

SBI3U Exam Review 2011**True/False**

Indicate whether the statement is true or false.

- ___ 1. Cells divide rather than continue to increase in size to facilitate the exchange of materials through the cell membrane.
- ___ 2. The stage between nuclear divisions in mitosis is called cytokinesis.
- ___ 3. A cell without a nucleus is referred to as totipotent.
- ___ 4. Cancer cells lack the ability to differentiate.
- ___ 5. Meiosis is a process by which gametes are formed.
- ___ 6. In humans, the haploid number of chromosomes is 46 and the diploid chromosome number is 23.
- ___ 7. All daughter cells produced by meiosis are genetically identical to each other and to the parent.
- ___ 8. Down syndrome is an example of a nondisjunction disorder.
- ___ 9. The phenotype is the "appearance" of the organism.
- ___ 10. In *Drosophila melanogaster*, eye colour is an example of multiple alleles.
- ___ 11. Genetic screening can be useful in identifying potentially harmful genetic conditions.
- ___ 12. The probability of two independent events occurring together is the product of the probability of each occurring alone.
- ___ 13. Organisms with longer digestive tracts usually eat plant materials while those with shorter digestive tracts usually eat plants.
- ___ 14. The hardest substance in the body is dentin.
- ___ 15. An animal that eats mainly plant materials has well developed canines.
- ___ 16. The breakdown or emulsification of fats by bile salts is an example of physical digestion.
- ___ 17. Even a person who sleeps all day consumes energy.
- ___ 18. Typical teenage girls and boys both require the same amount of energy in the form of food each day.
- ___ 19. Most Canadians have the antigen that makes them Rh-positive.
- ___ 20. The semilunar valves are located between the atria and the ventricles.
- ___ 21. Heart rate increases as a result of the stimulation of the sympathetic nervous system.
- ___ 22. Damage to capillary beds is more likely to occur from high diastolic pressure than from high systolic pressure.
- ___ 23. Heart rate remains constant whether an individual is standing, sitting, or lying down.
- ___ 24. Severe allergies in hypersensitive people lead to anaphylactic reactions.

Name: _____

ID: A

- ___ 25. The spleen is an important reservoir of red blood cells.
- ___ 26. Only the respiratory system of males has the structure known as "Adam's apple."
- ___ 27. Air moves into the lungs from outside the body when air pressure within the lungs is less than the atmospheric pressure.
- ___ 28. A system of "turning on" and "turning off" mechanisms is used to help maintain homeostasis.
- ___ 29. When a person has her vital capacity measured, there is no air remaining in her lungs.
- ___ 30. Caffeine is classified as a stimulant.
- ___ 31. Eubacteria and Archaeobacteria are the most primitive organisms in the six-kingdom system.
- ___ 32. Members of the kingdom protista first appeared in the fossil record 1.5 billion years ago, just before bacteria.
- ___ 33. Members of the phylum echinodermata are bilaterally symmetrical.
- ___ 34. One of the key features separating the arthropods from all other animals is the strong external skeleton, called the endoskeleton.
- ___ 35. By species, chordates make up the majority of known animal species.
- ___ 36. Lobe-finned fishes with specialized characteristics for aquatic living were the predecessors of the amphibians.
- ___ 37. Reptiles are the first fully terrestrial vertebrates.
- ___ 38. The most significant advance of reptiles over amphibians was the development of the ability to give birth to live young.
- ___ 39. Leaves are usually flat and thin so they can collect a lot of water.
- ___ 40. The stem of desert plants contain large amounts of parenchyma tissue to store carbon dioxide.
- ___ 41. When ethylene is applied to fruits, it speeds up their ripening.
- ___ 42. Vascular bundles, surrounded by pith cells, make up the stem of nonwoody plants.
- ___ 43. Lichens are part of the climax community after succession.
- ___ 44. Purchasing a fertilizer 21-7-7 should be applied to a lawn in the late summer.
- ___ 45. The two most important food crops for humans are wheat and rice.
- ___ 46. Plant-breeding technology ensures that the seeds of the best plants are planted, and these will provide high-quality food during the winter months.
- ___ 47. Forest regeneration efforts have been successful for a variety of reasons, including fertile soil and good planting techniques.
- ___ 48. Aspirin and rubber come from plants grown in the tropical rain forest.
- ___ 49. Scientists are continually testing plants in the tropical rain forests to discover new medicines and other products.
- ___ 50. Top carnivores in a food chain are the least affected by pesticides.

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 51. What is the correct sequence of the following events that occur in mitosis?
 1. The cytoplasm and organelles are divided between the daughter cells.
 2. The nucleolus and nuclear envelope reappear.
 3. The centromere splits.
 4. The chromosomes condense and the nucleolus disappears.
 5. The chromosomes are pulled to the poles of the cell.
 6. The chromosomes line up on the equatorial plane.
 a. 2, 1, 3, 6, 5, 4 b. 1, 4, 3, 5, 6, 2 c. 4, 3, 6, 5, 1, 2 d. 4, 6, 3, 5, 2, 1 e. 4, 6, 3, 2, 5, 1
- _____ 52. During anaphase of mitosis
 a. centrioles divide. b. chromosomes migrate toward poles. c. asters and spindle form. d. nuclear membranes reform. e. chromosomes attach to spindle fibres
- _____ 53. If the centromere in one of your 46 chromosomes does not split until telophase, it would result in
 a. two cells, each with 46 chromosomes. b. two cells, each with 23 chromosomes. c. two cells, one with 45 chromosomes and one with 47 chromosomes. d. two cells, one with 23 chromosomes and one with 46 chromosomes. e. two cells, one with 40 chromosomes and one with 52 chromosomes.
- _____ 54. Classify the following statement: The chromosomes are replicated in interphase.
 a. mitosis b. meiosis c. fertilization d. neither mitosis nor meiosis e. both mitosis and meiosis
- _____ 55. During which stage would it be most easy to distinguish a cell undergoing mitosis from a similar cell undergoing the first meiotic division?
 a. telophase b. prophase c. anaphase d. metaphase e. interphase
- _____ 56. Mendel's First Law (the Law of Segregation) states that
 a. the dominant form of a trait will appear in every generation. b. members of different pairs of genes behave independently during meiosis. c. genes are carried in pairs and separate during meiosis to be distributed into different sex cells. d. the probability of two or more independent events occurring together is the product of the individual probabilities. e. if genes are located on separate chromosomes, they are inherited independently of each other.
- _____ 57. The gene makeup of an organism for a particular trait is its
 a. genotype. b. pedigree. c. phenotype. d. recessiveness. e. dominance.
- _____ 58. The physical appearance of an organism for a particular trait is its
 a. genotype. b. pedigree. c. phenotype. d. recessiveness. e. dominance.
- _____ 59. The alleles for blood types A and B are codominant but are dominant over the allele for blood type O. Answer the following question. A female with AB blood type and a male with O blood type have several children. The phenotypic ratio for these children would be
 a. 1/2 type A and 1/2 type B. b. 1/4 type O and 3/4 type A. c. 1/2 type AB and 1/2 type O. d. 1/4 type O, 1/2 type AB and 1/4 type A. e. 1/2 type O, 1/4 type AB and 1/4 type A.
- _____ 60. Which parent genotypes could possibly have all four blood groups expressed in the offspring?
 a. $I^B I^O$ and $I^O I^O$ b. $I^A I^O$ and $I^B I^O$ c. $I^A I^O$ and $I^B I^B$ d. $I^A I^A$ and $I^A I^O$ e. $I^A I^O$ and $I^A I^O$
- _____ 61. A woman with blood type A has a child with blood type O. What is the woman's genotype?
 a. $I^A I^A$ b. $I^O I^O$ c. $I^A I^O$ d. $I^A I^O$ e. $I^A I^B$

