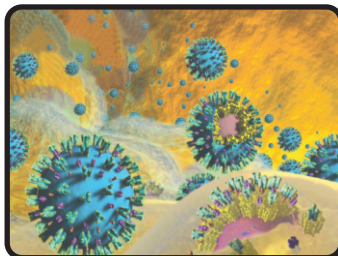


EtG

OLYMPIAD EXPLORER BIOTECHNOLOGY

EduHeal Foundation
Nationwide Biotechnology Olympiad
and other
National/International Biotechnology Olympiads/Talent Search Exams.



Class-10

EtG **BOOKS**

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

SYLLABUS GUIDELINES

CLASS - X

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

Different kinds of materials

- Why are some substances sour and some bitter in taste?
- Why does soap solution feel slippery?
- Why does seawater taste salty?
- Why does iron rust?
- Why does painted iron not rust?
- Why is burning sensation removed when one takes antacids?
- Why do substances stop burning in the absence of air?
- Why is flame seen when substances burn?
- Can substances burn without flame?
- Why does a matchstick kept in the blue part of the flame not burn?
- Why is a red coating formed on the zinc rod when it is kept in copper sulphate solution?
- What is the material of the coating?

How things change/react with one another

- How do copper, silver, iron exist in nature?
- What is the composition of natural gas used for cooking?
- What is petrol?
- What is vinegar?

What Biotechnology process is used in production of vinegar?

Materials of common use

- How is common salt obtained?
- Besides its use in food, is it used for other purposes?
- What makes washing soda and baking soda different materials?
- How does bleaching powder make paper and cloth white?
- What is the white material that is used for making casts?
- How do soaps clean clothes?
- Can some other material be used for cleaning clothes?
- Why does a man lose control on his body after drinking alcohol?
- Why do people become blind on drinking denatured alcohol?

How are elements classified?

- How do chemists study such a large number of elements?

Our Environment

- What will happen if we bury different materials in the soil?
- What will happen if we kill all insects?
- Some of us eat meat; some do not – what about animals?

How do we stay alive?

- What are the processes needed for living?

Control in the living

- Why do roots grow towards the ground?
- Can we make them grow upwards?
- Why do stems grow upwards?

Reproduction in the living

- Do plants and animals have similar reproductive cycles?
- Can we decide how many children are born in a family?

Class - 10

v

Heredity and evolution

- Why are we like our parents?
- Did similar plants and animals exist in the past?
- Did life always exist?
- Why is study of genetics so important in Biotechnology?

MOVING THINGS, PEOPLE AND IDEAS

HOW THINGS WORK

Electric circuits

- In which direction does current flow inside a conductor?
- How is potential difference across a conductor related to current through the conductor?
- How can you arrange a given set of resistors so that the same current flows through all?
- How are appliances connected in a resistances **house**?
- How much heat is generated when a current I flows through a resistor?

Magnets

- How does the needle of a compass change direction when placed at different points near a magnet?
- Does a current carrying conductor produce a magnetic field?
- What happens to a current carrying conductor when it is placed in a magnetic field?
- How does the above effect help us to design machines to do work?
- What do you observe when a magnet is moved towards a wire connected to a galvanometer?

How can the phenomenon of electromagnetic induction be used to design a device to generate electricity?

- Does the current produced by a generator have the same direction all the time?
- How are the bulbs etc. connected to the AC source in our homes?

NATURAL PHENOMENA

- Why is paper burnt when light passing through a lens strikes it?
- Does a spherical mirror also exhibit similar phenomenon?
- Can we see a full image of a tall building using a small mirror?
- Why does a spoon partly immersed in water in a transparent glass appear broken at the level of water when viewed from the sides?
- What do lenses do? How do they correct defects in vision?
- Why does the path of light change on entering a different medium?
- Why or how does a prism disperse light?
- Why is the sky blue?

NATURAL RESOURCES

Conservation of Natural

- How can we contribute to protect environment in our locality?

Resources

- What are the major global environmental issues of direct relevance to us?
- What are the steps expected on the part of local administration to maintain balances in nature in your region? How can we help?

The regional environment

- How does the construction of big dams affect the life of the people and the regional environment?
- Are rivers, lakes, forests and wild life safe in your area?

