



**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.

**FORM TP 2021049**

TEST CODE **01207010**

MAY/JUNE 2021

**CARIBBEAN EXAMINATIONS COUNCIL**

**CARIBBEAN SECONDARY EDUCATION CERTIFICATE®  
EXAMINATION**

**BIOLOGY**

**Paper 01 – General Proficiency**

*1 hour 15 minutes*

**01 JUNE 2021 (p.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?

**Sample Answer**

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

(A)  (B)  (C)  (D)

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.**

1. Which of the following features is used to classify a group of organisms as Class Insecta?

- (A) Size
- (B) Shape
- (C) Colour
- (D) Number of segments

2. Which of the following options correctly defines a niche and a habitat?

	Niche	Habitat
(A)	The role that an organism plays in the habitat	The place where an organism lives
(B)	The place where an organism lives	The role that an organism plays in the habitat
(C)	A community of living organisms which share the environment	The abiotic and biotic factors of the ecosystem
(D)	The biotic factors of the ecosystem where an organism lives	The abiotic factors of the ecosystem where an organism lives

3. Living organisms, such as plants, are affected by ABIOTIC factors which determine where they become established. Which of the following options lists some of these determining factors?

- (A) Sediment size, shape and colour
- (B) Sunlight availability, soil pH, minerals
- (C) Parasitism, commensalism, mutualism
- (D) Deforestation, slash and burn, shifting cultivation

4. Which of the following organisms are MOST important in biodegradation?

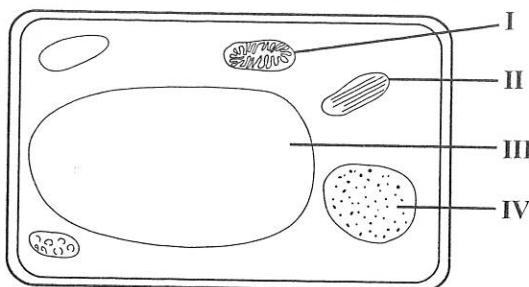
- (A) Bacteria
- (B) Vultures
- (C) Omnivores
- (D) Earthworms

5. A farmer notices pink mealy bugs in his garden. He is advised to introduce the ladybird beetle to control the mealy bugs. The type of relationship between the mealy bug and the ladybird beetle is described as

- (A) commensalism
- (B) predator-prey
- (C) mutualism
- (D) parasitism

6. Which of the following statements about recycling manufactured materials are true?
- I. Less energy is used in the manufacturing of new products by using the raw materials from recycled products.
  - II. Some manufactured products can be recycled.
  - III. Recycling of some non-biodegradable materials prevents landfill sites from filling up too quickly and for a long time.
- (A) I and II only  
(B) I and III only  
(C) II and III only  
(D) I, II and III
7. Approximately 10% of the energy stored in food is available to the next organism in a food chain because
- (A) most of the energy is lost as heat during the process of respiration  
(B) most of the energy is lost during the process of excretion  
(C) there are fewer consumers than producers in a food chain  
(D) many consumers compete for the same food source
8. Which of the following materials is considered to be non-biodegradable?
- (A) Grass cutting  
(B) Sardine can  
(C) Newspaper  
(D) Cloth
9. Replanting trees on a bare hillside is an example of
- (A) restoration and preservation  
(B) preservation and conservation  
(C) reafforestation and restoration  
(D) conservation and afforestation
10. The GREATEST threat to the survival of coral reefs is
- (A) increased dissolved oxygen levels  
(B) increased ocean temperatures  
(C) decreased greenhouse gases  
(D) decreased nitrogen levels
- Item 11 refers to the following graph of population growth.
- 
- The graph illustrates the four phases of population growth. The vertical axis is labeled "Number of organisms" and the horizontal axis is labeled "Time".
  - Phase 1: The initial rapid increase in population size.
  - Phase 2: The population reaches a peak and begins to level off.
  - Phase 3: The population stabilizes at a relatively constant level.
  - Phase 4: The population begins to decline, likely due to environmental factors.
11. Phase 4 of the graph of population growth is MOST likely due to
- (A) competition from invasive species  
(B) adequate food and space  
(C) a high natural birth rate  
(D) disease resistance
12. When compared to a cheek cell, a muscle cell contains more
- (A) vacuoles  
(B) ribosomes  
(C) mitochondria  
(D) chromosomes

