EtG

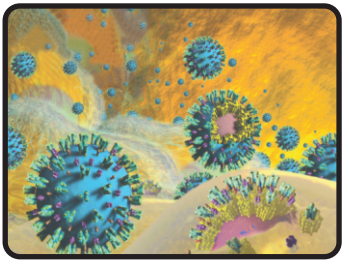
OLYMPIAD EXPLORER

BIOTECHNOLOGY

EduHeal Foundation
Nationwide Biotechnology Olympiad

and other

National/International Biotechnology Olympiads/Talent Search Exams.



Class-9

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(For additional science topics the child can also refer to science work books)

SYLLABUS GUIDELINES

CLASS - IX

Based on CBSE, ICSE & GCSE Syllabus & NCF guidelines devised by NCERT

Higher yields

What do we do to get higher yields in our farms? How Biotechnology plays a key role in this?

Material in our clothing

What kinds of clothes help us keep cool?

Why do wet clothes feel cool?

Different kinds of materials

In what way are materials different from each otther?

Is there some similarity in materials?

In how many ways can you group the diifferent materials you see around?

How do materials and gases differ from each other?

Can materials exist in all the three states?

What are things made of?

What are the various types of chemical substances?

Do substances combine in a definite manner?

How do things combine with each other?

Are there any patterns which can help us guess how things will combine with each other?

How do chemists weigh and count particles of matter?

What is there inside an atom?

Can we see an atom or a molecule under a microscope or by some other means?

What is there inside an atom?

What is nanotechnology? What is nanobiotechnology?

Biological Diversity

How do the various plants around us differ from each other?

How are they similar? What about animals? How are they similar to and different from each other?

What is biodiversity and how Biotechnology is useful in preserving it?

What is the living being made up of?

What are we made up of?

What are the different parts of our body? What is the smallest living unit?

How do we fall sick?

What are the various causes of diseases?

How can diseases be prevented?

How can we remain healthy?

What are edible vaccines?

What are vaccines and how Biotechnology helps in their production?

How do substances move from cell to cell?

How do food and water move from cell to cell? How do gases get into the cells?

What are the substances that living organisms exchange with the external world? How do they obtain these substances?

Motion

How do we describe motion?

Force and Newton's laws

What makes things change their state of motion?

Gravitation

What makes things fall?

Do all things fall in the same way?

Work, energy and power

How do we measure work done in moving anything? How does falling water make a mill run?

Floating bodies

How does a boat float on water?

How do we hear from a distance?

How does sound travel?

What kind of sounds can we hear?

What is an echo?

How do we hear?

HOW THINGS WORK NATURAL PHENOMENA

NATURAL RESOURCES

Balance in Nature

Why do air, water and soil seem not to be consumed?

How does the presence of air support life on earth? How have human activities created disturbances in the atmosphere?

How does nature work to maintain balance of its components?

What key role BT is playing in maintaining ecological balance

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Chapter 1 FUNDAMENTAL UNIT OF LIFE: CELL

Q.1. The centriole is most like the
(a) Chromatin (b) Cytoplasm
(c) Flagella (d) None of these

Q.2. Which part of the cell serves to process, package and Export protein?
(a) Golgi apparatus (b) Endoplasmic Reticulum
(c) Mitochondria (d) None of these

Q.3. Nuclear region without the Nuclear membrane is called
(a) Endoplasmic Reticulum
(b) Nucleus
(c) Nucleoid (d) None of these

Q.4. Chromosomes are found in_____of cells
(a) The cytoplasm (b) The Nucleus
(c) Both (a) and (b) (d) None of these

Q.5. The Jelly like substances present between the nucleus and cell membrane
(a) Protoplast (b) Chloroplast
(c) Cytoplasm (d) None of these

Q.6. Plastids which provide colour to different flowering parts and fruits are
(a) Chromoplasts (b) Leucoplasts
(c) Chloroplasts (d) None of these

Q.7. The cell organelle found only in plants
(a) Ribosomes (b) Mitochondria
(c) Plastids (d) None of these

Q.8. What is the function of vacuoles?
(a) They provide turgidity and rigidity to the cell
(b) They are storage sacs
(c) Both (a) and (b)
(d) None of these

