

Archived  
Information Bulletin  
Biology 30

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Diploma Examinations Program 2019–2020

This document was written primarily for:

Students	✓	of Biology 30
Teachers	✓	of Biology 30
Administrators	✓	
Parents		
General Audience		
Others		

Alberta Education, Government of Alberta

2019–2020

*Biology 30 Archived Information Bulletin*

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Please note that if you cannot access one of the direct website links referred to in this document, you can find diploma examination-related materials on the [Alberta Education website](#).



# Clarifications

Alberta Education receives questions and feedback from teachers and students by email, by phone, at working-group sessions, and on field tests. In response to the questions and feedback received, the following points were provided for clarification in previous information bulletins.

## Unit Clarifications

### Unit A: Nervous and Endocrine Systems

- Unit A, outcome A1.4k states, in part, that students will describe the structure and function of specified structures of the eye, including the cornea and the choroid. Students and teachers should be aware that the functions of the cornea include both protecting the eye and refracting light into the eye. They should also be aware that the functions of the choroid include both the absorption of light and the supplying of oxygen and nutrients to the retina through blood vessels. Multiple functions for structures may not always be included in all approved resources. The diploma examination is based on the program of studies, not any particular textbook or resource.
- Outcome A1.5k relates to the structure and function of the parts of the human ear, with several structures listed. Although the ossicles are included in the list, students are not required to know the names of individual ossicles. It is more important for students to understand the role of the ossicles and to be able to apply that knowledge in a variety of contexts.
- Students should be aware of the prefixes *hypo* and *hyper* as they relate to elements in the Biology 30 Program of Studies. For example, an endocrine disorder could be described as resulting from the hypersecretion or hyposecretion of a particular hormone.
- Outcomes A2.2k, A2.3k, A2.4k, A2.6k, and A2.3s refer to some hormones directly or indirectly involved in the regulation of water and ions. A discussion of the actions of the hormones and the physiological consequences of their imbalances is likely to include the use of the terms *dilute* and *concentrated*, which could refer to ions (e.g., sodium) or solutes (e.g., glucose) in urine or blood. Students should be familiar with the general meaning of those terms.
- Outcome A2.6k states that students will “describe ... the physiological consequences of hormone imbalances; i.e., diabetes mellitus.” A full description of physiological consequences of diabetes mellitus includes differentiating between type 1 and type 2 diabetes mellitus. Therefore, students should be able to describe how the physiological consequences of type 1 and type 2 diabetes mellitus differ from each other.
- Students should be familiar with the words *administration* and *administer*. Contexts in the *Biology 30 Diploma Examination* are often related to a particular disorder or condition that can be treated by administering a hormone or a drug. Students could see the use of the words *administration* or *administer* in this sense in a context or a question on the diploma examination.
- The concept of negative feedback remains important in Biology 30, particularly in units A and B. On a diploma examination, negative feedback could be depicted in a diagram or incorporated into a context. Students might be asked to label a diagram of a negative-feedback loop; however, they are more likely to be asked to think about hormone interactions and decide how the concept of negative feedback applies or might change in relation to a new context.