Sources of energy

- What are the various sources of energy we use? Are any of these sources limited? Are there reasons to prefer some of them over others?



- Q.1.** What is the function of enzymes present in human saliva?
(a) Its breaks down proteins into amino acid
(b) Its breaks down starch into sugar
(c) Its breaks down fats into fatty acid
(d) None of these
- Q.2.** Emulsification is the digestion of
(a) Fats (b) Carbohydrates
(c) Proteins (d) None of these
- Q.3.** Rate of respiration in aquatic organisms is_____ as compared to terrestrial organisms
(a) Fast (b) Equal
(c) Low (d) None of these
- Q.4.** This acid causes cramps in our muscles
(a) Sulphuric acid (b) Hydrochloric acid
(c) Lactic acid (d) None of these
- Q.5.** The first step in respiration is the break down of
(a) Sucrose (b) Fructose
(c) Glucose (d) None of these
- Q.6.** Gas exchange between the air and the lungs takes place in the
(a) Alveoli (b) Glottis
(c) Bronchi (d) None of these
- Q.7.** Gas exchange between air and blood within lungs in part of _____.
(a) External respiration (b) Breathing
(c) Internal respiration (d) None of these
- Q.8.** The area where gas exchange occurs must_____ for diffusion to be effective.
(a) Be thick
(b) Be dry
(c) Have a large surface area
(d) None of these
- Q.9.** Gas exchange takes place by the physical process of
(a) Diffusion (b) Osmosis
(c) Active transport (d) None of these

- Q.10.** Enzymes are
 (a) Monosaccharides (b) Nucleotides
 (c) Proteins (d) None of these
- Q.11.** The nitrogen base in ATP is _____.
 (a) Guanine (b) Adenosine
 (c) Thymine (d) None of these
- Q.12.** ATP is a
 (a) Lipid (b) Nucleotide
 (c) Protein (d) None of these
- Q.13.** Bacteria in the large intestine produce _____ which is necessary for blood clotting.
 (a) Vitamin K (b) Vitamin A
 (c) Vitamin C (d) None of these
- Q.14.** The large intestine
 (a) Is much longer than the small intestine
 (b) Absorbs water, salt and some vitamins
 (c) Produce digestive enzymes
 (d) None of these
- Q.15.** The function of liver is to
 (a) Produce bile (b) Store glucose as glycogen
 (c) Both (a) and (b) (d) None of these
- Q.16.** Which of the following enzymes is found in pancreatic juice?
 (a) Maltase (b) Amylase
 (c) Trypsin (d) None of these
- Q.17.** The pH of the stomach is
 (a) Basic (b) Neutral
 (c) Acidic (d) None of these
- Q.18.** The _____ prevents food from entering the trachea
 (a) Diaphragm (b) Cardiac sphincter
 (c) Epiglottis (d) None of these
- Q.19.** The _____ is where the respiratory and digestive passage come together
 (a) Larynx (b) Pharynx
 (c) Trachea (d) None of these
- Q.20.** Food is ingested through the mouth and makes its way to the stomach via the
 (a) Small intestine (b) Oesophagus
 (c) Trachea (d) None of these

- Q.21.** When the stomata opens
 (a) Water evaporates from the leaf
 (b) Carbon dioxide enters the leaf
 (c) Both (a) and (b)
 (d) None of these
- Q.22.** Each stomata has _____ guard cells.
 (a) 1 (b) 2
 (c) 3 (d) None of these
- Q.23.** An organism that has different types of cells that perform different jobs is
 (a) Unicellular (b) Multicellular
 (c) Both (a) and (b) (d) None of these
- Q.24.** Carbon-dioxide and water are necessary for ____, while oxygen and water are necessary for _____.
 (a) Plant life, animal life
 (b) producing food, producing offspring
 (c) Animal life, plant life
 (d) None of these
- Q.25.** An organism made of only one cell that can perform all processes necessary for survival is
 (a) Multicellular (b) Acellular
 (c) Unicellular (d) None of these

TRUE OR FALSE

Write T for TRUE and F for FALSE in the given statement.