Q.9. Lysosomes are called as
(a) Power house of the cell
(b) Kitchens of the cell
(c) Suicidal bags
(d) None of these

Q.10. ATP, a high energy molecule stands for
(a) Adenine triple phosphate
(b) Adenine tri phosphate
(c) Adenosine triphosphate
(d) None of these

Q.11. The synthesis, storage and release of ATP for cellular activities takes place in
(a) Mitochondira (b) Ribosomes
(c) Lysosomes (d) None of these

Q.12. The Ribosomes are chemically composed of
(a) Protein and RNA (b) DNA and RNA
(c) Protein and DNA (d) None of these

Q.13. Protein synthesis takes place in
(a) Mitochondria (b) Golgi apparatus
(c) Ribosome (d) None of these

Q.14. A cell that is missing Lysosomes would have difficulty in doing what?
(a) Packaging protein (b) Digesting food
(c) Storing energy (d) None of these

Q.15. The Golgi apparatus is present in
(a) Prokaryotic cells (b) Plant cells
(c) Eukaryotic cells (d) None of these

Q.16. Chromosomes are composed of
(a) DNA and RNA (b) DNA and Protein
(c) DNA (d) None of these

Q.17. Root hair absorbs water from soil through
(a) Diffusion (b) Osmosis
(c) Both (a) and (b) (d) None of these

Q.18. How carbon dioxide and oxygen move across cell membrane?
(a) By diffusion (b) By pressure
(c) By osmosis (d) None of these

Q.19. What is plasmolysis?
(a) When plant cell swells up with water through osmosis
(b) When plant cell does not lose or gain water
(c) When plant cell loses water through osmosis
(d) None of these

Q.20. Power house of cell is
(a) Golgi Apparatus (b) Endoplasmic Reticulum
(c) Mitochondria (d) None of these

Q.21. If the medium surrounding the cell has exactly the same water concentration as inside the cell, then it is
(a) Hypertonic solution (b) Isotonic solution
(c) Hypotonic solution (d) None of these

Q.22. If the medium surrounding the cell has a higher water concentration than that inside the cell, then it is
(a) Hypotonic solution (b) Isotonic solution
(c) Hypertonic solution (d) None of these

Q.23. What are the functions of nucleus?
(a) It helps in transmission of character from one generation to next
(b) It helps in cell division
(c) Both (a) and (b)
(d) None of these

Q.24. The cell organelle that controls all the activities, is
(a) Nucleus (b) Vacuoles
(c) Mitochondria (d) None of these

Q.25. The cell organelle found only in plant is
(a) Plastids (b) Mitochondria
(c) Ribosome (d) None of these

Q.26. The cell wall in plant cell is
(a) Non-permeable (b) Semipermeable
(c) Permeable (d) None of these

Q.27. Bacteria do not have
(a) Cell membrane (b) Cell nucleus
(c) Cell wall (d) None of these

Q.28. Which of the following is non-living?
(a) Protoplasm (b) Cell wall
(c) Plasma membrane (d) None of these

Q.29. What we find in all cells?
(a) Cell membrane (b) nucleus
(c) Cell wall (d) None of these

Q.30. Cells that do not produce cell wall are
(a) Plant cells (b) Bacteria
(c) Animal cells (d) None of these

Q.31. The largest cell in human body is
(a) Liver cell (b) Nerve cell
(c) Kidney cell (d) None of these

Q.32. Fungi, plants and animals are
(a) Multicellular organisms (b) Unicellular organisms
(c) Both (a) and (b) (d) None of these

Q.33. When a single cell constitute the entire organism, it is called
(a) Multi cellular organism (b) Single cellular organism
(c) Unicellular organism (d) None of these

Q.34. Who discovered nucleus in the cell?
(a) Camillo Golgi (b) Robert Hooke
(c) Robert Brown (d) None of these

Q.35. The term cell was coined by
(a) Robert Hooke (b) Brown Fleming
(c) Robert Brown (d) None of these

TRUE OR FALSE

Write T for True and F for False in the given statement

Q.36. Plant cells have small vacuoles.

Q.37. Chloroplasts are green coloured plastids.

