Scoring
2%

Students correctly stated one beneficial and one harmful effect to society.

Beneficial

- Return to homeostasis using antibiotics drugs.
- Return to homeostasis or function better in society using drugs to treat neurological disorders.

Harmful

- Abuse of narcotic prescription drugs.
- Increased crime for purchase of illegal drugs.
- Increased hospital admissions from overdoses/long term drug use.
- Resistance in bacteria by overuse of antibiotics.

1.5%
Student chose one benefit or harm correctly but the other answer had vague references.

1%
Student chose one benefit or harm correctly but had no other answer.

0.5%
Student gave a vague answer relating to one of the benefits or harm to society.

Commentary on Response

Students who strayed away from 'prescription drugs' to illegal drugs in constructing their answer did not achieve the maximum number of marks for this question.

Common Errors

Students stated that easy access to medication was beneficial, or that it was harmful if people built up immunity to the medication or the medication was difficult to obtain.

2% **77.(a) Due to positioning of the fetus, the umbilical cord becomes twisted and fails to function properly. State two possible problems this might cause for the fetus**.

Scoring

2%

Student would have to clearly state any two of the following:

1. Brain death/damage from low oxygen supply.
2. Malnutrition from lower nutrients from mother.
3. Lower birth weight.
4. Possible deformities.

1.5%

Student clearly stated one of the above selections but was vague on the second.

1.0%

Student clearly stated one of the above selections.

0.5 %

Student gave a vague reference to one of the above selections.

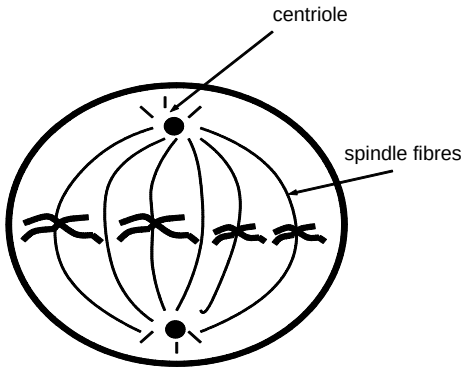
Commentary on Response

Some students interpreted the twisted umbilical cord as being wrapped around the baby's neck. With this thought process they did not complete the second problem for the fetus.

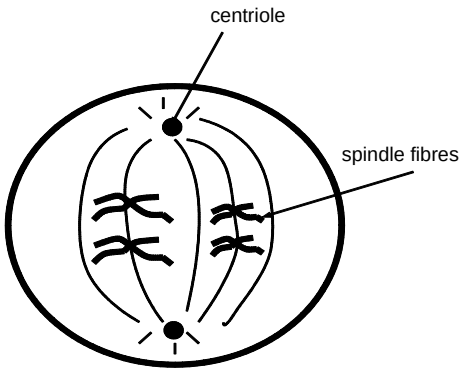
Common Errors

Students thought the umbilical cord was wrapped around the baby's neck.

2% **77(b) In the diagrams below, cell 1 is undergoing mitosis and cell 2 is undergoing meiosis. Explain how the arrangement of chromosomes in each diagram affects the cells produced at the end of mitosis and meiosis.**



Metaphase (mitosis)



Metaphase I (meiosis)

Scoring

2%

Student would have to clearly state any two of the following:

1. Cell 1 will have a diploid set of chromosomes upon completing mitosis.
2. Cell 1 will have two identical cells produced upon completing mitosis.
3. Cell 2 will have a haploid set of chromosomes upon completing meiosis.
4. Cell 2 will have 4 cells produced with one of the homologous pairs in each cell.

1.5%

Student gave three of the above selections.

1.0%

Student gave two of the above selections.

0.5%

Student gave one of the above selections.

Common Errors

Students:

- used 46 or 23 chromosomes in the construction of their answer.
- gave a response based on the first part of the stem while ignoring the latter part.
- stated that the cells were haploid at the end of mitosis and were diploid after meiosis is complete or four cells were produced after mitosis and 2 cells were formed after meiosis.
- explained the stages of mitosis and meiosis.

3% **77.(c) A woman is suffering from irregular and painful menstrual periods. Her doctor prescribes birth control pills for this condition.**

i) Explain how and why this treatment would be effective.

Scoring

2%

The student clearly stated one "how" and one "why".