- _____ 62. In Tibetan yaks, the heterozygous condition of the alleles for brown hair (b) and white hair (w) is expressed as a bluish coat. The phenotype percentage that will be expressed by the F_1 generation of a brown-haired yak crossed with a white-haired yak is
a. 100% blue. b. 75% brown and 25% white. c. 50% brown and 50% white. d. 25% brown, 50% blue, and 25% white. e. 75% blue, and 25% white.
- _____ 63. The allele R is essential for production of skin pigment, and s, when homozygous, prevents pigmentation. Which of the following individuals would be an albino?
a. RrSs b. RrSS c. RRss d. RRSs e. RRSS
- _____ 64. If K and R both produce purple colour, how many chances in 16 will there be for purple offspring to occur in the cross $KkRr \times KkRr$?
a. 3 b. 9 c. 12 d. 15 e. 16
- _____ 65. If a human zygote has an X and a Y chromosome, it will normally produce a
a. male. b. female. c. sterile male. d. lethal characteristic. e. sterile female.
- _____ 66. The chromosomal theory of inheritance is supported by all of the following statements except:
a. chromosomes segregate during meiosis b. chromosomes assort independently during meiosis
c. chromosomes determine the genotypic and phenotypic ratios d. genes are the hereditary units and are located on chromosomes e. each cell or gamete has half the number of chromosomes found in somatic cells
- _____ 67. The following question refers to Morgan's discovery of a male *Drosophila* (fruit fly) with white eyes instead of the usual red eyes. This white-eyed male was mated to a normal red-eyed female. If two of the F_1 were crossed, and if the gene were sex-linked, the expected results for the F_2 generation would be
a. males all white-eyed, females all red-eyed. b. males 1/2 red-eyed and 1/2 white-eyed, females all red-eyed. c. males 3/4 red-eyed and 1/4 white-eyed, females 3/4 red-eyed and 1/4 white-eyed. d. males 1/2 red-eyed and 1/2 white-eyed, females 1/2 red-eyed and 1/2 white-eyed. e. males all red-eyed, females all white-eyed.
- _____ 68. The following question refers to Morgan's discovery of a male *Drosophila* (fruit fly) with white eyes instead of the usual red eyes. This white-eyed male was mated to a normal red-eyed female. When Morgan discovered the results of the F_2 generation, he concluded that
a. the genes that influence eye colour occur in pairs. b. fruit flies have four pairs of homologous chromosomes. c. the gametes have half the number of chromosomes of a somatic (body) cell. d. no differences existed in the inheritance of eye colour in males and females. e. there is a difference in the chromosomes of male and female fruit flies.
- _____ 69. A man is a hemophiliac. This indicates that he
a. is afraid of the sight of blood. b. inherited the condition from his father. c. inherited the condition from his mother. d. is carrying a parasitic organism in his blood. e. has an allergic reaction to blood.
- _____ 70. The DNA double helix structure was first described by
a. Boyer and Cohen. b. Watson and Crick. c. Franklin and Wilkins. d. Avery, MacLeod, and McCarty. e. McClintock and Bear.
- _____ 71. Complementary base pairing would involve
a. adenine bonded to cytosine. b. thymine bonded to guanine. c. adenine bonded to guanine. d. guanine bonded to cytosine. e. thymine bonded to cytosine.

- ___ 72. Which does not describe the DNA molecule?
a. It is a double helix. b. Guanine pairs with cytosine. c. The sugar in each nucleotide is deoxyribose.
d. Nitrogenous bases are held together by hydrogen bonds. e. Phosphate molecules are located between the nitrogenous molecules.
- ___ 73. Which of the following best describes mutations?
a. They are changes in DNA. b. They are variations caused by the environment. c. Most of them are harmless. d. They unusually involve drastic reorganization of the organism. e. They are restricted to gametes.
- ___ 74. The following DNA bases are the purines
a. cytosine and thymine. b. cytosine and guanine. c. thymine and adenine. d. guanine and thymine.
e. adenine and guanine.
- ___ 75. In which of the following lists are the structures listed in order from the simplest to the most complex?
a. organ system, organ, tissue, cell b. tissue, organ, organ system, cell c. cell, organ system, system, tissue
d. cell, tissue, organ, organ system e. cell, organ, tissue, organ system
- ___ 76. Which of the following statements is true?
a. Canines are used mainly for tearing. b. Canines are used mainly for grinding. c. Molars are used mainly for tearing.
d. Molars are used mainly for grinding. e. Incisors are used mainly for grinding.
- ___ 77. Which of the following is not found in digestive fluids in the stomach?
a. hydrochloric acid b. pepsinogen c. pepsin d. amylase e. mucus
- ___ 78. Which of the following factors probably does not contribute to the formation of peptic ulcers?
a. stress b. diet c. a bacterium known as *Helicobacter pylori* d. drinking large amounts of milk
e. drinking large amounts of orange juice
- ___ 79. Which of the following colour changes would indicate the presence of the sugar maltose?
a. blue to purple to red b. blue to yellow to red c. blue to yellow to orange d. orange to yellow to blue
e. red to yellow to blue
- ___ 80. Canadians Banting and Best discovered that patients with diabetes could have their blood-sugar level lowered with
a. gastrin. b. bicarbonates. c. glucagon. d. insulin. e. pepsinogen.
- ___ 81. The American doctor Henry Beaumont treated Canadian trapper Alexis St. Martin for a gunshot wound that left an opening into his stomach. Beaumont discovered that pieces of meat lowered into the stomach were digested by what we now know as
a. cholecystokinin. b. gastrin. c. hydrochloric acid. d. bicarbonate ions. e. glucagon.
- ___ 82. Chewing gum for a period of time will
a. satisfy your hunger. b. provide you with needed proteins. c. stimulate the release of bile from the gall bladder.
d. stimulate the release of gastric juices. e. provide you with needed vitamins.
- ___ 83. What is the role of the bicarbonate ion in the digestive process?
a. to initiate the digestion of starches b. to emulsify fats c. to lower the pH of material entering the small intestine from the stomach
d. to raise the pH of material entering the small intestine from the stomach
e. to stimulate the release of gastric juices