Q.38. Diffusion across membrane depends upon surface area.

Q.39. A cell placed in hypotonic solution will shrink.

Q.40. Nucleus, Mitochondria and chloroplast have double membrane.

Q.41. Genes are the functional segment of DNA.

Q.42. Dead cells can undergoes osmosis.

Q.43. All cells in multicellular organisms comes from pre-existing cells.

Q.44. Chlamydomonas is multi cellular organism.

Q.45. The cell wall found in plant cell is non-living.

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ANSWERS

1.	(c)	2.	(a)	3.	(c)	4.	(b)	5.	(c)	6.	(a)	7.	(c)	8. (c)
9.	(c)	10.	(c)	11.	(a)	12.	(a)	13.	(c)	14.	(b)	15.	(c)	16. (b)
17.	(b)	18.	(a)	19.	(c)	20.	(c)	21.	(b)	22.	(c)	23.	(c)	24. (a)
25.	(a)	26.	(c)	27.	(b)	28.	(b)	29.	(a)	30.	(c)	31.	(b)	32. (c)
33.	(c)	34.	(c)	35.	(a)	36.	(F)	37.	(T)	38.	(T)	39.	(F)	40. (T)
41.	(T)	42.	(F)	43.	(T)	44.	(F)	45.	(T)					

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Chapter 2 TISSUES IN PLANTS AND ANIMALS

Q.1. The structural and functional unit of nerve cell is
(a) Dendrite (b) Nucleus
(c) Neuron (d) None of these

Q.2. Which is the largest cell of human body?
(a) Nerve cell (b) Cells of arms
(c) Cells of legs (d) None of these

Q.3. Which tissue is specialized for receiving and transmitting impulses?
(a) Meristematic tissue (b) Nervous tissue
(c) Connective tissue (d) None of these

Q.4. Striated muscles are
(a) Involuntary muscles (b) Voluntary muscles
(c) Both (a) and (b) (d) None of these

Q.5. Cardiac muscles are found in
(a) Heart (b) Arms
(c) Uterus (d) None of these

Q.6. Which tissue contributes to the hardness of seed coat?
(a) Epidermis (b) Sclerenchyma
(c) Collenchyma (d) None of these

Q.7. The muscle fibre which is long, cylindrical and shows striations is called
(a) Unstriated muscles (b) Striated muscles
(c) Both (a) and (b) (d) None of these

Q.8. The important features of Striated muscles are that they are
(a) Multinucleated (b) Voluntary
(c) Both (a) and (b) (d) None of these

Q.9. The tissue which is responsible for movement in our body is
(a) Muscular tissue (b) Nervous tissue
(c) Connective tissue (d) None of these

Q.10. Adipose tissue found under the skin is specific for storing
(a) Carbohydrates (b) Fats
(c) Proteins (d) None of these

Q.11. Cartilage is found in
(a) External ear (b) Tip of nose
(c) Both (a) and (b) (d) None of these

Q.12. Tendons are
(a) Tough and inelastic (b) Soft and inelastic
(c) Tough and elastic (d) None of these

Q.13. Ligaments connect bone to bone whereas tendons connect
(a) Muscles to muscles (b) Bone to cartilage
(c) Muscles to bones (d) None of these

Q.14. Blood is a type of
(a) Tissue (b) Fluid
(c) Cell (d) None of these

Q.15. Simple Squamous, Stratified Squamous, Ciliated Columnar and Cuboidal are the types of
(a) Connective tissues (b) Muscular tissues
(c) Epithelial tissues (d) None of these

Q.16. The animal tissue that covers most organs and cavities within the body is
(a) Bone (b) Epithelial tissue
(c) Cartilage (d) None of these

Q.17. Stomata are enclosed by two kidney shaped cells called
(a) Epidermal cells (b) Guard cells
(c) Nerve cells (d) None of these

Q.18. The outer covering of all plants are made up of
(a) Vascular tissue (b) Muscular tissue
(c) Epidermal tissue (d) None of these

Q.19. The main function of xylem is to
(a) Transport water and minerals to various parts of plants
(b) Transport food and material from roots to leaves
(c) Both (a) and (b)
(d) None of these