How

Birth control pills contain estrogen and or progestin. These hormones are released in regulated amounts during the woman's monthly cycle which prevents irregular periods. The estrogen and progestin in the birth control pill prevents LH and FSH from being produced. This prevents ovulation and produces a thinner endometrial lining and thus less painful periods.

Why

Irregular periods are brought on by fluctuations in estrogen and progesterone each month. Birth control pills release regulated amounts of estrogen/progesterone to smooth out the cycle each month.

Painful periods are brought on by prostaglandin which causes the uterine lining to contract. The birth control pill causes the uterine lining to be less thick which will cause less pain and cramping.

1.5%

Student clearly stated one "how" or "why" but was vague on the other.

1.0%

Student clearly stated one "how" or one "why".

0.5%

Student gave a vague reference to a "how" or a "why".

Commentary on Response

Many students scored half marks on this question due to the fact that they often combined the how and the why as one. In addition, this question required a comprehensive knowledge of the menstrual cycle, its hormones, their effects and the birth control pill.

Common Errors

Students combined the "how" and the "why" together and were not very clear on either.

(ii) What is a possible unwanted side effect of this treatment?

Scoring

1%

Student clearly stated one of the following:

1. The woman cannot get pregnant.
2. Increased chance of blood clots especially if she is a smoker.
3. Increased cancer rates (breast/uterine).
4. Weight gain.
5. Mood swings.

0.5%

Student gave vague reference to one of the above but did not explain it well.

Commentary on Response

If students had carried out the mini-lab on hormone replacement therapy, this question was very easy to answer.

Common Errors

Students commented on increased chance of STI's, sterility, unwanted pregnancies or the treatment leading to the permanent end of the menstrual cycle. Increased bleeding, irregular periods, dizziness and upset stomach were also stated.

3% **78(a) The table below shows the gene pairs involved in determining eye colour. One pair codes for pigment in the front of the iris and the other for pigment in the back of the iris. If a man has grey-blue eyes and a woman has green eyes, use a Punnett square to determine which eye colour phenotypes would be possible for children born to this couple.**

Genotype	Eye Colour
AA BB	black-brown
AA Bb	dark brown
AA bb	Brown
Aa BB	Brown-green flecked
Aa Bb	light brown
Aa bb	grey-blue
aa BB	Green
aa Bb	dark blue
aa bb	light blue

Man is **Aabb**. Woman is **aaBB**.

Male alleles for each gamete are **Ab and ab**. Female alleles for each gamete are **aB** only.

Punnett Square

	aB
Ab	**AaBb**
ab	**aaBb**

Children will be light brown (AaBb) and dark blue (aaBb).

Scoring

3%

All of the following are required:

1. Parent genotypes were correctly selected from the table.
2. Punnett Square was correctly performed.
3. Phenotypes of the children were correctly stated.

2.5%

1. One of the children's phenotypes was left out.
2. A mistake was made within the cross.

2%

Punnett Square was incorrectly done.

1.5%

Identified the wrong parental genotypes, did a correct Punnett Square, selected the children's phenotypes correctly based on their erroneous parental genotypes.

1.0%

Only the correct parental genotypes were identified.

0.5%

1. One parental genotype correct.
2. One child's phenotype stated correctly.

Commentary on Response

This question was a unique variation on the traditional question within this section.

Common Errors

Students picked the incorrect parental genotypes. This was particularly evident for the male genotype. Students incorrectly grouped alleles in the Punnett Square or produced two Punnett Squares.

3% **78.(b) Current court cases have centered around ownership of individuals' DNA.**

i) State two arguments against a company's right to sell an individual's DNA.

Scoring

2%

Student would have to state two of the following:

1. Privacy of the individual's DNA.
2. Individual's DNA could be used to discriminate against health insurance, employment, etc.
3. Indiscriminate use of the individual's DNA by the new owners.

1.5%

Student clearly stated one of the above but was vague with the second argument. The second argument often involved identity or ownership of the DNA.

1.0%

Students could only produce one argument.

0.5%

Student gave vague references to one of the arguments using identity or ownership in their answer.

Commentary on Response

Students could come up with one argument but the second was often very unclear. This question required the students to have critically read the STSE in this unit.

Common Errors

Students often used a moral argument but did not specify how.

78(b) ii. Give a circumstance that might outweigh an individual's rights to ownership of DNA.

Scoring

1.0%
One of the following was stated:

1. Used in a serious crime scene investigation.
2. Used for national security.
3. Sold their rights with signed papers.
4. DNA contains unique properties that could benefit humankind.