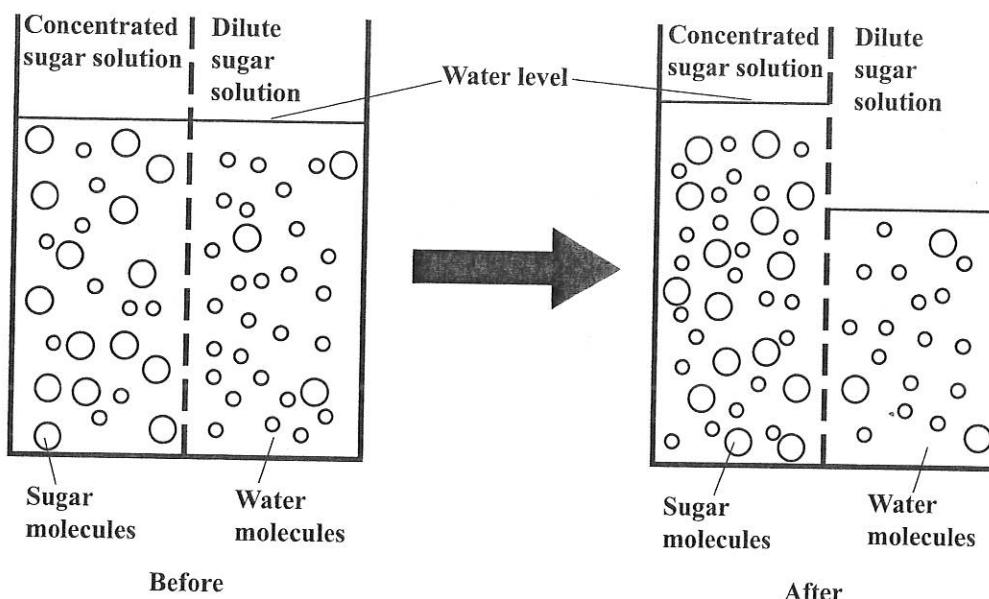
Item 13 refers to the following diagram of a cell.



13. Which of the labelled structures is responsible for controlling cellular activities?

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

Item 14 refers to the following diagrams which show a process by which substances are moved into and out of cells.



14. Which of the following options correctly identifies and describes the process occurring above?

	Process	Description
(A)	Diffusion	Water moving from concentrated to dilute solution
(B)	Osmosis	Water moving from dilute to concentrated solution
(C)	Diffusion	Sugar moving from dilute to concentrated solution
(D)	Osmosis	Sugar moving from concentrated to dilute solution

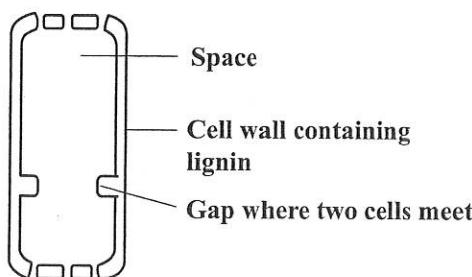
15. Which of the following functions is NOT correctly matched to the organelle?

	Function	Organelle
(A)	Osmotic control	Membrane
(B)	Protein synthesis	Chloroplast
(C)	Contains hereditary materials	Nucleus
(D)	Release of energy	Mitochondrion

17. Which of the following features does NOT enhance a leaf's ability to absorb solar energy?

- (A) Large surface area
- (B) Transparent cuticle
- (C) Presence of a vascular bundle
- (D) Presence of numerous chloroplasts in the palisade cells

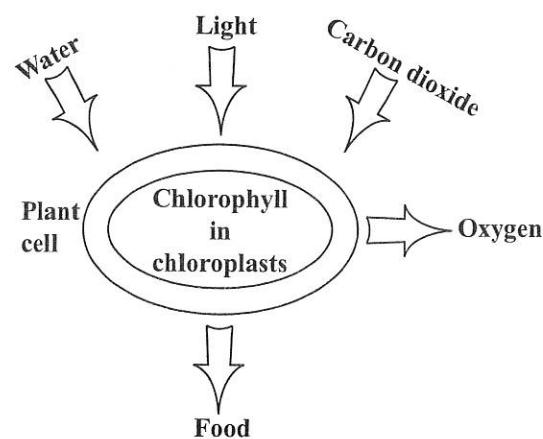
Item 16 refers to the following diagram which shows a xylem vessel.