- Q.26.** Aquatic animals spend more energy to breathe than do terrestrial animals.
- Q.27.** A moist surface are is needed for the diffusion of gases.
- Q.28.** Animals must have respiratory system in order to perform gas exchange.
- Q.29.** It is easier for animals to obtain oxygen from the water than the air.
- Q.30.** Internal respiration is gas exchange between blood and tissue fluid.
- Q.31.** Parasitic flatworms have no digestive tract at all
- Q.32.** When the stomata are closed, water is conserved but photosynthesis cannot take place.
- Q.33.** ATP is the energy currency for most cellular processes.

- Q.34.** Lactic acid in our muscles during sudden activity causes cramps
- Q.35.** The release of energy in aerobic process is less than in anaerobic process.
- Q.36.** Villi increases the surface area of absorption.
- Q.37.** Complete digestion of proteins, fats and carbohydrates takes place in the stomach.
- Q.38.** The length of the small intestine differs in various animals depending on the food they eat.
- Q.39.** Enzyme pepsin acts in acidic medium.
- Q.40.** The peristaltic movement of muscles occurs in the mouth to push food into alimentary canal.
- Q.41.** Ticks, lice, leeches take parasitic nutrition.
- Q.42.** The pores of stomata remain always open.
- Q.43.** During photosynthesis, carbon dioxide is changed into carbohydrates.
- Q.44.** The heterotroph's survival depends directly or indirectly on autotrophs.
- Q.45.** Enzymes, the bio-catalysts are used to break complex substances into simpler ones.



ANSWERS

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



Chapter 2 LIFE PROCESSES - II (TRANSPORTATION & EXCRETION)

- Q.1.** Which is not an excretory organ?
 (a) Kidney (b) Pancreas
 (c) Skin (d) None of these
- Q.2.** The number of nephrons in a kidney of man is
 (a) One million (b) Three million
 (c) Four million (d) None of these
- Q.3.** The largest detoxifying gland present in our body is
 (a) Liver (b) Thyroid
 (c) Pituitary (d) None of these
- Q.4.** Oxygenated blood is carried by
 (a) Pulmonary vein (b) Renal vein
 (c) Pulmonary artery (d) None of these
- Q.5.** Lymph consists of
 (a) RBC only (b) Lymphocytes
 (c) Hemoglobin (d) None of these
- Q.6.** The graphical record of electrical changes in heart is called
 (a) Electrocardiogram (b) Artificial pace maker
 (c) Electrocardiograph (d) None of these
- Q.7.** In humans heart beats – per minute
 (a) 62 Times (b) 82 times
 (c) 72 times (d) None of these
- Q.8.** The circulation of blood from right ventricle to left auricle via pulmonary artery and pulmonary vein is called
 (a) Systemic circulation
 (b) Double Circulation
 (c) Pulmonary circulation
 (d) None of these
- Q.9.** The circulation of blood from left ventricle to right auricle via aorta and vena cava is called
 (a) Systemic circulation
 (b) Double circulation
 (c) Pulmonary circulation
 (d) None of these
- Q.10.** In human beings, heart is
 (a) 3 chambered (b) 2 chambered

- (c) 4 chambered (d) None of these
- Q.11.** Which one of the following blood vessels contains only oxygenated blood?
 (a) Pulmonary artery (b) Capillaries
 (c) Pulmonary vein (d) None of these
- Q.12.** Which one of the following blood vessels contains only deoxygenated blood?
 (a) Pulmonary artery (b) Capillaries
 (c) Pulmonary vein (d) None of these
- Q.13.** Which one of the following blood vessels is thinnest of all?
 (a) Capillaries (b) Veins
 (c) Arteries (d) None of these
- Q.14.** At the time of injury to a blood vessel, which chemical is released?
 (a) Fibrinogen (b) Thromboplastin
 (c) Thrombin (d) None of these
- Q.15.** Which of the following cells are involved in the process of blood clotting?
 (a) Blood platelets (b) Lymphocytes
 (c) RBCs (d) None of these
- Q.16.** A red coloured pigment present in RBC that imparts red colour to blood is
 (a) Chlorophyll (b) Carotenoid
 (c) Haemoglobin (d) None of these
- Q.17.** What is the average age of RBC?
 (a) 30 days (b) 60 days
 (c) 120 days (d) None of these
- Q.18.** Which blood group is the universal recipient?
 (a) AB (b) B
 (c) O (d) None of these
- Q.19.** Which blood group is the universal donor blood group?
 (a) AB (b) B
 (c) O (d) None of these
- Q.20.** Name the system responsible for transportation of material in human beings.
 (a) Digestive system (b) Respiratory system
 (c) Circulatory system (d) None of these
- Q.21.** Non-flowering plants have

