FORM TP 2022001

CANDIDATE – PLEASE NOTE!

PRINT your name on the line below and return this booklet with your answer sheet. Failure to do so may result in disqualification.

TEST CODE **01207010**

JANUARY 2022

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

BIOLOGY

Paper 01 – General Proficiency

1 hour 15 minutes

19 JANUARY 2022 (a.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 60 items. You will have 1 hour and 15 minutes to answer them.

2. In addition to this test booklet, you should have an answer sheet.

3. Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.

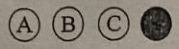
4. On your answer sheet, find the number which corresponds to your item and shade the space having the same letter as the answer you have chosen. Look at the sample item below.

   Sample Item

   Which of the following diseases is due to a dietary deficiency?

   (A) Malaria
   (B) Diabetes
   (C) Influenza
   (D) Anaemia

   Sample Answer

   The correct answer to this item is "Anaemia", so (D) has been shaded.

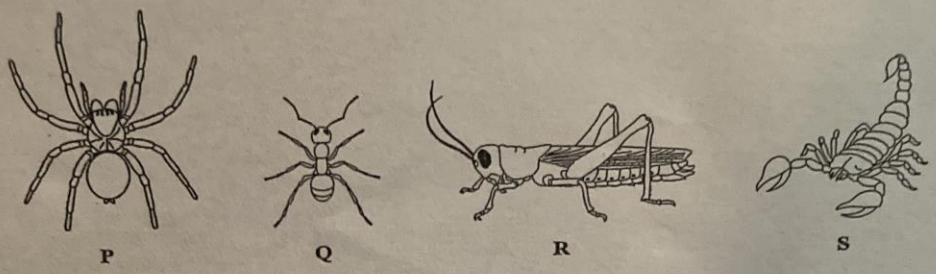
5. If you want to change your answer, erase it completely before you fill in your new choice.

6. When you are told to begin, turn the page and work as quickly and as carefully as you can. If you cannot answer an item, go on to the next one. You may return to that item later.

7. Figures are not necessarily drawn to scale.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

Item 1 refers to the following diagram which shows four organisms labelled P, Q, R and S, collected during an ecological study of an abandoned plot.

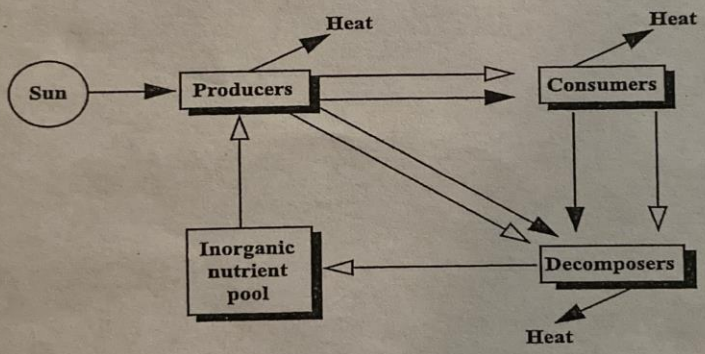


P Q R S

1. The organisms that can be placed in the same group are

(A) P and Q
(B) R and S
(C) P and R
(D) P and S

Item 2 refers to the following diagram of energy transfer from the sun.



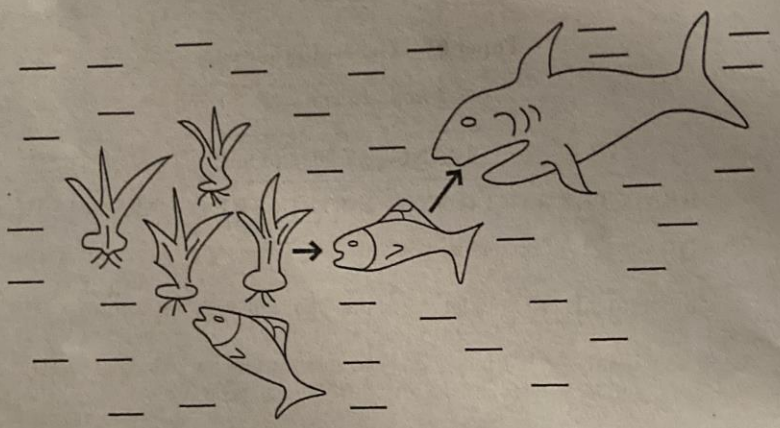
2. Energy flow through ecosystems is not 100% efficient. This is so because energy is

(A) lost during respiration and excretion
(B) recycled from plants to the atmosphere
(C) circular, moving in and out of organisms
(D) linear, moving from one organism to the next

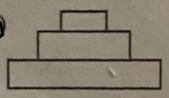
3. Which of the following organisms can be collected using a line transect?