16. The MAJOR feature that is responsible for the rigid structure of the xylem vessel is the

- (A) lignin
- (B) cell wall
- (C) space in the cells
- (D) gap where two cells meet

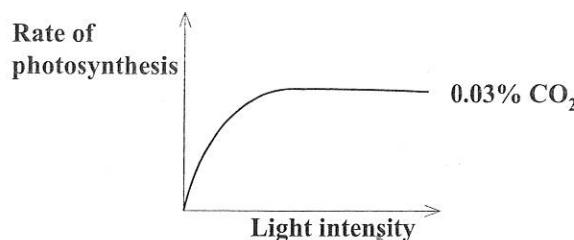
Item 18 refers to the following diagram which represents a metabolic process carried out in plants.



18. The food produced is

- (A) fat
- (B) glucose
- (C) protein
- (D) amino acid

Item 19 refers to the following graph of rate of photosynthesis vs light intensity.



19. Which of the following statements BEST accounts for the shape of the graph?
- (A) As photosynthesis rates increase, there is a decrease in carbon dioxide levels.
  - (B) As light intensity increases, the rate of photosynthesis also increases, until a stationary phase exists, when denaturation of the enzymes occurs.
  - (C) As carbon dioxide levels gradually increase, there is a similar increase in the rate of photosynthesis, until a plateau phase exists where no further increase in carbon dioxide results in any further increase in photosynthesis.
  - (D) As light intensity increases, there is an increase in photosynthesis, until there is no further increase in the rate due to some other limiting factor.

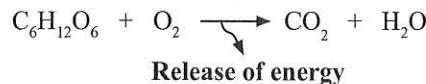
20. Which of the following organisms is a saprophyte?

- (A) Bread mould
- (B) Mango tree
- (C) Amoeba
- (D) Cat

21. An enzyme is BEST defined as a molecule which

- (A) increases the rate of a chemical reaction
- (B) decreases the rate of a chemical reaction
- (C) decreases the rate of a chemical reaction but remains unchanged at the end of the reaction
- (D) increases the rate of a chemical reaction but remains unchanged at the end of the reaction

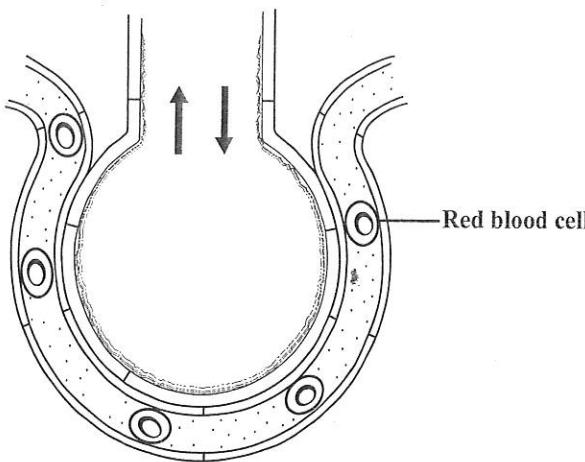
Item 22 refers to the following equation which shows the oxidation of glucose in cells.



22. The energy released from the process above is

- (A) converted to ADP
- (B) converted to ATP
- (C) stored in a high energy bond in ADP
- (D) stored in a high energy bond in ATP

Item 23 refers to the following diagram of a respiratory structure.



23. The respiratory structure shown above is that of

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

24. Which of the following is an effect of carbon monoxide found in cigarette smoke?

- (A) Increased heart rate
- (B) Increased beating of cilia
- (C) Reduced oxygen transport by the blood
- (D) Increased mucus production in the cells lining the respiratory passage

25. Why is it difficult to develop a vaccine for the common cold?

- (A) Vaccines cannot be developed for viruses.
- (B) The antigens on the common cold virus remain the same.
- (C) The antigens on the common cold virus change frequently.
- (D) Human beings cannot produce antibodies for the common cold.