## Unit B: Reproduction and Development

- Some teachers have asked for clarification as to the functions of the prostate gland and Cowper's gland. Both glands secrete both mucus and alkaline fluids. Therefore, if students were asked a question about the functions of these two glands, both functions are acceptable answers.
- In outcome B1.1k, the term *Fallopian tube* is used and therefore will be used on the examination rather than alternative terms such as *oviduct* or *uterine tube*.
- Outcome B1.2k specifies the names of structures in the male reproductive system. The term *vas deferens* will be used on diploma examinations. The plural form of the term, *vasa deferentia*, is used when necessary, as is *epididymides*, the plural form of *epididymis*.
- Students in Biology 30 are not required to differentiate between the terms *secondary oocyte* and *ovum*. Therefore, the term *ovum* will be used on diploma examinations to refer to the secondary oocyte. If the term *secondary oocyte* appears on an examination, it will be defined in a context. In certain circumstances, the word *egg* is used as an alternative to *ovum*.
- Diagrams of the ovary sometimes appear on diploma examinations as part of a context. Students should be aware that multiple structures are shown in the ovary at once (e.g., follicle and corpus luteum), even if those structures would not normally be present in an ovary at the same time. The diagrams of ovaries in the two approved textbooks are presented in the same way.
- Outcome B2.1k refers to the role of hormones, including GnRH, in the regulation of primary and secondary sex characteristics. Therefore, students can expect to see questions on the role of GnRH in human reproduction, including its interaction with other hormones and associated feedback mechanisms.
- Outcomes B2.2k and B2.3s relate to the physiology and hormone interactions involved in the menstrual cycle. For simplicity, the vocabulary used to refer to the four phases of the menstrual cycle are flow phase (or flow), follicular phase (or follicular stage), ovulatory phase (or ovulation), and luteal phase (or luteal stage).
- Outcomes B2.2k and B2.3s refer to the interaction of reproductive hormones in the maintenance of the menstrual cycle. Some resources consider that the menstrual cycle includes changes in the ovaries as well as changes in the endometrial lining. Other resources consider that the menstrual cycle refers specifically to changes that occur in the uterus, (i.e., the uterine cycle). In diploma exams, the term *menstrual cycle* typically refers to the events that occur during an ovarian cycle and those that occur during the uterine cycle. Occasionally, the terms *ovarian cycle* or *uterine cycle* are used to refer to specific events that occur only in the ovaries or only in the endometrial lining, respectively. Students should be familiar with those terms.
- In embryonic development, the blastocyst stage is considered to be a continuum. Students are required to have general knowledge about a blastocyst and understand the idea that cells become only slightly more differentiated over time during that stage of development. They should understand that cells of the blastocyst are relatively undifferentiated compared to later developmental stages.

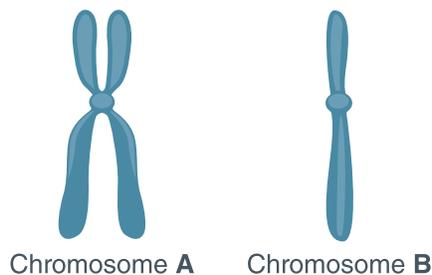
- Outcomes B3.2k and B3.2s indicate that students must describe human development and the effects of environmental factors in general terms. If students were given a context describing the effect of an environmental factor on the development of an organ system, general knowledge of development by trimester would be enough to enable students to address the question.

For example, assume that a context described a teratogen that affects development of an organ system and a question asks the time of development when exposure to the teratogen is most likely to harm the embryo or fetus. Students have the knowledge that most organ development takes place in the first trimester, so they can easily apply that knowledge to the question by ruling out any time intervals later than 12 weeks. If the choices included time intervals that fall within the first trimester, then they would have the knowledge to reason through them as well. Because students have knowledge about fertilization and implantation (also specified in B3.2k), they could also rule out the time intervals earlier than five days, knowing that no organ development would have taken place yet.

Beyond the zygote, the blastocyst, and the process of gastrulation, students are not required to know specific details of human development. Instead, they should focus on the general events that occur in each trimester. They will be well equipped to apply what they know to a new context.

## Unit C: Cell Division, Genetics, and Molecular Biology

- The terms *haploidy*, *diploidy*, and *polyploidy* appear in Unit C, outcome C1.1k; therefore, students should be familiar with these terms as well as the more general term *ploidy*. The terms *triploid* and *tetraploid* will be defined in a context if they are used on an examination.
- Sometimes, the chromosome content of a cell is described as having two copies of each chromosome or as having one copy of each chromosome. The meaning of the word *copy* should not be taken literally; in this sense, the number of copies refers to the number of chromosomes present and the ploidy of the cell. For example, if a cell is described as having two copies of each chromosome, the meaning is that two chromosomes of any specific type are present in the cell and the cell is diploid. If a cell is described as having one copy of each chromosome, the meaning is that there is only one chromosome of each type present and the cell is haploid.
- Outcomes C1.2k, C1.3k, C1.4k, and C1.2s refer to describing, demonstrating, and comparing the processes of mitosis and meiosis. During certain phases of cell division, chromosomes have different appearances:



In words, Chromosome A would be described as *duplicated*, and Chromosome B as *unduplicated*. Chromosome A could also be described as *replicated*, and Chromosome B as *unreplicated*, although the terms *duplicated* and *unduplicated* are preferred.