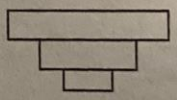
(A) Decaying leaves and grass
(B) Insects and some types of plants
(C) Fast-moving organisms and plants
(D) Slow-moving organisms and plants

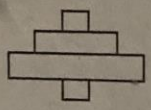
Item 4 refers to the following illustration of a feeding relationship.

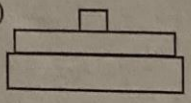


4. Which of the following pyramid of numbers BEST represents the feeding relationship shown above?

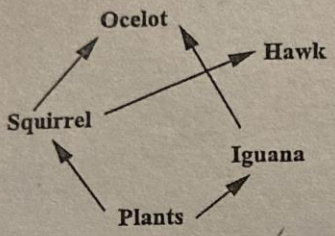
(A)


(B)


(C)


(D)


Item 5 refers to the following food web.



5. How many food chains are there in the food web shown above?

(A) 1
(B) 2
(C) 3
(D) 4

6. Commensalism is illustrated by the relationship between a

(A) dog and a flea
(B) hen and a chick
(C) cow and an egret
(D) man and a mosquito

7. In a food chain, the GREATEST amount of energy flows through the

(A) herbivores
(B) producers
(C) carnivores
(D) decomposers

8. Which of the following is the MAIN advantage of recycling?

(A) Recycling creates jobs.
(B) Recycled products are cheaper.
(C) Recycling saves on raw materials.
(D) Recycled products are more durable.

9. The GREATEST threat to the survival of coral reefs is

(A) decreased nitrogen levels
(B) increased dissolved oxygen
(C) decreased greenhouse gases
(D) increased ocean temperatures

10. Which of the following practices may be used in the conservation or restoration of an ecosystem?

I. Restricting hunting seasons
II. Planting of mangroves along the shoreline
III. Quarrying to remove limestone

(A) I only
(B) II only
(C) I and II only
(D) I, II and III

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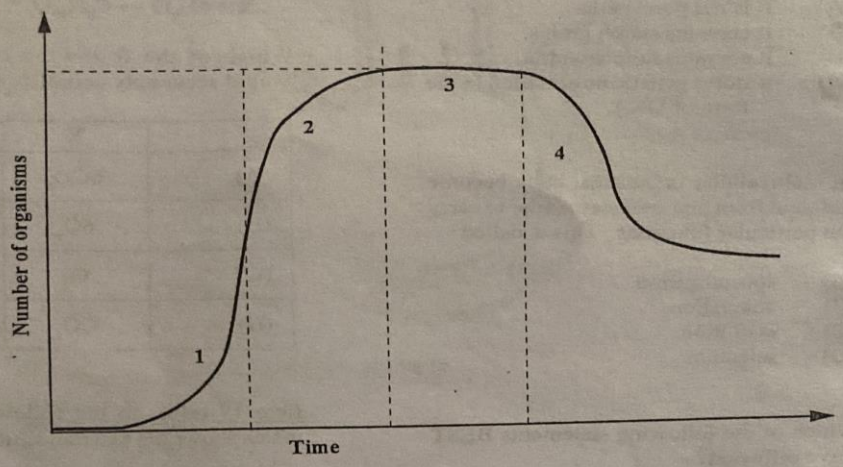
Item 11 refers to the following graph of population growth.



11. Phase 4 of the graph of population growth is MOST likely due to

(A) disease resistance
(B) a high natural birth rate
(C) adequate food and space
(D) competition from invasive species

12. Which of the following structures are found in BOTH the generalized plant cell and the animal cell?

(A) Cell wall, vacuole and cytoplasm
(B) Cell wall, cell membrane and nucleus
(C) Cell membrane, vacuole and chloroplast
(D) Cell membrane, mitochondrion and vacuole

13. Which of the following organelles is directly involved in photosynthesis?

(A) Mitochondrion
(B) Chloroplast
(C) Vacuole
(D) Nucleus

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14. Which of the following BEST describes the nucleus of a cell?

(A) It is not permeable.
(B) It contains starch grains.
(C) It contains mitochondria.
(D) It stores genetic information in the form of DNA.