26.

In heart bypass surgery, an artery is advantageous over a vein to bypass the blockage because

- (A) arteries have thicker, more muscular walls than veins
- (B) veins allow blood to flow in one direction
- (C) arteries carry blood away from the heart
- (D) veins carry only deoxygenated blood

27.

Which of the following options BEST identify some of the transport substances in animals?

- I. Amino acids
- II. Hormones
- III. Glucose

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

28.

In the transport of solutes in the phloem, the source is defined as any area of the plant where

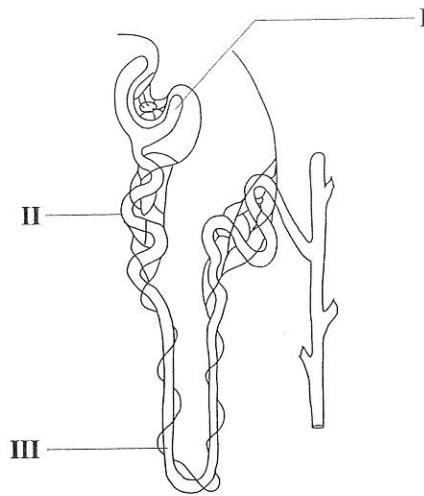
- (A) water is taken out of the phloem
- (B) water is loaded into the phloem
- (C) sucrose is loaded into the phloem
- (D) sucrose is taken out of the phloem

29.

Under which conditions will the rate of transpiration in plants be HIGHEST?

- (A) Sunny and low wind speed
- (B) Sunny and high wind speed
- (C) Cloudy and low wind speed
- (D) Cloudy and high wind speed

Item 30 refers to the following diagram of a mammalian kidney nephron.



30. Which option correctly relates to the processes occurring in the parts labelled I, II and III?

	I	II	III
(A)	Ultrafiltration	Water conservation	Selective reabsorption
(B)	Ultrafiltration	Selective reabsorption	Water conservation
(C)	Water conservation	Under the influence of ADH	Urine production
(D)	Selective reabsorption	Ultrafiltration	Under the influence of ADH

31. The BEST description of the role of excretion in living organisms is to

- (A) produce urine
- (B) produce faeces
- (C) get rid of toxic waste
- (D) get rid of excess water

32. Which of the following is NOT a form of excretion in plants?

- (A) Carbon dioxide diffusing in, through the stomata
- (B) Substances being stored in the bark of a tree
- (C) Water vapour diffusing out, through the epidermis
- (D) Calcium oxalate crystals being stored in leaves during leaf fall

33. Which of the following correctly describe(s) movement in plants?

- I. Growth movement
  - II. Part movement
  - III. Whole body movement
- (A) I only
  - (B) I and II only
  - (C) II and III only
  - (D) I, II and III

34. In humans, the skeletal system performs a variety of functions including

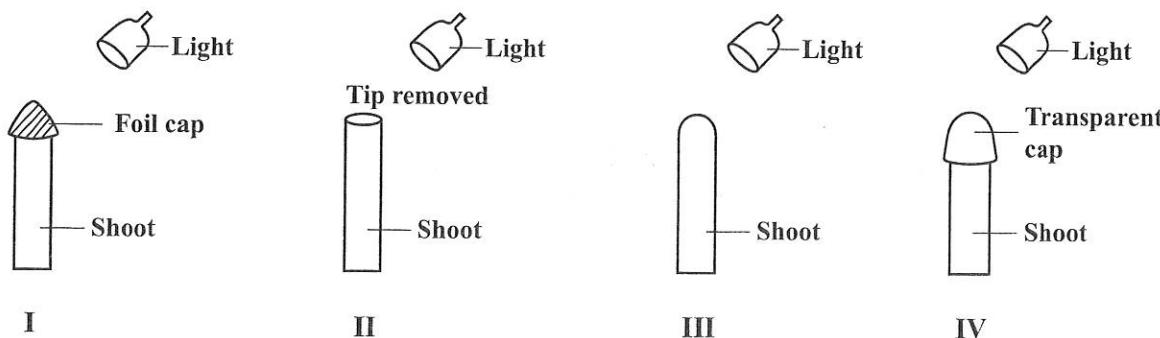
- (A) blood cell formation
- (B) hormone formation
- (C) immune response
- (D) mastication