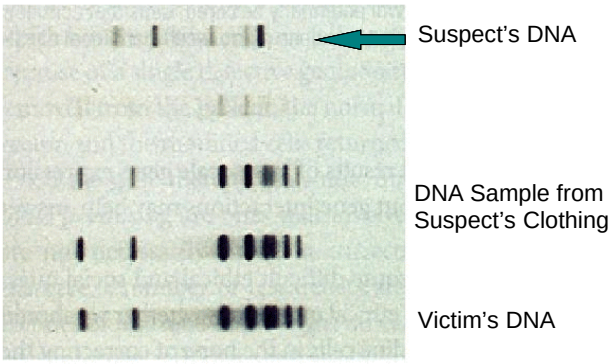
0.5%
1. Donated their DNA.
2. Identification of a dead person from a relative.
3. Treatment of major disorders to society.

Common Errors
Students:

- linked the answer to insurance claims (STSE) or job discrimination.
- often used the idea that a person's life needed to be saved.
- stated that when the person dies, they lose their ownership.

3% **78(c) The DNA fingerprint below shows DNA samples from a crime scene. The bands shown represent DNA from the victim and a suspect.**

DNA Fingerprint



i). What technique was used to create this fingerprint?

Scoring

1%

Gel Electrophoresis

0.5%

Gel …… with the second word indecipherable.

Common Errors
Students made incorrect references to heating and cooling and DNA fingerprinting.

ii). State a conclusion that can be made and explain how the fingerprint supports this conclusion.

Scoring

2.0 %

Both of the following are required:

1. The victim's DNA was on the suspects clothing.
2. The fingerprint under gel electrophoresis reveals the same banding pattern for the victim's DNA and the DNA sample from the suspect's clothing.

1.5%

Stating one of the above two and a weak description of the other.

1%

Stating one of the two required.

0.5%

The suspect was in contact with the victim or there was vague reference to banding patterns from the gel electrophoresis.

Commentary on Response

Most students were able to conclude that the suspect had the victim's DNA present on his/her clothing. However, many students could not support their answer.

Common Errors

Many students came to the conclusion that the suspect was guilty of a specific crime (ex. murder) and that the DNA was blood.

2% **79(a) A radioactive isotope has a half-life of 5000 years. A recently discovered fossil contains ⅛ of the original isotope. Calculate the age of the fossil.**

Scoring

2%

Both of the following are required:

1. State that there are 3 half-lives.
2. Calculate the age of the fossil to be 15,000 years old.

1.5%

1. Give the three half-lives.
2. Write the correct formula. (Variations of the formula were accepted since some students applied the formula $y = ab^{x/c}$ and others applied $N_f = N_o(1/2)^{t/h}$.)

1%

Stated only that there were three half-lives.

0.5%

Stated the correct half-life formula but gave no calculations.

Commentary on Response

Students tended to attain only half the possible marks for this question because they did not complete the two step process.

Common Errors

Students:

- divided 5000 by 8.
- calculated the incorrect half-life due to misinterpretation of exponents. eg. $(1/2)^4 = 1/8$ and concluding that the number of half-lives was 4.

2% **79(b) State two ways that chance or accidental conditions may have played a role in the development of life on Earth.**

Scoring

2%

Both of the following are required:

1. Chemical Evolution and an explanation showing an understanding of chemical evolution such as mentioning lightning causing the development of organic matter from inorganic matter. Mention of the Oparin-Haldane Hypothesis or Miller-Urey experiment instead of describing the reaction was also acceptable.

2. Panspermia and an explanation of microscopic life forms being present on meteorites or asteroids.

1.5%

A full explanation of one of the above and a partial explanation or vague reference to the other.

1%

Clearly stated an explanation of either Chemical Evolution or Panspermia.

0.5 %

A partial understanding or vague reference to only one of the theories.

Commentary on Response

The use of the words "chance" and "accidental" were often taken as two separate items that needed to be addressed in the answer. Many students did not attempt this question.

Note: Please see page two of this document for an explanation of how this question was used in determining student marks.

Common Errors

Students:

- gave only one theory even though the question asks for two.
- made references to God and Creationism as a chance occurrence.
- referred to other concepts in evolution which were unrelated to the origin of life. (eg. Founder Effect, bottleneck effect, Galapagos finches (adaptive radiation) and natural selection were commonly given.)