Q.20. The vascular tissue which transport food from leaves to other part in plants is called
(a) Xylem (b) Parenchyma
(c) Phloem (d) None of these

Q.21. Xylem and phloem constitute together to make
(a) Muscular tissues (b) Meristematic tissues
(c) Vascular tissues (d) None of these

Q.22. Tracheids & Vessels are the main components of
(a) Parenchyma (b) Xylem
(c) phloem (d) None of these

Q.23. Which tissue in plants is concerned with photosynthesis?
(a) Sclerenchyma (b) Collenchyma
(c) Parenchyma (d) None of these

Q.24. Which of the function is not performed by parenchyma?
(a) Stores food
(b) Provides support to plant
(c) Provides flexibility to plants
(d) None of these

Q.25. Parenchyma cells having chloroplasts with main function of photosynthesis is termed as
(a) Chloroplasts (b) Chlorenchyma
(c) Sclerenchyma (d) None of these

Q.26. Which of these tissues in plants consists of dead cells?
(a) Collenchyma (b) Sclerenchyma
(c) Parenchyma (d) None of these

Q.27. What are the three main types of simple permanent tissue?
(a) Parenchyma, sclerenchyma, collenchyma
(b) Sclerenchyma, phloem, collenchyma
(c) Xylem, phloem, parenchyma
(d) None of these

Q.28. The tissue that had lost the power of cell division is
(a) Permanent tissue (b) Meristematic tissue
(c) Both (a) and (b) (d) None of these

Q.29. The need of tissues in multicellular organism arises due to
(a) Increase in movement of body
(b) Increase in structure of body
(c) Increase in size of body
(d) None of these

Q.30. What are meristematic cells?
(a) A group of different cells which can combine and form new cells
(b) A group of similar cells which can divide and form new cells
(c) A group of dead cells
(d) None of these

Q.31. Height of plant increases as the result of division in
(a) Epidermal tissue (b) Vascular tissue
(c) Meristematic tissue (d) None of these

Q.32. Where is Apical meristem found?
(a) At the growing tips of stems and roots
(b) At the lateral sides of stems and roots
(c) At the base of the leaves
(d) None of these

Q.33. Meristematic tissues are classified as
(a) Simple and complex
(b) Parenchyma, chlorenchyma and sclerenchyma
(c) Apical, lateral and intercalary
(d) None of these

Q.34. All the cells of a tissue are
(a) Similar in structure but different in function
(b) Different in structure but similar in function
(c) Similar in both structure and function
(d) None of these

Q.35. Group of cells having a common origin and performing similar functions are called
(a) Organs (b) Tissues
(c) Cells (d) None of these

True or False

Write T for True F for False in the given statement

Q.36. Nerve cells are the smallest cells of the body.

Q.37. Cardiac muscles are found in the heart.

Q.38. Smooth muscles are also called involuntary muscles.

Q.39. Cartilages have space between the cells, so it can bend.

Q.40. The Columnar epithelia tissue having hair-like projection are found in respiratory tract.

Q.41. The Parenchyma tissue containing chlorophyll is called Sclerenchyma.

Q.42. Cells of meristematic tissue differentiate to form different types of permanent tissues.

Q.43. Meristematic tissues do not have vacuoles.

Q.44. Ligament and blood are connective tissue.

Q.45. Bone is a flexible tissue.

Q.46. Muscular tissue form the covering of the external and internal organs.

Q.47. Height of plant increases as a result of division in vascular tissue.

Q.48. The opening and closing of stomata is controlled by guard cells.

Q.49. Permanent tissues helps in the growth of plants.

Q.50. The plants are covered by epidermal tissue.