GO ON TO THE NEXT PAGE

35. Locomotion is important to animals for

- I. avoiding predators
  - II. acquiring food and shelter
  - III. reproduction
- (A) I and II only  
(B) I and III only  
(C) II and III only  
(D) I, II and III

Item 36 refers to the following diagrams illustrating an experiment.



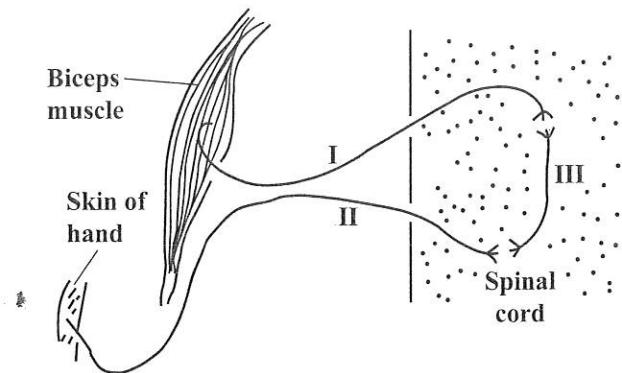
36. After a few days the TALLEST shoot would MOST likely be

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

37. Which of the following options BEST describes the terms 'stimulus' and 'response'?

	Stimulus	Response
(A)	A deliberate provocation of an organism	The movement of an organism
(B)	An organism's exposure to sunlight	The growth of an organism away from light
(C)	A wave of excitement in an organism	Locomotion of an organism
(D)	A detectable change in an organism's environment	An organism's reaction to a stimulus

Item 38 refers to the following diagram of a spinal reflex.



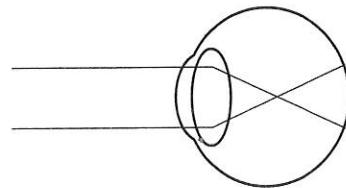
38. The numbered structures are

	I	II	III
(A)	sensory neurone	motor neurone	relay neurone
(B)	sensory neurone	relay neurone	motor neurone
(C)	motor neurone	sensory neurone	relay neurone
(D)	motor neurone	relay neurone	sensory neurone

39. The role of an effector is to

- (A) detect a stimulus
- (B) respond to a stimulus
- (C) create a nerve impulse
- (D) relay a nerve impulse

Item 40 refers to the following diagram of an eye which shows nearsightedness.



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

	Lens	Bending of Light Rays Before Entering the Eye
(A)	Diverging	Outwards
(B)	Diverging	Inwards
(C)	Converging	Outwards
(D)	Converging	Inwards

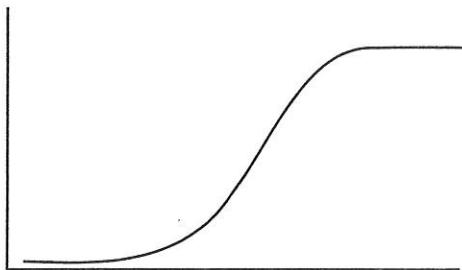
41. The following statements describe the processes taking place within a seed during germination.

- I. The embryo uses food to develop the 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
- (D) II → III → I

Item 42 refers to the following graph which illustrates a measurement of growth in living organisms.



42. Which of the following is an INCORRECT label for the y-axis?

- (A) Mass
- (B) Length
- (C) Units of time
- (D) Number of leaves

Item 43 refers to the following activities involved in the menstrual cycle.