- (a) Only vessels
 (b) Only tracheids
 (c) Both tracheids and vessels
 (d) None of these
- Q.22.** The process in which loss of water takes place in the form of water vapour through stomata
 (a) Transpiration (b) Translocation
 (c) Transportation (d) None of these
- Q.23.** Which type of xylem cell conducts water and mineral in non-flowering plants?
 (a) Vessels (b) Sieve tubes
 (c) Tracheids (d) None of these
- Q.24.** Name the tissue which transports food and other substances in plants.
 (a) Phloem (b) Tracheids
 (c) Xylem (d) None of these
- Q.25.** Which tissue is involved in the transportation of water and minerals in plants?
 (a) Phloem (b) Sieve tube
 (c) Xylem (d) None of these

TRUE OR FALSE

Write T for TRUE and F for FALSE in the given statement

- Q.26.** Hydrolytic enzymes are mainly stored in cellular vacuoles.
- Q.27.** In case of kidney failure an artificial kidney is employed. This process is known as dialysis.
- Q.28.** Persons having blood group AB is called universal donor while persons having blood group O are called universal acceptor.
- Q.29.** Kidney is made up of nephrons which is the structural and functional unit of excretion.
- Q.30.** Human excretory system consist of paired kidney, ureters, a urinary bladder, a urethra and excretory opening.
- Q.31.** Veins are thick walled and do not have valves.
- Q.32.** Transpiration helps upward movement of water or sap from roots to leaves.
- Q.33.** In human being transportation takes place through blood.

- Q.34.** Tracheids and vessels are living.
- Q.35.** Xylem carries water and minerals from soil to various parts of plant body.

☺☺☺

ANSWERS

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

☺☺☺

Chapter 3 CONTROL AND COORDINATION

- Q.1.** Which part of brain helps in activities like riding a bicycle?
 (a) Cerebellum (b) Hypothalamus
 (c) Cerebrum (d) None of these
- Q.2.** Which of the following structure is associated with reflex arc?
 (a) Cerebrum (b) Cerebellum
 (c) Spinal cord (d) None of these
- Q.3.** Which of the following activities is not under the control of medulla in hind brain?
 (a) Blood Pressure (b) Hearing
 (c) Vomiting (d) None of these
- Q.4.** Which part of a nerve cell contains a nucleus?
 (a) Cell body (b) Axon
 (c) Dendrite (d) None of these
- Q.5.** Which of the following is correct about the direction of flow of nerve impulse along a neuron?
 (a) Axon → Cell body → Dendrite
 (b) Cell body → Dendrite → Axon
 (c) Dendrite → Cell body → Axon
 (d) None of these
- Q.6.** During puberty, which hormone is secreted in boys
 (a) Oestrogen (b) Thymus
 (c) Testosterone (d) None of these
- Q.7.** Which one of the following endocrine glands is known as master gland?
 (a) Adrenal (b) Thyroid
 (c) Pituitary (d) None of these
- Q.8.** Blood pressure is controlled by
 (a) Thyroid gland (b) Thymus gland
 (c) Adrenal gland (d) None of these
- Q.9.** Ageing in human beings is caused by disappearance of which of the following glands?
 (a) Thyroid (b) Pituitary
 (c) Thymus (d) None of these
- Q.10.** Which hormone regulates carbohydrate, protein and fat metabolism?