- Outcomes C1.3k and C1.4k relate to the process of meiosis, including the reduction of chromosome number and the comparison of meiosis with mitosis. Therefore, students should be familiar with the terms *tetrad*, *synapsis*, and *segregation*. (Segregation also appears in C2.1k.) These terms are used in both approved resources.
- Outcomes C1.3k, C1.4k, and C1.5k relate to meiosis, including the idea of crossing over. Students are expected to understand that crossing over generally begins in prophase I once tetrads have been formed.
- The term *segregation* can be used to refer to processes that occur in both meiosis I and meiosis II. Chromosomes segregate in anaphase I, whereas chromatids segregate in anaphase II. It is also appropriate to refer to *separation* of chromatids in anaphase II. Both terms will be used in diploma examinations.
- Outcomes C1.5k and C1.3s relate to nondisjunction and its significance to organism inheritance and development. Students are expected to know the meaning of the terms *monosomy* and *trisomy*, but they are not required to know the names of specific chromosomal disorders, such as Edward syndrome, for example. If such names are used in a context, they will be described or defined.
- When students are solving problems related to Mendelian genetics, they should always express genotypic and phenotypic ratios in lowest terms. For example, if the phenotypic ratio in the offspring of two parent plants is expected to be 6 red flowers to 2 white flowers, the ratio should be expressed as 3 red : 1 white (lowest terms) and not 6 red : 2 white. In certain cases, a solution to a problem might indicate that two parents would produce no offspring of a particular genotype or phenotype. Students would then simply indicate “0” in the ratio, in the blank that relates to that particular genotype or phenotype.
- Some people have asked how allele symbols are chosen for problems in Mendelian genetics. Whenever possible, the allele symbols used on the examination are those used in the scientific literature. If it is not possible to use the actual allele symbols, then simple letters that best reflect the traits in question are chosen. In all cases, the symbols used are then validated by academic experts in the fields of genetics and cell biology.
- Students should be familiar with the word *respectively*. For example, here is a correct statement: The genotype and phenotype of the plant are *Rr* and red, respectively. Here is an incorrect statement: The genotype and phenotype of the plant are red and *Rr*, respectively. The latter statement is incorrect because the use of *respectively* means that, in this example, the genotype is stated first and the phenotype second.
- In general, students should expect to express answers to questions that ask for a calculated probability as a decimal rather than as a percentage. Occasionally, an answer expressed as a percentage will be required, but only if necessary. For example, if the answer to a numerical-response question expressed as a probability were 0.005 23, students would not be able to properly indicate the answer in the four boxes in the numerical-response section of the answer sheet. Instead, students would be asked for the percentage probability, making the answer 0.52%, which easily fits into the four boxes. In such cases, the question will clearly direct students to express their answer as a percentage probability. For all numerical-response questions, students are encouraged to carefully read the instructions for expressing answers that follow each question.

- Outcomes C2.2k, C2.5k, and C2.3s refer to inheritance patterns, genotypes, and phenotypes. Students are expected to understand the difference between a genotype and a phenotype. For example, if asked to predict a genotypic ratio, students should be looking for an alternative that includes genotypes (e.g.,  $I^A I^B$ ) rather than phenotypes (type AB blood). It is possible that both responses are present in the alternatives. Students need to choose the genotype or phenotype, as appropriate, to show that they understand the difference between the two concepts.
- In the Biology 30 Program of Studies, in the approved textbooks, and on *Biology 30 Diploma Examinations*, the terms *sex-linked* and *X-linked* have been used interchangeably to describe a pattern of inheritance. Although sex-linked inheritance most often refers to genes inherited on the X chromosome, the term can also refer to genes inherited on the Y chromosome. Therefore, to improve clarity, the terms *X-linked* and *Y-linked* will be used to describe patterns of inheritance on diploma examinations instead of the term *sex-linked*.
- Students should expect to see questions on diploma exams relating to the historical events leading to the discovery of DNA, given that these aspects are present in the program of studies (C3.1k).
- Students should assume that when a sequence of DNA is provided, the sequence given is always the coding strand. Students should transcribe mRNA directly from the strand that is given.
- The terms *purine* and *pyrimidine* are considered to be part of outcomes C3.2k and C3.2s, which are related to the structure of DNA. The presence of these terms on a diploma examination should not be unexpected. These terms are also defined in the data pages at the end of each exam booklet.
- The concept of cancer occasionally arises on a diploma examination. The area of the program of studies in which cancer appears is outcome C3.3s and specifically how “changes in genetic information ... lead to heritable mutations and cancer.” The implication is that students should broadly understand that changes in DNA can lead to uncontrolled mitosis, and cancer could be the result.