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ANSWERS

1. (c)	2. (a)	3. (b)	4. (b)	5. (a)	6. (b)	7. (b)	8. (c)
9. (a)	10. (b)	11. (c)	12. (a)	13. (c)	14. (a)	15. (c)	16. (b)
17. (b)	18. (c)	19. (a)	20. (c)	21. (c)	22. (b)	23. (b)	24. (c)
25. (b)	26. (b)	27. (a)	28. (a)	29. (c)	30. (b)	31. (c)	32. (a)
33. (c)	34. (c)	35. (b)	36. (F)	37. (T)	38. (T)	39. (T)	40. (T)
41. (F)	42. (T)	43. (T)	44. (T)	45. (F)	46. (F)	47. (F)	48. (T)
49. (F)	50. (T)						

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NATIONWIDE BIOTECHNOLOGY OLYMPIAD (NBTO) SAMPLE PAPER

Total duration : 60 Minutes **Total Marks :** 50

GENERAL KNOWLEDGE

1. Which of the following household materials is considered hazardous waste?
(a) plastic packaging (b) glass
(c) batteries (d) spoiled food

2. What day is Earth Day celebrated?
(a) March 25 (b) April 22
(c) August 20 (d) November 15

3. The number one cause of tropical deforestation worldwide is
(a) Commerical logging (b) Wildfire
(c) Clearing of lands for agricultural use
(d) Gathering of firewood

4. Which country is the 'greenest'?
(a) Switzerland (b) Germany
(c) Japan (d) Spain

5. What are greenhouse gases?
(a) Other words for inert gases
(b) Fuel used by farmers
(c) Vapors rising off greenhouses
(d) Heat-trapping atmospheric gases

6. Does global warming mean that every place on Earth is getting warmer?
(a) No, just summers are warmer (b) No, but world average is rising
(c) Yes, every spot on Earth is hotter (d) No, only certain spots

7. In the average home, which of the following uses the most water?
(a) flushing the toilet (b) filling the bathtub
(c) taking a 10-minute shower (d) washing one load of clothes

8. What do some scientists believe will happen to deserts?
(a) They will become wet grasslands (b) They will remain the same
(c) They will expand
(d) They will disappear and become water bodies

9. Which substance makes the most potent greenhouse gas?
(a) Carbon (b) Methane
(c) Water (d) Hydrochloric acid

10. Which of these is not a natural resource?
(a) Trees (b) Petroleum
(c) Soil (d) Plastic

LIFE SCIENCE

11. What is the name of the first cloned animal?
(a) Andi (b) Copycat
(c) Dolly (d) None of these

12. In India, the largest number of biotech companies operate in which segment?
(a) Agriculture (b) Vaccines (c) Enzymes (d)None of these

13. Put the following in order
A. Identification of desired clone.
B. Isolation of plasmid DNA and DNA containing gene of interest.
C. Recombinant bacterium.
D. Product of the desired gene.
E. Recombinant DNA plasmid.
(a) B, C, E, A , D (b) E, C, B, E, A
(c) B, E, C, A, D (d) None of these

14. What is karyotype?
(a) Characteristics of chromosome of a species
(b) Characteristics of nucleolus of a species
(c) Characteristics of endoplasmic reticulum of species
(d) Characteristics of multiple allele of different genotype.

15. Application of nitrogenous manure to a plant causes
(a) Early flowering (b) Early fruiting
(c) Vigorous vegetative growth
(d) None of these

16. Which of the following is bisexual?
(a)  (b)  (c)  (d) All of these

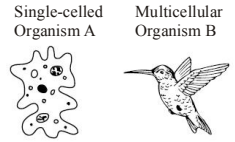
17. Karyokinesis is
(a) Similar to cytokinesis (b) Division of nucleus
(c) Division of cytoplasm (d) None of these

18. Fumigants are used for
(a) Increasing nutrients of plants
(b) Killing insects harming food grains
(c) Preserving food material
(d) None of these

19. Rapid increase in egg production is called
(a) White revolution (b) Blue revolution
(c) Silver revolution (d) None of these

20. Which process is directly used by autotrophs to store energy in glucose?
(a) Diffusion (b) Respiration
(c) Photosynthesis (d) None of these

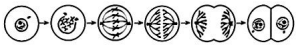
21. Two organisms are represented below.



Which statement concerning organism A and organism B is correct?
(a) Organism A contains tissues while organism B lacks tissues.
(b) Organism A and organism B have the same organs.
(c) Organism A and organism B have the structure that allow them to maintain homoeostasis.
(d) Organism A lacks structures that maintain a dynamic equilibrium, while organism B has these structures.