- (a) Thyroxine (b) Adrenal
(c) Insulin (d) None of these
- Q.11.** Which hormone helps in lowering the level of blood glucose in human beings?
(a) Thyroxine (b) Glucagon
(c) Insulin (d) None of these
- Q.12.** Hormones are carried from one part to another part in the body by
(a) Brain (b) Heart
(c) Blood (d) None of these
- Q.13.** Hormones are secreted in trace amount by
(a) Endocrine glands (b) Exocrine glands
(c) Both (a) and (b) (d) None of these
- Q.14.** Which area of the brain is responsible for control of the body temperature?
(a) Hypothalamus (b) Thalamus
(c) Pituitary (d) None of these
- Q.15.** After an accident a man lost his memory and speech. Which of the following part of his brain gets affected?
(a) Cerebellum (b) Medulla
(c) Cerebrum (d) None of these
- Q.16.** Which part of the human brain regulates involuntary function, such as heart beat rate?
(a) Cerebellum (b) Medulla oblongata
(c) Cerebrum (d) None of these
- Q.17.** Part of brain associated with thinking, reasoning and intelligence is
(a) Cerebrum (b) Medulla oblongata
(c) Cerebellum (d) None of these
- Q.18.** Which part of the brain controls respiration?
(a) Medulla (b) Cerebral cortex
(c) Cerebellum (d) None of these
- Q.19.** Cerebrum is a part of
(a) Cerebellum (b) Thalamus
(c) Forebrain (d) None of these
- Q.20.** The involuntary action like blood pressure is controlled by
(a) Hind Brain (b) Mid Brain
(c) Fore Brain (d) None of these

- Q.21.** Thinking part of the brain is
(a) Mid Brain (b) Hind Brain
(c) Fore Brain (d) None of these
- Q.22.** The total number of spinal nerves arising from spinal cord are
(a) Thirty one pairs (b) Twenty one pairs
(c) Twelve pairs (d) None of these
- Q.23.** The nerves arising from brain are called
(a) Visceral nerves (b) Spinal nerves
(c) Cranial nerves (d) None of these
- Q.24.** Brain and spinal cord are parts of
(a) Central nervous system
(b) Autonomous nervous system
(c) Peripheral nervous system
(d) None of these
- Q.25.** Which part of nerve cell conducts a nerve impulse 'away from the cell body'
(a) Axon (b) Cytoplasm
(c) Dendrites (d) None of these
- Q.26.** Which structure in a neuron helps to conduct a nerve impulse 'towards the cell body'.
(a) Axon (b) Nucleus
(c) Dendrites (d) None of these
- Q.27.** Nerve impulse-an information passing through neurons in the form of
(a) Electrical signals
(b) Chemical and electrical signals
(c) Chemical signals
(d) None of these
- Q.28.** Olfactory receptors responds to
(a) Smell (b) Taste
(c) Sound (d) None of these
- Q.29.** The nervous system consists of
(a) Brain, spinal cord, nerves
(b) Heart, nerves, spinal cord
(c) Brain, heart, nerves
(d) None of these
- Q.30.** Auxin, Gibberellins and Cytokinins are
(a) Growth promoting hormones

- (b) Transport promoting hormones
 (c) Movement promoting hormones
 (d) None of these
- Q.31.** Bending of plant stem towards light is called
 (a) Chemotropism (b) Geotropism
 (c) Phototropism (d) None of these
- Q.32.** Growth of pollen tube towards ovule is called
 (a) Chemotropism (b) Hydrotropism
 (c) Geotropism (d) None of these
- Q.33.** Geotropism is a tropic movement which involves-
 (a) Growing of roots towards gravity
 (b) Drooping of leaflet on touch
 (c) Bending of plants towards light
 (d) None of these
- Q.34.** The movement of plants in the direction of stimulus is
 (a) Nastic movement (b) Tactic movement
 (c) Tropic movement (d) None of these
- Q.35.** The immediate response of the spinal cord to a sudden impulse is
 (a) Interaction (b) Response action
 (c) Reflex action (d) None of these

True or False

Write T for TRUE and F for FALSE in the given statement

- Q.36.** Muscle cells have special proteins that change their shape and arrangement in the cell.
- Q.37.** Growth hormone is secreted by adrenal gland.
- Q.38.** Iodine is essential for the synthesis of thyroxine.
- Q.39.** Insulin is given to the person suffering from goiter.
- Q.40.** Cytokinins are present in greater concentration in young fruits and seeds.
- Q.41.** Reflex arc is found in human beings only.
- Q.42.** Gustatory receptors detect taste.
- Q.43.** Hormones are secreted in large amounts by endocrine glands.
- Q.44.** Forebrain includes cerebellum and medulla.
- Q.45.** Reflex action is an automatic motor response without the involvement of brain.