## Unit D: Population and Community Dynamics

- The first bulleted point under outcome D2.1k of the Biology 30 Program of Studies refers to producer–consumer relationships; therefore, its appearance on a diploma examination should not be unexpected.
- Students are expected to be able to differentiate between density-dependent and density-independent factors and evaluate how each type of factor affects the growth of a particular population. Density-dependent and density-independent growth factors are considered an interpretation of outcomes D3.1k, D3.2k, and D3.2s.
- In the Biology 30 Program of Studies, the concept of open and closed populations appears in outcome D3.3k. However, this portion of the D3.3k outcome is not present in the McGraw–Hill Ryerson textbook, *Inquiry into Biology*. Teachers should be aware that open and closed populations constitute part of the required program of studies; therefore, teachers should take steps to ensure they include these concepts in their teaching of the course.

- Outcomes D3.4k and D3.3s relate to characteristics and reproductive strategies of *K*-selected and *r*-selected organisms. Some organisms can be clearly classified as either *r*-selected or *K*-selected because they display multiple traits that clearly exemplify one strategy or the other. However, many organisms exhibit characteristics of both strategies.

Contexts in the diploma examination will provide students with the information they need in order to classify an organism as *r*-selected or *K*-selected. Alternatively, students could be given information about several traits within the same organism, some of which they would classify as *r*-selected and some of which they would classify as *K*-selected. In the past, students have consistently shown that they do not have difficulty with this concept, but they should be aware that both types of traits can exist in a single organism.

- Outcomes D3.3k and D3.4k are related to growth patterns and reproductive strategies. Students should not assume that a particular reproductive strategy is always associated with a particular growth pattern. For example, *K*-selected organisms most often have a logistic growth pattern, and *r*-selected organisms most often have an exponential growth pattern. There are some instances when this is not the case, depending on environmental conditions. It is important that students read and evaluate the context in order to determine the growth pattern of organisms living in specific conditions.
- Growth rate (*gr*) is the change in number of individuals in a population over time; therefore, time is included in the calculation of *gr*. However, per capita growth rate (*cgr*) is the change in number of individuals in a population relative to the original number of individuals. It is not necessary to include time in the calculation for *cgr*. Although one of the approved resources shows an example of per capita growth rate being calculated over time, students are not expected to include time in their calculations of *cgr* on a diploma examination questions.

## General Clarifications

- The first two skills outcomes in each general outcome in the Biology 30 Program of Studies (e.g., A1.1s, A1.2s, B1.1s, B1.2s) are the same in every unit, and both relate to scientific inquiry:
  - “Students will formulate questions about observed relationships and plan investigations of questions, ideas, problems and issues.”
  - “Students will conduct investigations into relationships between and among observable variables and use a broad range of tools and techniques to gather and record data and information.”

Therefore, questions related to experimental variables in the context of any unit of study in Biology 30 should not be unexpected

- The Biology 30 Program of Studies requires students to analyze and interpret data, including graphical data (e.g., A2.3s, B2.2s, B2.3s, B3.3s). As much as possible, graphical data is sourced from scientific research and presented authentically. Students will see new scenarios on diploma examinations to which they are expected to apply their acquired knowledge and skills, but they should be assured their course work has prepared them to be able to interpret these new contexts, graphical or otherwise.
- Students should be familiar with the word *analogous*, which is often used as a means of comparing two structures that are similar in form or in function. The vast majority of students will have had experience with this word while studying evolutionary biology in Biology 20 (Unit B: Ecosystems and Population Change, General Outcome 2).
- Some of the contexts used in diploma examinations refer to humans, and some refer to other species. In cases where the context does not specify an organism, students should assume that the context refers to humans. For example, a question could provide a list of events in cell division and require the student to select the events that apply to meiosis. In the absence of any information about a different species, students should assume that the question is about meiosis in human cells. Therefore, the students would select a statement such as “Haploid cells are produced.”
- Sometimes, words on diploma examinations appear in italics. Italicized text simply indicates that a word is not an English word, and it is not used to provide any particular emphasis. Italicized words are typically Latin or Greek, and examples include genus and species names of organisms.
- Outcomes B1.1sts, B2.2sts, B3.2sts, and C2.1sts require students to be able to identify, explain, evaluate, and apply a number of different perspectives, including social, cultural, environmental, ethical, and economic perspectives.
  - A social (or societal) perspective relates to society as a whole and a large group of people rather than one person or a small group of people such as a family.
  - A cultural perspective relates to behaviours, beliefs, and other aspects characteristic of a particular group of people defined by the context.
  - An environmental perspective relates to aspects of ecology, including ecological management and human effects on the environment.