15. In multicellular organisms, cells become different from one another in order to carry out particular functions. This is called

(A) specialization
(B) adaptation
(C) evolution
(D) selection

16. Which of the following statements BEST leave diffusion?

(A) Energy is required.
(B) A cell membrane is required.
(C) It involves movement of water only.
(D) A concentration gradient is necessary.

17. Which of the following organisms are autotrophs?

(A) Cows
(B) Moulds
(C) Humans
(D) Seaweeds

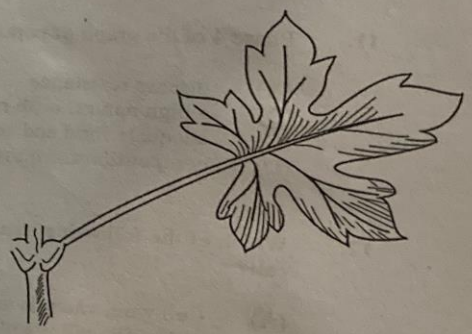
18. The chemical equation for photosynthesis shown below is incomplete.

$$X + 6H_2O \rightarrow C_6H_{12}O_6 + Y$$

Which of the following combinations would accurately complete the equation?

	X	Y
(A)	$6CO_2$	$6O_2$
(B)	$6O_2$	$6CO_2$
(C)	O_2	CO_2
(D)	CO_2	O_2

Item 19 refers to the following diagram which shows the external structure of a leaf.



19. What **visible** characteristics of the leaf allow it to carry out photosynthesis effectively?

(A) Held upright, large surface area, network of veins
(B) Green, small surface area, network of veins
(C) Held upright, large surface area, many palisade cells
(D) Many stomata, large air spaces, palisade cells with many chloroplasts

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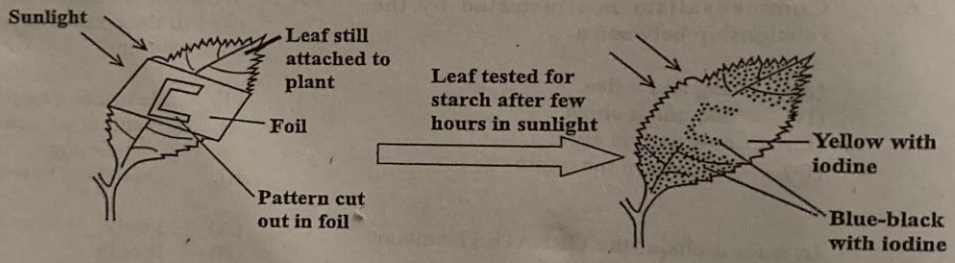
20. Which of the following combinations of conditions and amount of product for the action of salivary amylase is optimum?

	Temperature (°C)	pH	Amount of Maltose Produced (µg)
(A)	20–30	1–2	12
(B)	30–40	7–8	73
(C)	30–40	9–10	64
(D)	40–50	7–8	32

Item 21 refers to the following diagram which illustrates the result of an investigation on a well-watered, de-starched plant which was left for a few hours in sunlight.



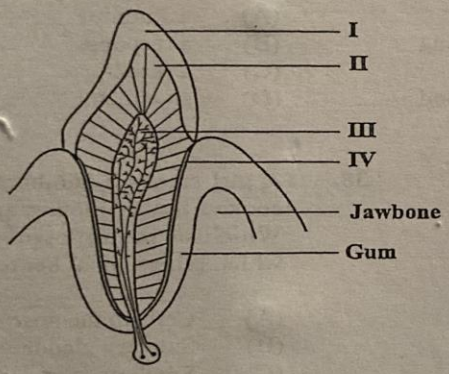
21. A likely explanation of this result is that the

(A) covered part of the leaf died
(B) soil around the plant dried out
(C) foil prevented light from entering the leaf
(D) foil prevented carbon dioxide from entering the leaf

22. The role of an enzyme is BEST described as

(A) increasing the rate of a chemical reaction
(B) decreasing the rate of a chemical reaction
(C) decreasing the rate of a chemical reaction but remains unchanged at the end of the reaction
(D) increasing the rate of a chemical reaction but remains unchanged at the end of the reaction

Item 23 refers to the following diagram of a section through an incisor tooth.