ANSWERS

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



**NATIONWIDE BIOTECHNOLOGY
OLYMPIAD (NBTO)
SAMPLE PAPER**

Total duration : 60 Minutes

Total Marks : 50

GENERAL KNOWLEDGE QUESTIONS

1. How many years does it take for an aluminum can to decompose?
(a) 20 years or less (b) 20 to 50 years
(c) 50 to 80 years (d) 80 to 100 years
2. Water harvesting' has emerged as a sensible method of meeting the water shortfall in a cost effective manner and is now being applied in most cities to raise the groundwater levels. Water harvesting is the
(a) Collection of water from rivers
(b) Collection of rainwater in storage tanks or putting back into the soil to recharge groundwater
(c) Harvesting of water from tube wells
(d) None of the above
3. Rubber tyres do not degrade naturally and at present there is no viable way of large scale recycling of the rubber used to make them. If tyres are burnt, they produce clouds of acrid black smoke in addition to a toxic pollutant. Name it.
(a) SO₂ (b) Unburnt hydrocarbons
(c) CO (d) All the above
4. What is the order of the environmental 3R's used to indicate the best ways to conserve natural resources?
(a) reduce, recycle, reuse (b) reduce, reuse, recycle
(c) reuse, recycle, reduce (d) recycle, reuse, reduce
5. What chemicals have been banned in most of the world because of their role in destroying the ozone layer?
(a) Metal oxides (b) DDT (first modern pesticide)
(c) Chlorofluorocarbons (d) Peroxides
6. Which action can have the greatest impact on reducing the threat of global warming?
(a) Recycling (b) Reducing energy use
(c) Composting (d) Planting a tree
7. Which of the following groups of household cleaners are safest for the environment?
(a) Bleach, oven cleaner, and furniture polish.
(b) Dynamite, acid, and moth balls.
(c) White vinegar, baking soda, and lemon juice.
(d) Toilet cleaner, paint, and sandpaper

8. Wind energy is one of the oldest sources of renewable energy. Which of the following statements about wind energy is INCORRECT?
- Wind farms require large amounts of land.
 - Wind energy is free and available.
 - Wind energy is nonpolluting.
 - Wind energy is easy to store.
9. What is one reason why scientists think that sea level is getting higher?
- Ships make the water higher
 - Melting glaciers add more water to the sea
 - The ozone hole is warming the ocean
 - Undersea volcanoes are displacing sea water
10. What are sources for renewable energy?
- Coal
 - Petroleum
 - Nuclear
 - Natural gas

LIFE SCIENCE

11. Which statement is *not* a part of the cell theory?
- Cells are the basic unit of structure of living things.
 - Cells are the basic unit of function of living things.
 - Cell parts such as chloroplasts are self replicating.
 - Cells come from preexisting cells.
12. In a chemical analysis of a sample of animal tissue, which element would most likely be found in the *smallest* quantity?
- hydrogen
 - carbon
 - iodine
 - oxygen
13. Which statement about enzymes is *not* correct?
- Enzymes are composed of polypeptide chains.
 - Enzymes form a temporary association with a reactant.
 - Enzymes are destroyed when they are used and must be synthesized for each reaction.
 - Enzymes are specific because of their shape and catalyze only certain reactions.
14. Bacteria that can survive without oxygen are described as
- aerobic
 - anaerobic
 - heterotrophic
 - saprophytic
15. A metabolic waste of algae that can be recycled for use in cellular respiration is
- sodium
 - organic acid
 - carbon dioxide
 - oxygen
16. The ability of an organism to obtain food, seek shelter, and avoid predators is most directly related to the function of
- reproduction
 - egestion
 - locomotion
 - excretion
17. Which terms would most likely be included in the explanation of the production of starch in a potato?