- An ethical perspective relates to moral principles and a sense of right and wrong.
- An economic perspective relates to the costs, benefits, and associated effects of the application of a particular technology.

Sometimes, perspectives can overlap with one another, and in such cases, students will have to use their judgment to choose the perspective that is most strongly exemplified. In other situations where perspectives overlap, and depending on the question, more than one answer may be acceptable.

- Some people have asked if multiple correct answers are accepted for numerical-response items. Multiple correct answers are accepted when appropriate. In such cases, a statement will be added to the end of the question indicating to students that there is more than one correct answer to the question.
- Sometimes, a number given in a diagram or with a description can be used more than once in the answer. In some of these cases, a statement will be added to the end of the question indicating to students that a number can be used more than once. Other times, the question is designed so that the student must decide if using a number more than once most appropriately answers the question. In these cases, the instructions will not indicate whether or not a number can be used more than once.
- Note that the answer for any one numerical-response question will not necessarily require the use of all four columns in the grid provided on the answer sheet. Some answers could require three columns, and some answers could require two columns.

# Written-response Question for Classroom Assessment

Teachers are encouraged to use a variety of methods to assess the learning of their students. Outcomes prescribed in the Biology 30 Program of Studies include knowledge, skills, and attitudes. Some of these outcomes can be more effectively assessed through the use of classroom and laboratory activities, observations, assignments, experiments, and written work than by machine-scored tests.

A sample written-response question illustrating one method of assessment that teachers could use with their students is included on the following pages. This question appeared on a field test. After marking and data analysis, this written-response item was deemed to be more difficult than desired. Teachers are welcome to make whatever modifications to the question they deem appropriate before using it with their students.

# Biology 30 Field Test Open-response Question, Sample Responses, and Scoring Guide

Use the following information to answer the first question.

Complete androgen insensitivity syndrome (CAIS) is a rare, sex-linked recessive disorder in which babies born with male sex chromosomes develop a female phenotype.

Although people with CAIS have an unmutated Y chromosome, a mutation on their X chromosome results in the production of a defective testosterone receptor, making cells insensitive to testosterone. As a result, people with CAIS develop breasts and a vagina, but they develop testes in their abdomens rather than ovaries. Although people with CAIS are infertile, the disorder has remained in the population.

For many years, female athletes who compete in the Olympics have been tested to verify their sex. A male sprinter competed as a female in a women's event in the 1932 Olympics; it was not discovered until many years later that the athlete was genotypically male. Some people think that testing for sex is unfair and that these tests should be discontinued, whereas others think that this testing is necessary to ensure fair competition. The issue of female sex verification continues to challenge the International Olympic Committee.

—based on based on Ferguson-Smith, M.A., and Elizabeth A. Ferris. 1991. Gender verification in sport: The need for change? *British Journal of Sports* 25 (1): 17–20.

## Written Response—15 marks

1. Write a unified response addressing the points identified below.

- **Describe** two reasons why a person with CAIS is infertile.

## Sample Answers

### Female:

A person with CAIS does not have ovaries and therefore cannot produce ova.

A person with CAIS does not have Fallopian tubes to allow the transport of ova to the uterus or to allow sperm to fertilize an ovum.

A person with CAIS does not have a uterus to allow for the nourishment of the embryo.

or

Any other reasonable answer

### Male:

A person with CAIS does not have functioning testes because they are located in the abdomen, which has a higher temperature than that required for spermatogenesis.

A person with CAIS does not have vasa deferentia, which prevents sperm from travelling from the testes to the exterior of the body.

or

Any other reasonable answer

- **Explain** how the administration of FSH could increase fertility in a person without CAIS but will not increase fertility in a person with CAIS.

In a person without CAIS, FSH will increase spermatogenesis. FSH will not increase fertility in a person with CAIS because the temperature in the abdomen is too high for effective spermatogenesis.