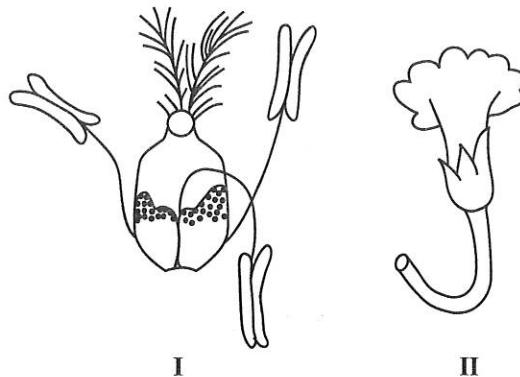
- I. Repair of the uterine lining
- II. Ovulation
- III. Shedding of the uterine lining
- IV. Development of the Graafian follicle

43.

Which of the following sequences shows the correct order of activities?

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

Item 44 refers to the following diagrams of flowers from two different types of plants.



44.

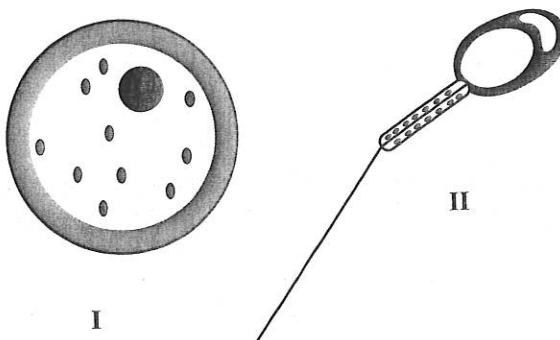
Which of the following statements is true for both flowers?

- (A) Both are wind pollinated.
- (B) Petals are absent from both I and II.
- (C) Both are pollinated by a hummingbird.
- (D) I is pollinated by the wind; II is pollinated by a hummingbird.

45. Which of the following shows the correct sequence for seed formation after fertilization?

- (A) Ovule → zygote → embryo → seed
- (B) Ovule → embryo → seed → zygote
- (C) Embryo → ovule → zygote → seed
- (D) Embryo → zygote → ovule → seed

Item 46 refers to the following diagrams of specialized cells.



46. Which of the following structures is common to both cells?

- (A) Cilium
- (B) Nucleus
- (C) Cell wall
- (D) Acrosome

47. Which of the following forms of birth control is MOST likely to be 100% effective?

- (A) Condom
- (B) Diaphragm
- (C) Tubal ligation
- (D) Birth control pill

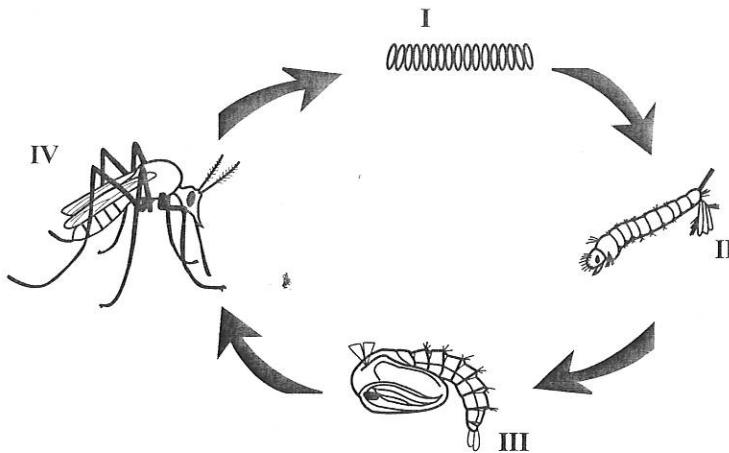
48. A vector is defined as an organism that

- (A) bites humans
- (B) causes diseases
- (C) lives on other organisms
- (D) transmits disease organisms

49. A 60-year-old man has been diagnosed with hypertension as well as diabetes. Which of the following treatments would be MOST effective for the management of BOTH diseases?

- (A) Exercising and lowering the intake of salt and refined carbohydrates
- (B) Spending more time relaxing
- (C) Starting a rigorous exercise programme
- (D) Taking insulin injections

Item 50 refers to the following diagram which shows the life cycle of a vector.