22. The great variety of possible gene combinations in a sexually reproducing species is due in part to the
(a) Sorting of genes as a result of gene replication
(b) Pairing of genes as a result of mitosis
(c) Pairing of genes as a result of differentiation
(d) Sorting of genes as a result of meiosis

23. Which activity most directly involves the process represented in the diagram below?



(a) a gamete reproducing sexually
(b) a white blood cell engulfing bacteria
(c) a zygote being produced in an ovary
(d) an animal repairing damaged tissue

24. Which sequence of terms represents a *decrease* from the greatest number of structures to the least number of structures present in a cell?
(a) Nucleus → gene → chromosome
(b) Gene → nucleus → chromosome
(c) Gene → chromosome → nucleus
(d) Chromosome → gene → nucleus

25. Gases move into intercellular spaces in leaves through openings known as
(a) Stomates (b) Phloem tubes
(c) Lenticels (d) Xylem tubes

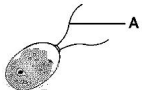
26. Which process is *least* likely to add to the variety of traits in a population?
(a) Deletion of bases from DNA
(b) Genetic engineering
(c) Accurate replication of DNA
(d) Exchange of segments between chromosomes

27. Which statement is true of both mitosis and meiosis?
(a) Both are involved in asexual reproduction.
(b) Both occur only in reproductive cells.
(c) The number of chromosomes is reduced by half.
(d) DNA replication occurs before the division of the nucleus.

28. The hydra and the amoeba are similar in that both organisms
(a) Eliminate ammonia and carbon dioxide through the idle membrane
(b) Move by means of pseudopods
(c) Surround prey with tentacles
(d) Carry out both intracellular and extracellular digestion

29. Which organism is correctly paired with its main adaptation for gas exchange?
(a) Amoeba - Nucleus
(b) Earthworm - Nephridia
(c) Grasshopper - Tracheal tubes
(d) Human - Skin

30. The diagram below represents a green alga.



Which process is most closely associated with structure A?
(a) Excretion (b) Locomotion
(c) Transport (d) Reproduction.

31. A change in genetic material that produces a variation in a species may be a result of
(a) A mutation (b) Competition
(c) Overproduction of a species
(d) A struggle for survival

32. Mixed cropping is useful when
(a) Crops with different nutritional requirements are sown
(b) Crops with varying maturity periods are sown together
(c) Crops with same maturity periods are sown together
(d) None of these

33. HIV stands for
(a) High Immuno Deficiency Virus
(b) Human Immuno Deficiency Virus
(c) Health Infectious Virus (d) None of these

34. The number of which of the cell components remain fixed for a particular species :
(a) Mitochondria (b) Lysosome
(c) Chromosome (d) None of these

35. Infective stage of malaria is
(a) Merozoite (b) Trophozoite

(c) Sporozoite (d) None of these

36. Cell theory was put forward by
(a) Watson and Crick (b) Sutton and Boveri
(c) Schleiden and Schwann (d) None of these

37. To which phylum does the animal shown in the picture belong to?
(a) Annilida (b) Arthropoda
(c) Mollusca (d) None of these

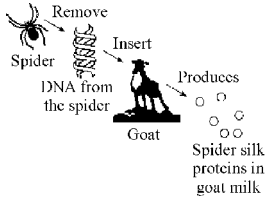
38. Which of the following is not a viral disease?
(a) Mumps (b) AIDS (c) Flu (d) None of these

39. Fertilizers should be used carefully because
(i) They can cause water pollution
(ii) Increase in soil fertility is short lived
(iii) They can be harmful to the micro organisms present in soil
(a) (i) and (ii) only (b) (ii) and (iii) only
(c) (i), (ii) and (iii) all (d) None of these

40. What is the main target organ for malarial parasite
(a) Stomach (b) Liver
(c) Lymph node (d) None of these

INTERACTIVE QUESTIONS

41. Which process is illustrated in the diagram below?

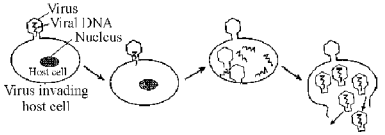


(a) Chromatography (b) Meiosis
(c) Genetic engineering (d) None of these

42. All of the cell shapes shown in the diagrams below have the same volume. Which form could absorb nutrients most efficiently and quickly?