In a person without CAIS, FSH will increase spermatogenesis. FSH will not increase fertility in a person with CAIS because there is no pathway for the sperm to be released from the body.

In a person without CAIS, FSH will stimulate the development of a follicle in an ovary. FSH will not increase the fertility of a person with CAIS because that person does not have ovaries.

or

Any other reasonable answer

- **Explain** how CAIS can be inherited from two unaffected parents.

The parents are unaffected because the father carries a normal X chromosome and a normal Y chromosome, whereas the mother carries one normal X chromosome and one X chromosome with the CAIS mutation, which is recessive. If a sperm carrying a Y chromosome fertilizes an ovum carrying an X chromosome that carries the mutation associated with CAIS, then a person will inherit CAIS.

- **Explain** two ways in which the inheritance of CAIS differs from the inheritance of an autosomal genetic disorder.
- Only people who are genetically male will have CAIS, whereas an equal number of males and females will be affected by an autosomal disorder.
- A person can inherit the X-linked recessive mutation that causes CAIS only from his mother, whereas a person can inherit an autosomal recessive mutation from either parent.
- A person who is genetically male will have CAIS if he inherits one copy of the recessive mutation that causes the disorder, whereas a person will have an autosomal recessive disorder only if he or she inherits two copies of a recessive mutation.
- A person who has CAIS can never have two X chromosomes, whereas a person who has an autosomal recessive disorder could have either two X chromosomes or X and Y chromosomes.

- A person can never inherit the recessive mutation that causes CAIS from his or her father, whereas a person can inherit an autosomal recessive mutation from his or her father.
- **Explain** how CAIS can remain in the population when people who have the disorder are infertile. **Hypothesize** how the frequency of CAIS in the population could change in the future.

Although people who have CAIS cannot pass the disorder on to their offspring, carriers of the disorder pass the recessive mutation on to their offspring. Therefore, the recessive allele associated with CAIS remains in the population.

The frequency of CAIS will decrease in the future because individuals with the disorder cannot reproduce, and therefore the mutated gene is not passed on as frequently as other mutations.

or

The frequency of CAIS will remain the same because the individuals who are carriers can pass on the mutated gene to their offspring.

or

Any other reasonable hypothesis

- **Explain** two technologies that could be used to diagnose CAIS. **Describe** how each technology would provide evidence of the disorder.

A karyotype of a phenotypically female person with CAIS would show both X and Y sex chromosomes.

A pelvic examination of a phenotypically female person with CAIS would indicate that no uterus is present.

An ultrasound image of a phenotypically female person with CAIS would indicate that no uterus is present.

An ultrasound image of a phenotypically female person with CAIS would indicate the presence of testes in the abdomen.

An MRI of the abdomen and pelvis could be taken to indicate whether testes or ovaries are present.

Exploratory surgery of the abdomen and pelvis could be performed to determine whether ovaries or testes are present.

Mapping the X chromosome could be used to check for the presence of the mutated gene causing CAIS.

or

Any other reasonable answer

- **Describe** one individual issue that could arise when an athlete with CAIS competes in sporting events. **Describe** two reasons why the process of female sex verification challenges a governing body of sport such as the IOC.

**Individual issues:**

- People with CAIS who compete as females might have a competitive advantage over others in women's sporting events.
- People with CAIS who compete as males might not be able to match the strength and physical fitness of other male athletes even though they are genetically male.
- A person with CAIS who competes in sporting events could experience a violation of personal privacy as a result of blood/urine tests taken after the competition.
- If the person with CAIS is disqualified from competing in a team sport, other members of the team could be disqualified or could experience undue stress.
- Athletes with CAIS might feel discriminated against if they are not allowed to compete simply because of their anatomy and/or genetics.
- It is unfair and/or unethical to ask athletes to submit to sex verification tests for the purposes of identifying a genetic condition.
- Testing athletes could put undue stress on them before or during competition and thus impair their athletic performance.

or

- Any other reasonable issue

**Governing bodies of sport are challenged for the following reasons:**

- The reliability of the method of sex verification could be challenged.
- The method of sex verification used might not be sufficient to make a final ruling in all cases.
- Female sex verification could be considered to be sexist and unfair to women.
- People might think that resources and money used to develop sex-verification tools could be better spent monitoring athletes' use of performance-enhancing drugs.
- Female sex verification could be considered to be irrelevant if a large number of female athletes are using male hormones and other drugs to enhance their athletic performance.
- It is very expensive to carry out sex-verification tests on a large number of female athletes when CAIS is so rare.