- ___ 84. Society's image of the ideal human body type
a. has always remained the same. b. is based on scientific studies. c. is the same for all cultural groups.
d. is determined by the government. e. varies according to whatever is "in fashion."
- ___ 85. When oxygen is lost from oxyhemoglobin, the colour of the blood without the oxygen changes
a. from pink to red b. from red to pink c. from pink to blue d. from red to blue e. from blue to red
- ___ 86. An individual who has no special markers (antigens) attached to the membrane of their red blood cells has which of the following blood types?
a. A, Rh positive b. A, Rh negative c. B, Rh positive d. O, Rh positive e. O, Rh negative
- ___ 87. The septum completely separates the two halves of the mammalian heart. Because of this
a. the heart is able to hold a larger volume of blood. b. the blood flows faster. c. the blood flows more slowly. d. oxygenated blood and deoxygenated blood are kept separate. e. oxygenated blood and deoxygenated blood are allowed to mix freely.
- ___ 88. Which of the following statements is true with respect to the mammalian heart?
a. All the blood leaving the heart via the arteries is oxygenated. b. All the blood leaving the heart via the veins is deoxygenated. c. The blood leaving the heart via the coronary arteries is deoxygenated. d. The blood leaving the heart via the pulmonary veins is deoxygenated. e. The blood leaving the heart via the systemic arteries is deoxygenated.
- ___ 89. The largest artery in the human body is the
a. coronary artery. b. pulmonary artery. c. carotid artery. d. aorta. e. brachial artery.
- ___ 90. Which one of the following statements is not true concerning the exchange of materials between blood in the capillaries and the extra cellular fluid surrounding them?
a. Most fluids simply diffuse through the capillary cell membranes. b. Tiny muscle fibres actively force selected molecules through the membrane. c. A few protein molecules are exchanged by endocytosis or exocytosis. d. There are spaces between the cells of the capillaries that allow water and some ions to pass. e. Capillary cell membranes are permeable to oxygen and carbon dioxide.
- ___ 91. The balance between osmotic pressure and fluid pressure in capillary beds is upset by all but which one of the following situations?
a. hunger b. hemorrhage c. starvation d. extreme thirst e. inflammation
- ___ 92. Which of the following is not true concerning an anaphylactic reaction?
a. It usually occurs about 24 h after exposure to the trigger. b. It is a response to bees stings or certain foods. c. It produces weakness and sweating. d. It produces breathing difficulties. e. It is relieved by an injection of epinephrine.
- ___ 93. Which of the following reactions correctly describes cellular respiration?
a. oxygen + carbon dioxide → sugar + water + energy b. oxygen + sugar → carbon dioxide + water + energy c. oxygen + water → sugar + carbon dioxide + energy d. carbon dioxide + water + energy → sugar + oxygen e. carbon dioxide + oxygen + energy → sugar + water
- ___ 94. Which of the following is not involved in the homeostatic regulation of appropriate levels of oxygen and carbon dioxide?
a. A chemical receptor ensures that carbon dioxide does not accumulate. b. The brain stem receives impulses to help it coordinate breathing rates. c. Impulses are sent to the muscles to increase breathing rates. d. Oxygen concentration has more effect on the rate of breathing than carbon dioxide concentration. e. Chemical receptors in the walls of the corotid artery detects low oxygen levels.

- ___ 95. Which of the following is not an environment in which you would find Archaeobacteria?
a. salt marshes b. hot springs c. active volcanoes d. ocean vents e. swamps
- ___ 96. Which of the following is not a characteristic of bacterial cells?
a. they are prokaryotic and single celled b. contain no membrane-bound organelles c. have a single chromosome d. majority are pathogens e. reproduce asexually
- ___ 97. In an experiment similar to Investigation 9.3.1, "Effects of Antiseptics," the following observations were made.

Zones of Inhibition (mm) for Various Antiseptics

	Antiseptic 'A'	Antiseptic 'B'	Antiseptic 'C'	Antiseptic 'D'
<i>Pseudomonas</i>	5	2	14	4
<i>Staphylococcus</i>	7	6	14	12
<i>Streptococcus</i>	3	10	8	12
<i>Clostridium</i>	5	6	12	12

- On the basis of this data, which antiseptic appears to be the best overall at controlling bacterial growth?
a. A b. B c. C d. D e. cannot tell from this data
- ___ 98. In Investigation 9.3.1, "Effects of Antiseptics," the use of a sterile disc with no antiseptic is referred to as a(n)
a. control. b. independent variable. c. dependent variable. d. cohort. e. source of error.
- ___ 99. Under adverse conditions, members of the protozoans may form resting cells called
a. spores. b. endodents. c. encrustacenas. d. ectoplasms. e. cysts.
- ___ 100. Which of the following is not a characteristic of the fungilike protists?
a. always unicellular b. members of the Gymnomycota c. prefer cool, shady, moist environments
d. also called slime moulds e. resemble protozoans during part of life cycle
- ___ 101. Which of the following is one of the germ layers in an animal?
a. epiderm b. meriderm c. entoderm d. ectoderm e. none of the above
- ___ 102. Which of the following is not an ecological role of sponges?
a. food source for many other animals b. shelter for many smaller invertebrates c. help regulate global carbon dioxide levels d. some help recycle calcium in the ocean e. involved in symbiotic relationships with other organisms
- ___ 103. What is the key feature that separates the arthropods from all other animals?
a. cephalization b. segmentation c. an exoskeleton d. photoreceptors e. jointed appendages
- ___ 104. The Theory of Evolution by Acquired Characteristics did **not** include which of the following?
a. organisms can change during their own lifetime b. physical characteristics cannot be passed to offspring
c. organisms were originally created by a Creator d. strenuous activities can change organisms e. the environment plays a role in selecting favourable characteristics
- ___ 105. Carl Linnaeus is important to the study of evolution because he
a. conducted genetic experiments with garden peas b. proposed that the environment could drive evolutionary change
c. proposed a theory of evolution called natural selection d. proposed a theory of evolution called adaptations e. constructed a modern system used to classify organisms