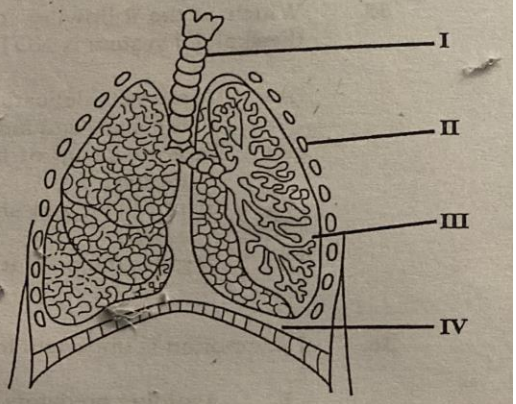
23. The region of the tooth sensitive to temperature is labelled

(A) I
(B) II
(C) III
(D) IV

24. An athlete suffered muscle cramps following his race. The muscle cramps are MOST likely caused by an accumulation of

(A) urea
(B) oxygen
(C) lactic acid
(D) excess glucose

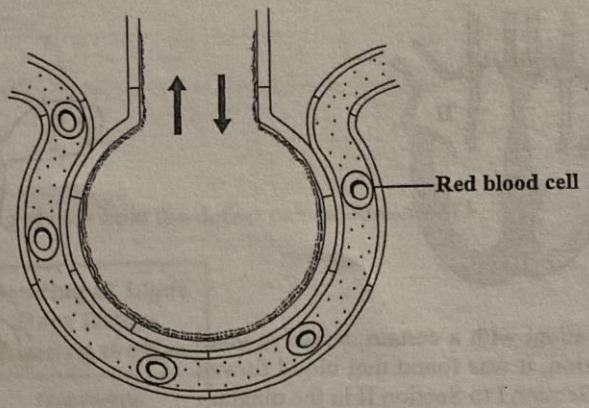
Item 25 refers to the following diagram of the respiratory system.



25. Which of the labelled parts represents the rib?

(A) I
(B) II
(C) III
(D) IV

Item 26 refers to the following diagram of a respiratory structure.



26. The respiratory structure shown above is

(A) a trachea
(B) an alveolus
(C) a bronchiole
(D) a gill filament

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27. Which of the following options are BEST identified as some of the transport substances in animals?

I. Amino acids
II. Hormones
III. Sucrose

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

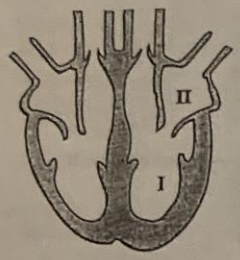
28. The following statements describe some of the stages of the clotting of blood.

I. Platelets are activated.
II. Thrombin converts fibrinogen to fibrin.
III. Prothrombin converted to thrombin.
IV. A clot is formed.

Which of the following correctly identifies the sequence of events in the process of clotting?

(A) I → II → III → IV
(B) I → III → II → IV
(C) II → I → III → IV
(D) III → II → I → IV

Item 29 refers to the following diagram of a mammalian heart.



29. In a patient with a certain defective heart condition, it was found that blood flowed from Section I to Section II in the diagram above. This was MOST likely due to malfunction of the

(A) left atrium
(B) left ventricle
(C) bicuspid valve
(D) semi-lunar valve

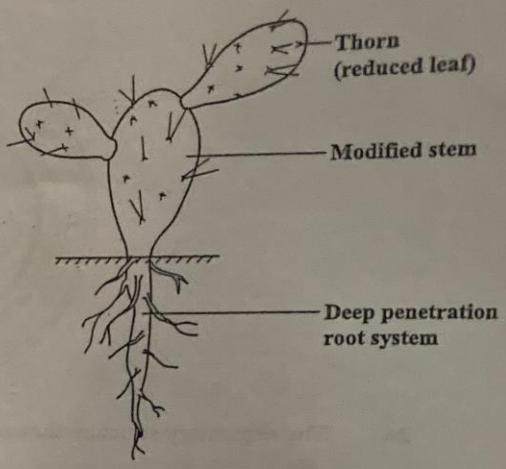
30. Artificial immunity can BEST be described as immunity

(A) produced by deliberate exposure to a pathogen
(B) that has been passed on from the mother's colostrum
(C) acquired from the body's natural defence against disease
(D) that has been passed on from mother to child in the uterus

31. Which of the following statements correctly describes the xylem of a flowering plant?

(A) It has lignified walls for support.
(B) It transports water and manufactured food.
(C) Its mitochondria release energy for the movement of materials.
(D) The presence of end walls prevents materials from being lost to the atmosphere.

Item 32 refers to the following diagram of a cactus.