or

- Any other reasonable answer

Science

Score	Scoring Criteria
<p><b>Excellent</b> <b>5</b></p>	<p>The student ...</p> <ul style="list-style-type: none"> <li>describes two reasons for infertility and completely explains how FSH could increase fertility in a person without CAIS but not in a person with CAIS</li> <li>explains how CAIS can be inherited from unaffected parents and explains two ways in which the inheritance of CAIS differs from that of an autosomal disorder</li> <li>explains how CAIS can remain in the population and writes a complete hypothesis</li> </ul>
<p><b>Proficient</b> <b>4</b></p>	<ul style="list-style-type: none"> <li>describes one reason for infertility and writes a complete explanation or describes two reasons for infertility and writes a partial explanation</li> <li>explains how CAIS can be inherited from unaffected parents and explains one way in which the inheritance of CAIS differs from that of an autosomal disorder or explains two ways in which the inheritance of CAIS differs from that of an autosomal disorder</li> <li>partially explains how CAIS can remain in the population and writes a complete hypothesis or explains how CAIS can remain in the population and writes a partial hypothesis</li> </ul>
<p><b>Satisfactory</b> <b>3</b></p>	<ul style="list-style-type: none"> <li>describes two reasons for infertility or writes a complete explanation or describes one reason for infertility and writes a partial explanation</li> <li>explains how CAIS can be inherited from unaffected parents or explains one way in which the inheritance of CAIS differs from that of an autosomal disorder</li> <li>explains how CAIS can remain in the population or writes a complete hypothesis or partially explains how CAIS can remain in the population and writes a partial hypothesis</li> </ul>
<p><b>Limited</b> <b>2</b></p>	<ul style="list-style-type: none"> <li>describes one reason for infertility or describes the role of FSH in fertility</li> <li>attempts to explain how CAIS can be inherited from unaffected parents or describes one aspect of autosomal or sex-linked inheritance</li> <li>partially explains how CAIS can remain in the population or writes a partial hypothesis</li> </ul>
<p><b>Poor</b> <b>1</b></p>	<ul style="list-style-type: none"> <li>addresses only one of the three bullets at a 2 or a 3 level</li> </ul>
<p><b>Insufficient</b> <b>0</b></p>	<ul style="list-style-type: none"> <li>does not address the question presented or provides an answer that is too brief to assess</li> </ul>
<p><b>NR</b></p>	<ul style="list-style-type: none"> <li>does not provide a response</li> </ul>

## Technology and Society

Score	Scoring Criteria
<b>Excellent</b> <b>5</b>	<p>The student ...</p> <ul style="list-style-type: none"> <li>identifies two technologies that could be used to diagnose CAIS and describes how the two technologies would provide evidence of CAIS</li> <li>describes one individual issue and describes two reasons why a governing body of sport is challenged</li> </ul>
<b>Proficient</b> <b>4</b>	<ul style="list-style-type: none"> <li>identifies two technologies and describes how one technology would provide evidence of CAIS or identifies one technology and describes how two technologies would provide evidence of CAIS</li> <li>describes one individual issue and describes one reason or describes two reasons</li> </ul>
<b>Satisfactory</b> <b>3</b>	<ul style="list-style-type: none"> <li>identifies one technology and describes how the technology would provide evidence of CAIS or identifies two technologies or describes how two technologies would provide evidence of CAIS</li> <li>describes one issue or describes one reason</li> </ul>
<b>Limited</b> <b>2</b>	<ul style="list-style-type: none"> <li>identifies one technology or describes how a technology would provide evidence of CAIS</li> <li>attempts to describe one issue or one reason</li> </ul>
<b>Poor</b> <b>1</b>	<ul style="list-style-type: none"> <li>addresses only one of the two bullets at a 2 level</li> </ul>
<b>Insufficient</b> <b>0</b>	<ul style="list-style-type: none"> <li>does not address the question presented or provides an answer that is too brief to assess</li> </ul>
<b>NR</b>	<ul style="list-style-type: none"> <li>does not provide a response</li> </ul>