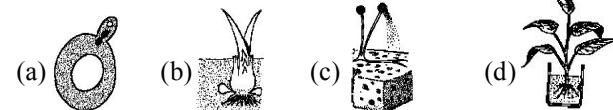
- proteins, hydrolysis, and amino acids
 - photosynthesis, glucose, and dehydration synthesis
 - protein synthesis, urea, and deamination
 - fatty acids, glycerol, and respiration
18. The immediate source of the intercellular fluid surrounding all human body cells is
- blood plasma
 - enzymatic secretions
 - lymphatic tissue
 - glomerular filtrations
19. An example of sexual reproduction is
- regeneration in starfish
 - spore formation in mushrooms
 - fusion of the nuclei of gametes
 - development of new plants from undifferentiated tissue
20. In human females, how many egg cells are formed as a result of one primary sex cell undergoing normal meiotic cell division?
- 1
 - 3
 - 2
 - 4
21. In a human, what is the ratio of the normal chromosome number in a nucleus produced by mitosis to the normal chromosome number in a nucleus produced by meiosis?
- 1:1
 - 3:1
 - 2:1
 - 4:1
22. Chromosomal mutations occurring in gametes of humans can affect the appearance of offspring because
- many traits are usually affected
 - only one trait is usually affected
 - these mutations usually speed up embryonic development
 - these mutations usually result in sex-linked traits
23. The weakest bonds in a double-stranded molecule of deoxyribonucleic acid exist between the
- deoxyribose sugars
 - nitrogenous bases
 - phosphate groups
 - 5-carbon sugars
24. The types of enzymes produced in a cell are regulated by the
- order of nucleotides in DNA molecules
 - shape of DNA molecules
 - size of nucleotides in DNA molecules
 - location of DNA molecules
25. In the early stages of development, the embryos of dogs, pigs, and humans resemble one another. This observation suggests that these animals may have
- a similar number of chromosomes
 - similar habitat requirements
 - the same blood components
 - a common ancestry
26. Which action by humans has had the most positive ecological impact on the environment?

- (a) use of pesticides to regulate insect populations
 (b) reforestation and covercropping to prevent soil erosion
 (c) overhunting of many predators to prevent the death of prey animals
 (d) none of these
27. Identical twins develop from
 (a) one egg, fertilized by one sperm cell
 (b) one egg, fertilized by two separate sperm cells
 (c) two eggs, both fertilized by the same sperm cell
 (d) two eggs, each fertilized by a separate sperm cell
28. The result of genetic engineering can be used to
 (a) change only the genotype by adding or repairing a part of the genetic material
 (b) change only the phenotype without effecting any change in the genetic make up of the individual
 (c) change both phenotype and genotype according to will by adding or repairing a part of the genetic material
 (d) add or repair a pool of genetic material without changing the phenotype or genotype
29. GMO stands for
 (a) green modern organism (b) genetically mixed organism
 (c) genetically modified organism
 (d) genetically modern organism
30. A gene pool consists of
 (a) all the genes that mutate in a single generation
 (b) all the heritable genes for traits in a population
 (c) all the gametes produced by a population
 (d) the mutated alleles for a particular trait
31. Which factor has the greatest influence on the type of ecosystem that will form in a particular geographic area?
 (a) genetic variations in the animals
 (b) climate conditions (c) number of carnivores
 (d) percentage of nitrogen gas in the atmosphere
32. Chromosomes can be described as
 (a) large molecules that have only one function
 (b) folded chains of bonded glucose molecules
 (c) reproductive cells composed of molecular bases
 (d) coiled strands of genetic material
33. Which component of a stable ecosystem can *not* be recycled?
 (a) oxygen (b) water (c) energy (d) nitrogen
34. Relationships between plant species may most accurately be determined by comparing the
 (a) habitats in which they live
 (b) structure of guard cells
 (c) base sequences of DNA

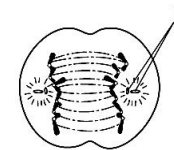
- (d) shape of their leaves
35. One irreversible effect of both deforestation and water pollution on the environment is the
 (a) extinction of species
 (b) thinning of the ozone shield
 (c) depletion of atmospheric carbon dioxide levels
 (d) increase in renewable resources
36. Which sequence of terms is in the correct order from simplest to most complex?
 (a) cells → tissues → organs → organ systems
 (b) tissues → organisms → cells → organ systems
 (c) cells → tissues → organ systems → organs
 (d) organs → organisms → organ systems → cells
37. Which energy transfer is *least* likely to be found in nature?
 (a) consumer to consumer (b) producer to consumer
 (c) host to parasite (d) predator to prey
38. Which factor is often responsible for the other three?
 (a) increase in levels of toxins in both water and air
 (b) increase in human population
 (c) increased poverty and malnutrition
 (d) increased depletion of finite resources
39. A collection of clones (genetically similar cells/organisms) having recombinant DNA is called
 (a) Gene bank (b) Gene library
 (c) Gene pool (d) Genome
40. Some deep-sea bacteria live near submerged volcanoes and make their own food using energy derived from minerals coming from the volcanoes. These bacteria would be classified as
 (a) heterotrophic (b) photosynthetic
 (c) autotrophic (d) abiotic

INTERACTIVE QUESTIONS

41. Which diagram represents the reproductive process of budding?



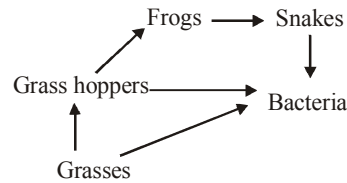
42. The cell in the diagram below illustrates a stage of mitotic cell division.