- ___ 106. Charles Lyell wrote *Principles of Geology*. This book was important to the formation of the Theory of Evolution because it
- described how rocks form
 - described how fossils form
 - suggested that species do not change
 - stated that natural processes that take place today are the same as those that took place in the past
 - stated that organisms change by acquiring new characteristics during their life span
- ___ 107. The major weakness in Lamarck's explanation of evolution is the fact that
- he knew nothing of genetic theory
 - mutations were not part of his explanation
 - acquired characteristics cannot be passed on
 - organisms cannot develop certain structures through use
 - no fossils had been found
- ___ 108. The term radioactive refers to
- the release of subatomic particles from an element
 - atoms that have an unstable nuclear arrangement
 - an element that is found in rock as it forms
 - an element that is found in rock as it ages
 - the time that is calculated by an examination of the elements present in a rock sample
- ___ 109. If a rock sample is thought to be approximately 25 000 years old, which parent isotope is most likely to be measured?
- carbon 12
 - carbon 14
 - nitrogen 14
 - potassium 40
 - uranium 235
- ___ 110. If a rock sample is thought to be approximately 25×10^6 years old, which parent isotope is most likely to be measured?
- argon 40
 - carbon 14
 - nitrogen 14
 - potassium 40
 - uranium 235
- ___ 111. *Archaeopteryx* represents a transition between which of the following?
- fish and amphibians
 - amphibians and reptiles
 - reptiles and birds
 - birds and mammals
 - none of the above
- ___ 112. In class Aves, most of the specialization that has occurred is a result of which of the following?
- walking
 - eating
 - breathing and circulation
 - flight
 - sharpening all senses compared to reptiles
- ___ 113. Mules and donkeys can be cross bred, but the offspring (mules) are sterile. Which of the following is an explanation for this?
- Prezygotic mechanisms such as behavioural isolation separate the populations.
 - Postzygotic mechanisms such as behavioural isolation separate the populations.
 - Their DNA is too different to combine.
 - Prezygotic mechanisms such as mechanical isolation separate the populations.
 - Postzygotic mechanisms such as mechanical isolation separate the populations.
- ___ 114. The term homozygous is defined as of which of the following?
- the portion of the DNA molecule that codes for a particular polypeptide sequence
 - a particular form of a DNA sequence that codes for a polypeptide
 - the location along a chromosome of a particular DNA sequence
 - the condition that exists when a pair of chromosomes has the same DNA sequence at the same location on each chromosome
 - the condition that exists when a pair of chromosomes has different DNA sequences at the same location on each chromosome
- ___ 115. The term phenotype is defined as which of the following?
- the complete set of DNA sequences in an organism
 - the set of all alleles possessed by an individual organism
 - observable traits that are formed by the interaction of genes and the environment
 - individuals with three or more complete sets of chromosomes
 - the total of all alleles within a population

- ___ 116. The term "fixed," when applied to DNA sequences, is defined as of which of the following?
a. the proportion of gene copies in a population of a given allele b. the total of all alleles within a species in a given location c. a gene that has only a single type of allele d. the proportion of a gene pair that is homozygous, dominant, homozygous, recessive, or heterozygous e. the total of all individuals of the same species living in the same region
- ___ 117. The term bottleneck effect is defined as of which of the following?
a. any change in gene or allele frequencies in a population b. any random change in gene or allele frequencies in a small population c. a rapid population decrease d. the establishment of a population in a new region e. the movement of alleles from one population to another
- ___ 118. The term gene flow is defined as of which of the following?
a. any change in gene or allele frequencies in a population b. any random change in gene or allele frequencies in a small population c. a rapid population decrease d. the establishment of a population in a new region e. the movement of alleles from one population to another
- ___ 119. Unlike the North American forests, grasslands were not separated during the Pleistocene glaciation. Grasshopper sparrows and vesper sparrows are two grassland bird species that are found in the same general localities and do not interbreed. The best explanation for this situation is which of the following?
a. the species are adapted to very different habitats b. the species have not diverged very much genetically c. the two sparrows should probably be considered one species d. the two species had already diverged before glaciation occurred e. the two sparrows nest during different seasons
- ___ 120. A species of flying squirrel inhabited an island. Ashes from a nearby volcano killed much of the vegetation, including all the trees. A few squirrels survived. Recently the squirrels were reported to be abundant, living among the rocks and shrubs now covering the island. In the present population, the "flight membranes" are mostly too small to be functional. The most probable explanation for this change is which of the following?
a. a new type of squirrel was introduced to the island b. natural selection no longer favoured those who could fly c. the squirrels had no chance to fly so the membranes shrivelled d. young squirrels were not taught to fly by their parents, so the membranes did not develop e. all the squirrels that could fly left the island
- ___ 121. The modern concept of the species is based upon which of the following?
a. geographic isolation b. differences in behaviour c. differences in morphology (body structure) d. the ability of groups of organisms to interbreed e. a common habitat
- ___ 122. Which of the following statements concerning the leaf is **incorrect**?
a. The photosynthetic tissue is called mesophyll. b. The palisade mesophyll is the primary site for photosynthesis. c. The spongy mesophyll contains many pockets called air spaces. d. The air spaces cause the diffusion of CO₂ out of the mesophyll and O₂ into the mesophyll cells. e. Photosynthesis causes the levels of CO₂ to drop in the mesophyll cells.
- ___ 123. Which of the following is not a function of the root?
a. Roots produce carbohydrates by photosynthesis. b. Roots absorb water and minerals. c. Roots support and anchor a plant. d. Roots produce hormones. e. Roots produce toxins to prevent the germination of other plant seeds.
- ___ 124. Which of the following is not required for photosynthesis to take place?
a. carbon dioxide b. water c. sunlight d. oxygen e. chlorophyll