32. Which of the following describes the function of the thorns?

(A) Aid in dispersal
(B) Ward off carnivores
(C) Reduce transpiration
(D) Increase surface area

33. Which of the following options correctly matches the storage organs to their stored nutrients?

	Roots	Fruits	Liver
(A)	Proteins	Glucose	Fats
(B)	Starch	Sucrose	Glycogen
(C)	Fats	Glucose	Glycogen
(D)	Carbohydrates	Sucrose	Glucose

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34. A student eats a highly salted snack and does not drink water. Which of the following describes and explains the urine MOST likely produced after a few hours?

	Type of Urine	ADH	Water Absorption by Kidney
(A)	Dilute	Released	Absorbed
(B)	Dilute	Not released	Not absorbed
(C)	Concentrated	Released	Absorbed
(D)	Concentrated	Not released	Not absorbed

35. Which of the following statements about the skeletal system is NOT correct?

(A) It protects delicate organs such as the heart and lungs.
(B) It is made up of hard non-living tissues.
(C) It produces red and white blood cells.
(D) It gives the body its shape.

36. Locomotion is important to animals for

I. avoiding predators
II. acquiring food and shelter
III. assimilating digested food

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

37. A detectable change in the internal or external environment of an organism is called

(A) a stimulus
(B) a response
(C) a receptor
(D) an effector

38. A girl smells a hamburger that is being cooked by her mother and she salivates. Which of the following is the effector which brings about her response?

(A) Cells in the nose
(B) Salivary glands
(C) Smell of food
(D) Secretion of saliva

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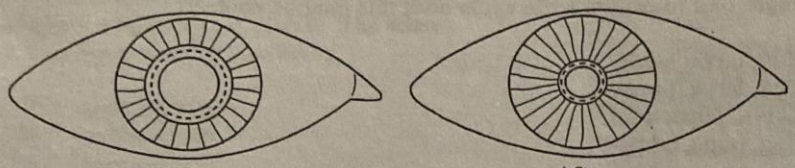
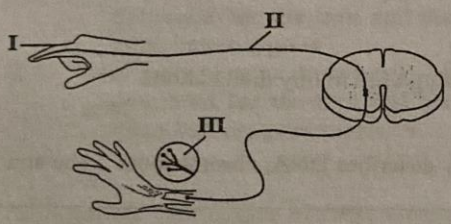
Item 39 refers to the following diagram showing an eye's response to looking at an object.



39. The response is MOST likely brought about by .

(A) an increase in the light intensity
(B) a decrease in the light intensity
(C) the object being brought nearer
(D) the object being moved further away

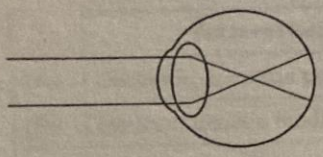
Item 40 refers to the following diagram showing a reflex arc.



40. Which of the following options correctly identifies the structures labelled I, II and III?

	I	II	III
(A)	Receptor	Sensory neuron	Motor neuron
(B)	Skin	Intermediate nerve	Muscle
(C)	Sensory nerve	Spinal nerve	Effector
(D)	Receptor	Spinal nerve	Effector

Item 41 refers to the following diagram of an eye which shows nearsightedness.



41. Which of the following shows how the defect can be corrected?

	Lens	Bending of Light Rays Before Entering the Eye
[redacted]	Diverging	Outwards
(B)	Diverging	Inwards
(C)	Converging	Outwards
[redacted]	Converging	Inwards

42. The following statements describe the processes taking place within a seed during germination.

I. Embryo uses food to develop radicle and plumule.
II. Enzymes break down proteins into amino acids.
III. Soluble products move into the embryo.

Which of the following correctly identifies the sequence of events during the germination of the seed?

(A) I → II → III
(B) I → III → II
(C) II → I → III
[redacted] II → III → I

43. One advantage that sexual reproduction has when compared to asexual reproduction is that sexual reproduction

(A) is conservative
[redacted] leads to variation
(C) produces disease-resistant crops
(D) produces a greater number of offspring

44. Which of the following forms of birth control is likely to be the MOST effective?

(A) Condom
(B) Diaphragm
[redacted] Tubal ligation
(D) Birth control pill

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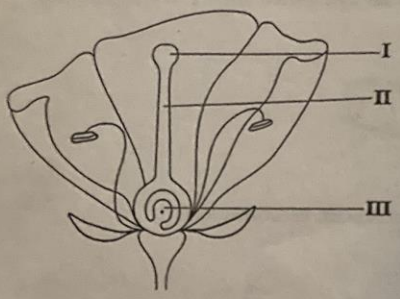
Item 45 refers to the following figure of a flower with its parts labelled I, II and III.