Letter *B* indicates the

- (a) paired chromosomes (b) centrioles
(c) cell plate (d) endoplasmic reticulum

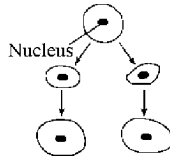
43. A food web is shown below.



Which organisms are necessary for the recycling of nitrogen?

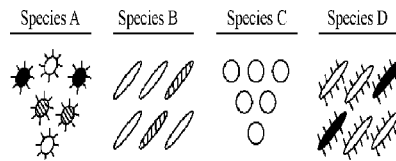
- (a) frogs (b) snakes
(c) grasshoppers (d) bacteria

44. A pattern of reproduction and growth in a one celled organism is shown below. Which statement best describes this pattern of reproduction?



- (a) All genetic material comes from one parent.
(b) Only some of the genetic material comes from one parent.
(c) The size of the parent determines the amount of genetic material.
(d) The size of the parent determines the source of the genetic material.

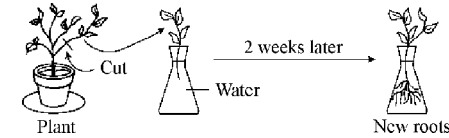
45. The diagram below represents four different species of bacteria



Which statement is correct concerning the chances of survival for these species if there is a change in the environment?

- (a) Species A has the best chance of survival because it has the most genetic diversity.
(b) Species C has the best chance of survival because it has no gene mutations.
(c) Neither species B nor species D will survive because they compete for the same resources.
(d) None of the species will survive because bacteria reproduce asexually.

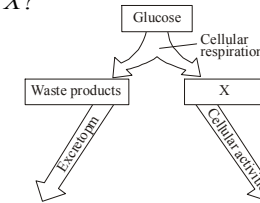
46. A technique used to reproduce plants is shown in the diagram below :



This technique is a form of

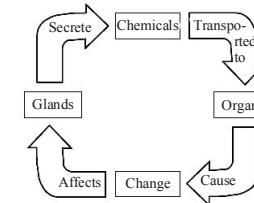
- (a) sexual reproduction (b) gamete production
(c) asexual reproduction (d) gene manipulation

47. The diagram below represents a biochemical process. Which molecule is represented by X?



- (a) DNA (b) starch (c) protein (d) ATP

48. The diagram below represents an interaction between parts of an organism.



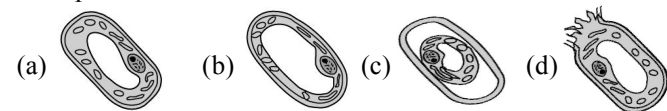
The term *chemicals* in this diagram represents

- (a) starch molecules (b) DNA molecules
(c) hormone molecules (d) receptor molecules

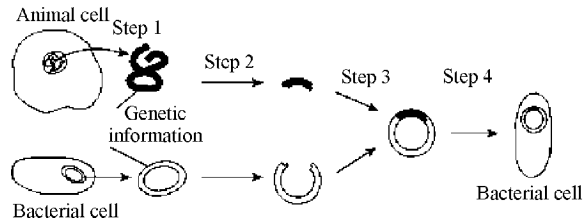
49. The diagram below represents a plant cell in tap water as seen with a compound light microscope.



Which diagram best represents the appearance of the cell after it has been placed in a 15% salt solution for two minutes?



Base your answers to question 50 on the diagram below, which illustrates some steps in genetic engineering.



50. What is the result of step 3 ?
- a new type of molecular base is formed
 - different types of minerals are joined together
 - DNA from the bacterial cell is cloned
 - DNA from different organisms is joined together

☺ END OF THE EXAM ☺

ANSWERS

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

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