- ___ 125. Cells produced by the lateral meristem are called
a. ground tissues. b. shoots. c. primary tissues. d. lateral tissues. e. secondary tissues.
- ___ 126. A tree that shows secondary growth is called
a. a seedling. b. a woody plant. c. a monocot plant. d. an annual plant. e. a herbaceous plant.
- ___ 127. Secondary growth is produced mainly by the
a. cork. b. ground tissue. c. vascular cambium. d. meristem. e. apical meristem.
- ___ 128. Which of the following best describes the collenchyma tissue?
a. cells with moderately thick walls for flexibility b. cells with very thick walls with lignin for strength and support c. cells that are long with tapered ends and cell walls with pits d. cells that are long and thin with large pores at their ends e. cells with large spaces for water storage
- ___ 129. Which of the following best describes the sclerenchyma tissue?
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- ___ 130. A row of cells lined up end to end with perforations in their end walls that conduct water efficiently are called
a. sieve cells. b. companion cells. c. vessel elements. d. sieve plates. e. phloem.
- ___ 131. The only way plants can control water loss on a short-term basis is to
a. close their stomata. b. develop a thick waxy layer. c. produce a thick layer of bark. d. grow only where water is available. e. all of the above.
- ___ 132. Water rises to the top of tall trees because transpiration in the leaves produces a force that
a. puts pressure on the root. b. attracts water to the root. c. pulls water up from the root. d. helps to get rid of excess water. e. puts pressure on the xylem in the stem.
- ___ 133. All of the following represent seed dispersal adaptations except
a. hooks on the fruit. b. spines on the fruit. c. fleshy fruit. d. sticky seeds. e. fluffy parachute structures on the seeds.
- ___ 134. The following macronutrients make up 95% of the dry mass of plants:
a. nitrogen, carbon, and hydrogen b. carbon, hydrogen, and oxygen c. potassium, oxygen, and nitrogen d. phosphorus, hydrogen, and nitrogen e. carbon, oxygen, and nitrogen
- ___ 135. A plant growing in a greenhouse produces very little seeds, and the leaves are very dark. Which of the following nutrients is the plant missing?
a. sulfur b. potassium c. nitrogen d. phosphorus e. calcium
- ___ 136. If the apical bud of a plant is removed to make the plant more bushy, which source of plant hormones has been removed?
a. auxins b. gibberellins c. cytokinins d. ethylene e. abscisic acid
- ___ 137. Panspermia is
a. a theory that proposes that life originated from non-living matter b. a theory that proposes that life originated from materials that came to Earth from space c. a polypeptide that forms when amino acids polymerize on the surface of hot liquids d. a RNA molecule that is able to catalyze a chemical reaction e. a spherical lipid molecule that forms in water

- ___ 138. A thermal proteinoid is
a. a theory that proposes that life originated from nonliving matter b. a theory that proposes that life originated from materials that came to Earth from space c. a polypeptide that forms when amino acids polymerize on the surface of hot liquids d. a RNA molecule that is able to catalyze a chemical reaction e. a spherical lipid molecule that forms in water
- ___ 139. The development of structurally similar, but different, species in geographically isolated but similar environments is which of the following?
a. adaptive radiation b. divergent evolution c. geographic isolation d. convergent evolution e. the founder principle
- ___ 140. Which of the following concerning primary succession is correct?
a. Primary succession follows a partial or complete destruction of an existing community. b. Primary succession depends on lichens, which help build the soil. c. Primary succession occurs where life previously existed, a burned forest, for example. d. An example of primary succession is the changes in a farmers' field when it is no longer being cultivated. e. none of the above
- ___ 141. Farmers regularly rotate legume and nonlegume crops
a. to remove excess nitrogen from the soil. b. so a plant with a low nitrogen demand can be planted in the field. c. to prevent insects from destroying the crops since they change regularly. d. to grow a variety of crops. e. to improve the soil fertility without the addition of a fertilizer.
- ___ 142. A farmer wishes to plant three crops to support and help feed the world. Which of the following are the three most important food crops he should grow?
a. wheat, rice, soybeans b. wheat, rice, corn c. rice, potatoes, corn d. corn, wheat, soybeans e. corn, rice, soybeans
- ___ 143. If a farmer wished to grow a profitable plant-specialty product, which should he grow?
a. coffee b. hops c. tea d. chocolate e. cola
- ___ 144. How is genetic diversity in plant crops achieved?
a. by cross breeding plants b. by seed banks c. by conservation of areas where wild plants grow d. by use of biotechnology e. all of the above
- ___ 145. Desertification is defined as
a. the loss of peat moss due to soil erosion through the loss of plants. b. creating a desert through the addition of cacti to the environment. c. a change in climate producing desertlike conditions. d. the loss of topsoil through erosion after the removal of plants. e. the gathering of firewood.
- ___ 146. Plant fibres are mainly composed of
a. cellulose. b. the bark of a tree. c. chlorophyll. d. fossil fuel. e. pith tissue.
- ___ 147. The main difference between cotton and flax fibres is
a. cotton fibres are made up of cellulose, and flax are made up of chlorophyll. b. cotton fibres come from the seeds of the plant, and flax comes from the leaves. c. cotton fibres come from the seeds of the plant, and flax comes from the stem. d. cotton is used in fabrics, while flax is used for paper only. e. c and d only
- ___ 148. Which plant is used to treat heart disorders?
a. opium poppy b. foxglove c. periwinkle d. willow e. belladonna
- ___ 149. Which plant product is used in making hoses, tires, and chewing gum?
a. rubber b. resins c. tannins d. waxes e. a and d

- ____ 150. Which of the following does not belong?
 a. digitoxin b. quinine c. aspirin d. nicotine e. codeine

Problem

151. When a white ram was mated with black ewes, it sired only white lambs. When this ram was mated with a certain white ewe, all lambs were white. When one of these lambs reached maturity, it was backcrossed with its mother, which produced a black lamb. Account for these results by making diagrams of each of these crosses mentioned, including the genotypes of the parents, gametes and offspring, and the phenotypes of the parents and offspring.
152. A couple have children of blood groups A and AB. This couple cannot have children of blood groups O or B. Use the table provided below.
- What are the possible genotypes of the couple?
 - Write out the possible crosses involved.

Phenotypes	Genotypes
type A	$I^A I^A, I^A I^O$
type B	$I^B I^B, I^B I^O$
type AB	$I^A I^B$
type O	$I^O I^O$

153. The black and yellow pigments in the coats of cats are controlled by a sex-linked pair of alleles, located on the X chromosome. The "tortoise shell" or "calico" cat is the heterozygous condition. Using B to represent the black allele, and Y for the yellow allele, match each item with the correct statement below.

A calico cat has a litter of 8 kittens: 1 yellow male, 2 black males, 2 yellow males, 2 yellow females, and 3 calico females. Assuming a single father, what was his colour? With the aid of a Punnett square, indicate the genotypes of the parents, and of the offspring in the F_1 generation.

154. If a normal man marries a normal woman whose father was colourblind, what are the chances that their sons and daughters will be colourblind? Colourblindness is a sex-linked trait that affects males more often than females.