50. At which stage is this vector easily controlled by the use of aerosol insecticides?

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

51. Which of the following options BEST describes a chromosome?

- (A) Two forms of the same gene
- (B) Structure made up of DNA wrapped around histones
- (C) Nucleic acid that contains all genetic information
- (D) Part of the DNA which carries genetic information to produce a protein

52. If a diploid organism has two different alleles for the same gene, it is described as being

- (A) heterozygous
- (B) homozygous
- (C) dominant
- (D) recessive

53. 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 doubles the number of chromosomes in gametes.
- (D) It causes haploid cells to form from diploid cells.

54. Tarzan and Jane are heterozygous for blood groups A and B respectively. Which of the following shows all of the possible results of their genetic cross?

- (A) 100% AB
- (B) 50% A: 50% AB
- (C) 25% AB: 50% B: 25% O
- (D) 25% A: 25% B: 25% AB: 25% O

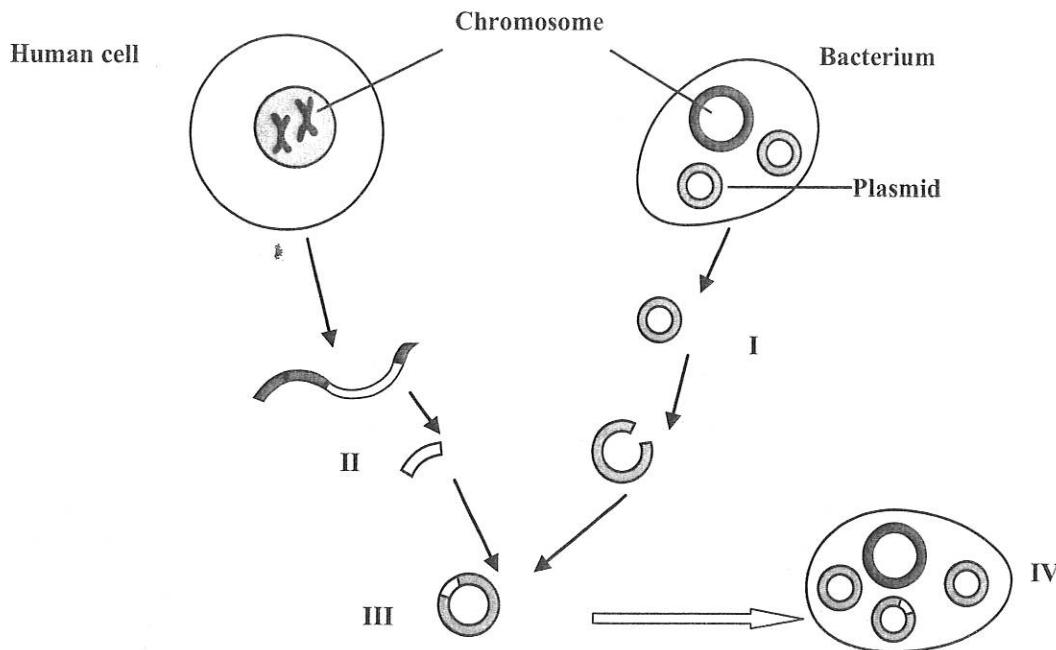
55. As a result of mitosis, each daughter cell has
- (A) a variable number of chromosomes  
(B) twice the number of chromosomes as the parent cell  
(C) the same number of chromosomes as the parent cell  
(D) half the number of chromosomes as the parent cell
56. One example of a sex-linked disease is
- (A) cancer  
(B) hypertension  
(C) colour blindness  
(D) down syndrome
57. Variation in a population is due to
- I. mutation  
II. crossing over  
III. asexual reproduction
- (A) I and II only  
(B) I and III only  
(C) II and III only  
(D) I, II and III
58. A species consists of members that
- (A) occupy the same habitat  
(B) reproduce by asexual means  
(C) interbreed under natural conditions  
(D) interbreed to produce fertile offspring

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59. Which of the following descriptions is true for 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 great biological diversity	Produces very different organisms from natural populations
(D)	Is a faster process	Is a slower process

Item 60 refers to the following diagram which shows Stages I, II, III and IV in the production of insulin by genetic engineering.



60. In which of the stages above can insulin be produced by the bacterium?

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

**END OF TEST**

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