45. The collective term used to describe these labelled parts is

(A) calyx
(B) carpel
(C) corona
(D) corolla

46. Which option gives the BEST description of each category as it relates to the disease HIV/AIDS?

	Causative Agent	Treatment	Control	Prevention
(A)	DNA virus	Antigens	Vaccination	Public education
(B)	Bacterium	Antibiotics	Monogamy; Abstinence	Condoms
(C)	Bacterium	Penicillin, Vaccination	Abstinence	Condoms
(D)	RNA virus	Anti-retrovirals, e.g. AZT	Monogamy; Abstinence	Condoms

47. The transfer of pollen from the anther of one flower to the stigma of another is referred to as

(A) self-pollination
(B) self-fertilization
(C) cross-pollination
(D) asexual reproduction

48. One method of controlling the population of mosquitoes is by getting rid of all stagnant water. Which stages of a mosquito's life cycle does this method control?

(A) Egg, larva, adult
(B) Egg, larva, pupa
(C) Larva, pupa, adult
(D) Egg, pupa, adult

49. Which of the following may be caused by pathogens?

(A) Physical addictions
(B) Deficiency diseases
(C) Communicable diseases
(B) Non-Communicable diseases

50. Which of the following is NOT a consequence of a plant or human disease?

(A) Loss of productivity
(B) Decrease in food prices
(C) Higher absenteeism from school
(D) Larger part of national budget being used to buy medications

51. Which of the following options correctly describes DNA, chromosome, gene and allele?

	DNA	Chromosome	Gene	Allele
(A)	Deoxyribonucleic acid	DNA + histamine	Unit that codes for a specific protein	An alternate form of a gene
(B)	Unit that codes for a specific protein	An alternate form of a gene	DNA + protein	Histones
(C)	Nucleic acid that has all genetic information	DNA + histones	The smallest unit of inheritance	An alternate form of a gene
(D)	Nucleic acid that has all genetic information	The smallest unit of inheritance	Unit that codes for a specific protein	DNA + protein

52. Which of the following statements about meiosis is NOT true?

(A) It allows for genetic variation.
(B) It results in the production of gametes.
(C) It causes haploid cells to form from diploid cells.
(D) It doubles the number of chromosomes in gametes.

53. A man with blood group A married a woman with blood group B. They had two children with blood group AB. The alleles A and B are described as being

(A) homozygous
(B) codominant
(C) recessive
(D) dominant

54. Albinism is caused by a single recessive allele. Two normal parents have an albino child. This is because

(A) both parents were heterozygous for the gene
(B) both parents were homozygous recessive for the gene
(C) one parent was homozygous dominant for the trait and the other heterozygous
(D) one parent was homozygous dominant for the trait and the other homozygous recessive

55. The gene for coat colour in cattle shows incomplete dominance. A purebred cow with red coat mates with a purebred bull with white coat. All of the offspring have roan coat. Which of the following would represent the genotype of the offspring?

(A) RR
(B) RW
(C) RO
(D) WW

56. One example of a sex-linked disease is

(A) cancer
(B) hypertension
(C) colour blindness
(D) Down's syndrome

57. Variation in the genetic composition of an organism does NOT arise from

(A) mutation
(B) crossing over in meiosis
(C) the fusion of sperm and ovum
(D) growing a plant from cuttings

58. A species is BEST defined as a group of organisms that

(A) cannot interbreed
(B) are physically similar
(C) can interbreed and produce many offspring
(D) can interbreed and produce fertile offspring

59. Which of the following is true about natural and artificial selection?

	Natural Selection	Artificial Selection
(A)	Occurs in domestic populations	Occurs in natural populations
(B)	Involves genetic modification	Largely controlled by the environment
(C)	Produces organisms well adapted to natural habitat	Produces organisms with desirable traits/ characteristics
(D)	Faster process	Slower process

60. Which of the following statements about genetic engineering and natural selection is correct?

(A) Genetic engineering can change the phenotype of an organism faster than natural selection.
(B) Genetic engineering does not change the phenotype whereas natural selection does.
(C) Genetic engineering does not change the genotype whereas natural selection does.
(D) Both genetic engineering and natural selection do not change the genotype.

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.