(a)  (b)  (c)  (d) 

43. Viral activity is represented in the diagram below.



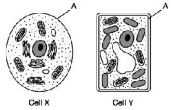
Invading the host cell enables the virus to

(a) Increase its size (b) Obtain nutrients
(c) Synthesize needed oxygen
(d) Reproduce

44. Which organism represented below is often described as a sessile organism?

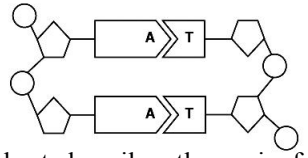
(a)  (b)  (c)  (d) 

45. The diagram below represents two cells, *X* and *Y*



Which statement is correct concerning the structure labeled *A*?
(a) It aids in the removal of metabolic wastes in both cell *X* and cell *Y*.
(b) It is involved in cell communication in cell *X,* but not in cell *Y*.
(c) It prevents the absorption of CO_2 in cell *X* and O_2 in cell *Y*.
(d) It represents the cell wall in cell *X* and the cell membrane in cell *Y*.

46. A portion of a molecule is shown in the diagram below.



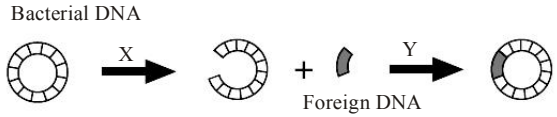
Which statement best describes the main function of this type of molecule?
(a) It is a structural part of the cell wall.
(b) It stores energy for metabolic processes.
(c) It determines what traits may be inherited.
(d) It transports materials across the cell membrane.

47. Some human body cells are shown in the diagrams below.

(A)  Cells from skin (B)  Blood cells (C)  Cells from lining of bladder (D)  Cells from lining of trachea

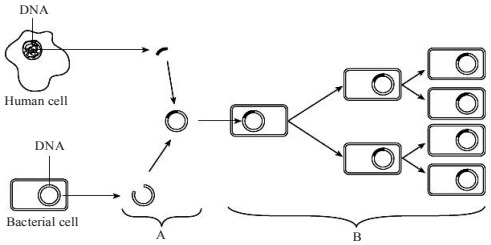
These groups of cells represent different
(a) Tissues in which similar cells function together
(b) Organs that help to carry out a specific life activity
(c) Systems that are responsible for a specific life activity
(d) Organelles that carry out different functions

48. The diagrams below represent some steps in a procedure used in biotechnology.



Letters *X* and *Y* represent the
(a) Hormones that stimulate the replication of bacterial DNA
(b) Biochemical catalysts involved in the insertion of genes into other organisms
(c) Hormones that trigger rapid mutation of genetic information
(d) Gases needed to produce the energy required for gene manipulation

Base your answers to questions 49 and 50 on the diagram below.



49. In the procedure indicated by letter A, DNA segments from humans and bacteria are joined by the action of
(a) Starch molecules (b) Enzymes
(c) Simple sugars (d) Hormones

50. Which process indicated by letter B?
(a) Natural selection (b) Asexual reproduction
(c) Sexual reproduction (d) Gene deletion

☺ END OF THE EXAM ☺

ANSWERS

1. (c)	**2.** (b)	**3.** (c)	**4.** (a)	**5.** (d)
6. (b)	**7.** (c)	**8.** (c)	**9.** (c)	**10.** (d)
11. (b)	**12.** (c)	**13.** (c)	**14.** (a)	**15.** (c)
16. (a)	**17.** (b)	**18.** (b)	**19.** (c)	**20.** (c)
21. (c)	**22.** (d)	**23.** (d)	**24.** (c)	**25.** (a)
26. (c)	**27.** (d)	**28.** (a)	**29.** (c)	**30.** (b)
31. (a)	**32.** (c)	**33.** (b)	**34.** (c)	**35.** (c)
36. (c)	**37.** (c)	**38.** (c)	**39.** (c)	**40.** (b)
41. (c)	**42.** (a)	**43.** (d)	**44.** (c)	**45.** (a)
46. (c)	**47.** (a)	**48.** (b)	**49.** (c)	**50.** (b)

☺☺☺