With the aid of a Punnett square, indicate the genotypes of the parents, and of the offspring, including their chances of being colourblind in the F_1 generation.

- 155.
- Using a computer keyboard has an energy factor of 9.0 kJ/kg/h and playing the piano has an energy factor of 11.2 kJ/kg/h. Compare the energy required by a 70-kg person if he were to spend 1.5 h doing each of the tasks.
 - Since using a computer keyboard and playing a piano both involve sitting and using the hands, why do you think piano playing has a higher energy factor than keyboarding?
156. A 75-kg student bicycles at a speed of 15.3 km/h for 3.0 h. To cover the same distance at 20.9 km/h would take 2.2 h. Compare the amount of energy required to travel the distance at the two speeds if the energy factors are as follows: 15.3 km/h (25.8 kJ/kg/h); 20.9 km/h (40.5 kJ/kg/h).

SBI3U Exam Review 2011
Answer Section

TRUE/FALSE

1.	ANS: T STA: GC1.01	PTS: 1	REF: K/U	OBJ: 3.1
2.	ANS: F STA: GC1.01	PTS: 1	REF: K/U	OBJ: 3.2
3.	ANS: F STA: GC1.01	PTS: 1	REF: K/U	OBJ: 3.4
4.	ANS: T STA: GC1.01	PTS: 1	REF: K/U	OBJ: 3.5
5.	ANS: T STA: GC1.04	PTS: 1	REF: K/U	OBJ: 3.6
6.	ANS: F STA: GC1.04	PTS: 1	REF: K/U	OBJ: 3.6
7.	ANS: F STA: GC1.04	PTS: 1	REF: K/U	OBJ: 3.6
8.	ANS: T STA: GC1.05	PTS: 1	REF: K/U	OBJ: 3.9
9.	ANS: T STA: GC1.03	PTS: 1	REF: K/U	OBJ: 4.2
10.	ANS: T STA: GC1.02	PTS: 1	REF: K/U	OBJ: 4.4
11.	ANS: T STA: GC3.02	PTS: 1	REF: MC	OBJ: 4.5
12.	ANS: T STA: GC1.06	PTS: 1	REF: I	OBJ: 4.6
13.	ANS: T STA: IS2.01	PTS: 1	REF: K/U	OBJ: 6.5
14.	ANS: F STA: IS2.01	PTS: 1	REF: K/U	OBJ: 6.3
15.	ANS: F STA: IS2.01	PTS: 1	REF: K/U	OBJ: 6.3
16.	ANS: T STA: IS1.03	PTS: 1	REF: K/U	OBJ: 6.6
17.	ANS: T STA: IS1.04	PTS: 1	REF: K/U	OBJ: 6.9
18.	ANS: F STA: IS1.04	PTS: 1	REF: K/U	OBJ: 6.9
19.	ANS: T STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.3
20.	ANS: F STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.5

21.	ANS: T STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.6
22.	ANS: F STA: IS1.02	PTS: 1	REF: MC	OBJ: 7.8
23.	ANS: F STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.9.1
24.	ANS: T STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.10
25.	ANS: T STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.11
26.	ANS: F STA: IS1.01	PTS: 1	REF: K/U	OBJ: 8.2
27.	ANS: T STA: IS1.01	PTS: 1	REF: K/U	OBJ: 8.2
28.	ANS: T STA: IS1.01	PTS: 1	REF: K/U	OBJ: 8.3
29.	ANS: F STA: IS1.01	PTS: 1	REF: K/U	OBJ: 8.4.1
30.	ANS: T STA: IS1.05	PTS: 1	REF: K/U	OBJ: 8.6
31.	ANS: T STA: DL1.01	PTS: 1	REF: K/U	OBJ: 9.3
32.	ANS: F STA: DL1.01	PTS: 1	REF: K/U	OBJ: 9.4
33.	ANS: F STA: DL1.03	PTS: 1	REF: K/U	OBJ: 11.4
34.	ANS: F STA: DL1.03	PTS: 1	REF: K/U	OBJ: 11.5
35.	ANS: F STA: DL2.01	PTS: 1	REF: I	OBJ: 12.1
36.	ANS: F STA: DL2.01	PTS: 1	REF: I	OBJ: 12.3
37.	ANS: T STA: DL2.01	PTS: 1	REF: I	OBJ: 12.4
38.	ANS: F STA: DL2.01	PTS: 1	REF: I	OBJ: 12.4
39.	ANS: F STA: PA1.02	PTS: 1	REF: MC	OBJ: 13.3
40.	ANS: T STA: PA1.02	PTS: 1	REF: MC	OBJ: 13.5
41.	ANS: T STA: PA1.05	PTS: 1	REF: MC	OBJ: 13.9
42.	ANS: T STA: PA1.04	PTS: 1	REF: K/U	OBJ: 13.5

43.	ANS: F STA: PA1.01	PTS: 1	REF: K/U	OBJ: 14.1
44.	ANS: T STA: PA2.02	PTS: 1	REF: MC	OBJ: 14.3
45.	ANS: T STA: PA1.06	PTS: 1	REF: K/U	OBJ: 14.4
46.	ANS: T STA: PA3.02	PTS: 1	REF: I	OBJ: 14.4.1
47.	ANS: F STA: PA3.02	PTS: 1	REF: K/U	OBJ: 14.5
48.	ANS: F STA: PA1.07	PTS: 1	REF: K/U	OBJ: 14.6
49.	ANS: T STA: PA1.07	PTS: 1	REF: K/U	OBJ: 14.6
50.	ANS: F STA: PA3.04	PTS: 1	REF: I	OBJ: 14.7

MULTIPLE CHOICE

51.	ANS: D STA: GC1.01	PTS: 1	REF: K/U	OBJ: 3.2
52.	ANS: B STA: GC1.01	PTS: 1	REF: K/U	OBJ: 3.2
53.	ANS: C STA: GC1.01	PTS: 1	REF: I	OBJ: 3.2
54.	ANS: E STA: GC1.01 GC1.04	PTS: 1	REF: K/U	OBJ: 3.7
55.	ANS: D STA: GC1.01 GC1.05	PTS: 1	REF: K/U	OBJ: 3.2 3.6 3.7
56.	ANS: C STA: GC1.06	PTS: 1	REF: K/U	OBJ: 4.1
57.	ANS: A STA: GC1.06	PTS: 1	REF: K/U	OBJ: 4.2
58.	ANS: C STA: GC1.06	PTS: 1	REF: K/U	OBJ: 4.2
59.	ANS: A STA: GC2.02	PTS: 1	REF: I	OBJ: 4.4
60.	ANS: B STA: GC2.02	PTS: 1	REF: I	OBJ: 4.4
61.	ANS: D STA: GC2.02	PTS: 1	REF: I	OBJ: 4.4
62.	ANS: A STA: GC2.02	PTS: 1	REF: I	OBJ: 4.5
63.	ANS: C STA: GC2.02	PTS: 1	REF: I	OBJ: 4.6