BIOLOGY 3201 ITEM ANALYSIS
SELECTED - RESPONSE (PART I)

Item	Answer	Responses			
		A	B	C	D
		%	%	%	%
1	B	18.7	54.9	11.4	15.0
2	A	39.3	2.0	12.2	46.5
3	B	28.1	24.0	25.1	22.6
4	A	39.7	12.7	21.1	26.2
5	A	76.6	7.2	12.3	3.8
6	D	13.3	2.9	12.0	71.6
7	B	1.0	84.2	10.4	4.4
8	C	32.0	14.3	43.4	10.1
9	C	7.8	22.1	67.4	2.6
10	D	1.9	34.7	29.4	33.9
11	B	27.0	59.8	2.5	10.6
12	B	5.3	67.1	8.7	18.9
13	D	3.2	4.8	4.6	87.3
14	A	67.8	20.2	5.8	6.0
15	A	70.1	8.3	15.5	5.9
16	A	44.9	20.1	19.9	15.0
17	B	13.1	79.2	4.2	3.4
18	A	54.9	22.1	7.8	15.2
19	C	14.0	14.4	65.4	6.0
20	B	14.6	68.2	10.2	6.8
21	B	16.0	60.7	8.0	15.2
22	A	60.6	19.4	14.3	5.6
23	A	64.1	20.5	14.1	1.3

24	D	13.7	14.9	24.7	46.7
25	D	9.6	18.5	16.4	55.4
26	C	1.2	1.9	92.9	4.0
27	B	11.3	66.0	6.4	16.2
28	B	20.1	50.9	12.9	16.1
29	C	43.8	22.9	15.7	17.5
30	C	29.8	25.4	39.6	5.2
31	A	72.9	10.4	6.8	9.8
32	D	26.0	1.6	22.8	49.5
33	D	19.5	8.2	10.8	61.4
34	D	1.6	1.0	4.7	92.7
35	D	16.7	25.4	18.3	39.4
36	B	17.9	64.3	13.5	4.2
37	B	6.0	82.7	6.9	4.3
38	C	0.7	13.1	75.3	11.0
39	C	13.7	13.2	72.2	0.9
40	B	3.0	37.2	38.3	21.6
41	D	8.7	9.2	8.1	73.8
42	A	78.7	9.7	8.5	2.8
43	C	13.6	27.5	58.6	1.9
44	C	12.9	17.2	40.9	28.8
45	C	14.1	18.2	46.4	21.0
46	C	18.7	12.6	41.5	26.9
47	D	10.0	12.3	8.7	68.8
48	B	25.5	55.1	5.0	14.2
49	B	40.2	52.8	5.5	1.3
50	D	2.6	2.0	2.5	92.8
51	A	72.7	16.3	7.4	3.4

52	D	8.6	11.3	15.0	64.7
53	B	11.2	74.2	3.5	11.0
54	B	23.0	43.5	22.0	11.2
55	B	22.5	64.9	6.7	5.8
56	D	3.3	7.2	11.3	78.0
57	D	2.7.	1.6	3.0	92.5
58	D	16.4	18.3	20.5	44.5
59	B	18.2	60.2	9.9	11.5
60	C	13.5	9.4	56.3	20.5
61	B	10.0	62.6	10.2	8.0
62	A	54.2	8.8	18.2	18.7
63	B	7.7	58.4	8.2	25.6
64	D	8.7	35.6	7.2	48.2
65	A	86.5	4.9	7.7	0.6
66	B	28.3	57.4	5.0	8.9
67	B	6.2	86.6	5.3	1.7
68	C	9.0	17.2	54.5	19.2
69	C	2.4	3.0	91.6	2.9
70	C	4.7	24.1	51.1	19.4
71	B	40.3	40.4	4.9	14.0
72	A	82.8	9.3	5.6	2.3
73	B	10.9	55.6	20.9	12.4
74	C	6.6	32.7	42.7	16.8
75	B	18.9	58.8	16.4	5.4

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

BIOLOGY 3201 ITEM ANALYSIS
CONSTRUCTED RESPONSE (PART II)

Item	Number of Students Completing Item	Value	Average
76 (a)	3265	3	2.0
76 (b)	3265	2	1.7
77 (a)	3265	2	1.5
77 (b)	3265	2	0.7
77 (c)	3265	3	1.6
78 (a)	3265	3	2.3
78 (b)	3265	3	1.4
78 (c)	3265	3	1.4
79 (a)	3265	2	1.1
79 (b)	3265	2	0.6