64.	ANS: D STA: GC2.02	PTS: 1	REF: I	OBJ: 4.6
65.	ANS: A STA: GC1.06	PTS: 1	REF: K/U	OBJ: 5.3
66.	ANS: C STA: GC1.03	PTS: 1	REF: K/U	OBJ: 5.2
67.	ANS: B STA: GC2.02	PTS: 1	REF: K/U	OBJ: 5.3
68.	ANS: E STA: GC2.02	PTS: 1	REF: K/U	OBJ: 5.3
69.	ANS: C STA: GC1.06	PTS: 1	REF: K/U	OBJ: 5.3
70.	ANS: B STA: GC3.01	PTS: 1	REF: K/U	OBJ: 5.5
71.	ANS: D STA: GC1.02	PTS: 1	REF: K/U	OBJ: 5.6
72.	ANS: E STA: GC1.02	PTS: 1	REF: K/U	OBJ: 5.6
73.	ANS: A STA: GC1.02	PTS: 1	REF: K/U	OBJ: 5.3
74.	ANS: E STA: GC1.02	PTS: 1	REF: K/U	OBJ: 5.6
75.	ANS: D STA: IS2.01	PTS: 1	REF: K/U	OBJ: 6.1
76.	ANS: A STA: IS2.01	PTS: 1	REF: MC	OBJ: 6.3
77.	ANS: D STA: IS1.03	PTS: 1	REF: K/U	OBJ: 6.4
78.	ANS: D STA: IS3.03	PTS: 1	REF: MC	OBJ: 6.4
79.	ANS: C STA: IS1.03	PTS: 1	REF: K/U	OBJ: 6.5
80.	ANS: D STA: IS3.03	PTS: 1	REF: MC	OBJ: 6.8
81.	ANS: C STA: IS3.03	PTS: 1	REF: MC	OBJ: 6.8
82.	ANS: D STA: IS1.03	PTS: 1	REF: MC	OBJ: 6.8
83.	ANS: D STA: IS1.03	PTS: 1	REF: K/U	OBJ: 6.8
84.	ANS: E STA: IS1.04	PTS: 1	REF: MC	OBJ: 6.9
85.	ANS: D STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.2

86.	ANS: E STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.3
87.	ANS: D STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.5
88.	ANS: D STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.5
89.	ANS: D STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.5
90.	ANS: B STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.10
91.	ANS: A STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.10
92.	ANS: A STA: IS1.02	PTS: 1	REF: K/U	OBJ: 7.10
93.	ANS: B STA: IS1.01	PTS: 1	REF: K/U	OBJ: 8.1
94.	ANS: D STA: IS1.01	PTS: 1	REF: K/U	OBJ: 8.3
95.	ANS: C STA: DL1.02	PTS: 1	REF: K/U	OBJ: 9.3
96.	ANS: D STA: DL1.02	PTS: 1	REF: K/U	OBJ: 9.3
97.	ANS: C STA: DL1.03 DL2.02	PTS: 1	REF: I	OBJ: 9.3.1
98.	ANS: A STA: DL1.03 DL2.02	PTS: 1	REF: I	OBJ: 9.3.1
99.	ANS: E STA: DL1.03 DL1.04	PTS: 1	REF: K/U	OBJ: 9.4
100.	ANS: A STA: DL1.03 DL2.02	PTS: 1	REF: K/U	OBJ: 9.4
101.	ANS: D STA: DL1.03	PTS: 1	REF: K/U	OBJ: 11.1
102.	ANS: C STA: DL1.03	PTS: 1	REF: K/U	OBJ: 11.2
103.	ANS: C STA: DL1.03	PTS: 1	REF: K/U	OBJ: 11.5
104.	ANS: B STA: EV1.02	PTS: 1	REF: K/U	OBJ: 11.3
105.	ANS: E STA: EV1.02	PTS: 1	REF: K/U	OBJ: 11.3
106.	ANS: D STA: EV1.02	PTS: 1	REF: K/U	OBJ: 11.3
107.	ANS: C STA: EV1.02	PTS: 1	REF: K/U	OBJ: 11.3

108.	ANS: B STA: EV3.02	PTS: 1	REF: K/U	OBJ: 11.2
109.	ANS: B STA: EV3.02	PTS: 1	REF: K/U	OBJ: 11.2
110.	ANS: E STA: EV3.02	PTS: 1	REF: K/U	OBJ: 11.2
111.	ANS: C STA: DL1.03	PTS: 1	REF: K/U	OBJ: 12.5
112.	ANS: D STA: DL1.03	PTS: 1	REF: K/U	OBJ: 12.5
113.	ANS: E STA: EV1.01	PTS: 1	REF: K/U	OBJ: 12.6
114.	ANS: D STA: EV1.03	PTS: 1	REF: K/U	OBJ: 12.1
115.	ANS: C STA: EV1.03	PTS: 1	REF: K/U	OBJ: 12.1
116.	ANS: C STA: EV1.03	PTS: 1	REF: K/U	OBJ: 12.2
117.	ANS: C STA: EV1.03	PTS: 1	REF: K/U	OBJ: 12.3
118.	ANS: E STA: EV1.03	PTS: 1	REF: K/U	OBJ: 12.3
119.	ANS: D STA: EV1.01	PTS: 1	REF: K/U	OBJ: 12.6
120.	ANS: B STA: EV1.04	PTS: 1	REF: K/U	OBJ: 12.4
121.	ANS: D STA: EV1.01	PTS: 1	REF: K/U	OBJ: 12.6
122.	ANS: D STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.3
123.	ANS: A STA: PA1.01	PTS: 1	REF: K/U	OBJ: 13.4
124.	ANS: D STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.1 13.3
125.	ANS: E STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.1
126.	ANS: B STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.5
127.	ANS: C STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.1
128.	ANS: A STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.2
129.	ANS: B STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.2

130.	ANS: C STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.2
131.	ANS: A STA: PA1.02	PTS: 1	REF: MC	OBJ: 13.3
132.	ANS: C STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.3 13.6
133.	ANS: D STA: PA2.02	PTS: 1	REF: MC	OBJ: 13.7
134.	ANS: B STA: PA1.02	PTS: 1	REF: K/U	OBJ: 13.8
135.	ANS: D STA: PA2.02	PTS: 1	REF: I	OBJ: 13.8
136.	ANS: A STA: PA1.05	PTS: 1	REF: MC	OBJ: 13.9
137.	ANS: B STA: EV2.01	PTS: 1	REF: K/U	OBJ: 13.1
138.	ANS: C STA: EV2.01	PTS: 1	REF: K/U	OBJ: 13.1
139.	ANS: D STA: EV1.01	PTS: 1	REF: K/U	OBJ: 13.3
140.	ANS: B STA: PA1.01	PTS: 1	REF: K/U	OBJ: 14.1
141.	ANS: E STA: PA2.02	PTS: 1	REF: K/U	OBJ: 14.3
142.	ANS: B STA: PA1.06	PTS: 1	REF: MC	OBJ: 14.4
143.	ANS: A STA: PA1.07	PTS: 1	REF: MC	OBJ: 14.4
144.	ANS: E STA: PA3.02	PTS: 1	REF: K/U	OBJ: 14.4
145.	ANS: D STA: PA1.01	PTS: 1	REF: K/U	OBJ: 14.5
146.	ANS: A STA: PA1.06	PTS: 1	REF: K/U	OBJ: 14.5
147.	ANS: C STA: PA1.06	PTS: 1	REF: K/U	OBJ: 14.5
148.	ANS: B STA: PA1.07	PTS: 1	REF: K/U	OBJ: 14.6
149.	ANS: A STA: PA1.07	PTS: 1	REF: K/U	OBJ: 14.6
150.	ANS: D STA: PA1.07	PTS: 1	REF: K/U	OBJ: 14.6

PROBLEM

151. ANS:

Since the white ram \times black ewes produced only white lambs, the white trait must be dominant, and the white ram must be homozygous.

white=W

black=w

Cross 1:

Parent Phenotypes: white ram \times black ewe
 Genotypes: WW \times ww
 Gametes: W \times w

	W	W
w	Ww	Ww
w	Ww	Ww

F₁ genotypes: all WwF₁ phenotypes: white lambs

Cross 2:

Parent phenotypes: white ram \times a certain white ewe
 Genotypes: WW \times Ww
 Gametes: W \times W or w

	W	W
W	WW	WW
w	Ww	Ww

F₁ genotypes: Ww or WW in a 1:1 ratioF₁ phenotypes: all white lambs

Cross 3:

Parent phenotypes: white ram \times a certain white ewe
 Genotypes: Ww \times Ww
 Gametes: W or w \times W or w

	W	w
W	WW	Ww
w	Ww	ww

F₁ genotypes: 1 WW : 2 Ww : 1 wwF₁ phenotypes: 3 white lambs : 1 black lamb

PTS: 1

REF: I

OBJ: 4.1 | 4.2 | 4.6

STA: GC1.06 | GC1.07 | GC2.02

152. ANS:

a) The parents may have been $I^A I^A$ and $I^B I^O$

OR

The parents may have been $I^A I^A$ and $I^A I^B$

b)

	I^A	I^A
I^B	$I^A I^B$	$I^A I^B$
I^O	$I^A I^O$	$I^A I^O$

Offspring blood groups: AB or A

	I^A	I^A
I^A	$I^A I^A$ A	$I^A I^A$
I^B	$I^A I^B$	$I^A I^B$

Offspring blood groups: A or AB

PTS: 1

REF: I

OBJ: 4.1 | 4.2 | 4.4

STA: GC1.06 | GC1.07 | GC2.02

153. ANS:

Since there are yellow females in the litter, the father must have been yellow.

Parents: calico female \times yellow male
 $X^B X^Y$ $X^Y Y$

Punnett square:

	X^B	X^Y
X^Y	$X^B X^Y$	$X^Y X^Y$
Y	$X^B Y$	$X^Y Y$

Offspring: 1 calico female $X^B X^Y$: 1 yellow female $X^Y X^Y$: 1 black male $X^B Y$: 1 yellow male $X^Y Y$

PTS: 1

REF: K/U

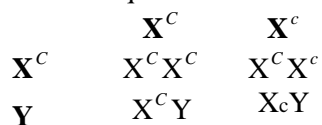
OBJ: 5.3

STA: GC2.02

154. ANS:

Parents: normal male \times normal female whose father was colourblind (carrier)

Punnett square:



Offspring:	1 normal female $X^C X^C$:	1 carrier female $X^C X^c$:	1 normal male $X^C Y$:	1 colourblind male $X^c Y$
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Sons: there is a 50% chance a son will be colourblind.

Daughters: there is a 0% chance a daughter will be colourblind, but a 50% chance a daughter will be a carrier.

PTS: 1 REF: K/U OBJ: 5.3 STA: GC2.02

155. ANS:

a) Energy required for 1.5 h = energy factor \times body mass time

$$\begin{aligned} \text{The computer keyboard} &= 9.0 \text{ kJ/kg/h} \times 70 \text{ kg} \times 1.5 \text{ h} \\ &= 9.45 \text{ kJ} \\ &= 9.5 \times 10^2 \text{ kJ} \end{aligned}$$

$$\begin{aligned} \text{The piano} &= 1176 \text{ kJ} \\ &= 1.2 \times 10^3 \text{ kJ} \end{aligned}$$

It takes 9.5×10^2 kJ of energy to use the computer keyboard and 1.2×10^3 kJ to play the piano for 1.5 h.

b) Playing the piano requires more energy because the player must reach farther and use a variety of hand movements. In addition, the piano player uses his or her feet to operate the pedals of the piano.

PTS: 1 REF: MC OBJ: 6.9 STA: IS1.04

156. ANS:

$$\begin{aligned}\text{Energy required at 15.3 km/h} &= \text{energy factor} \times \text{body mass} \times \text{time} \\ &= 25.8 \text{ kJ/kg/h} \times 75 \text{ kg} \times 3.0 \text{ h} \\ &= 5805 \text{ kJ}\end{aligned}$$

$$\begin{aligned}\text{Energy required at 20.9 km/h} &= 40.5 \text{ kJ/kg/h} \times 75 \text{ kg} \times 2.2 \text{ h} \\ &= 6683 \text{ kJ}\end{aligned}$$

$$\text{Difference } 6683 \text{ kJ} - 5805 \text{ kJ} = 878 \text{ kJ}$$

$$= 8.8 \times 10^2 \text{ kJ}$$

To travel the distance at 20.9 km/h requires 8.8×10^2 kJ more energy.

PTS: 1

REF: MC

OBJ: 6.9

STA: IS1.04