

Xuquuq-Dhawr

Xuquuqda buuggani waxay u dhawrsoon tahay qoraaga, qayb kamida lama daabacan karo, lama koobiyeen karo, iyadoon ogolaansho rasmiya laga haysan qoraha buuggan.

Afeef

" Waxaan ka afeefanayaa in dhammaan wixii khaladaada ee aad ku aragto buuggan, aaney u dhicin si ula kac ah ee ay ku yimaadeen ilduuf iyo qoraal Alle, waxaan kaa codsanayaa in aad ila soo socodsiiso"

Hibeyn

" Buugg-yarahan waxaan u hibeynayaa dhammaan Ardayda soomaaliyeed ee aan aadka u jeclahay gaar ahaan ku wooda hadda ka qalin bedelanaya Dugsiyada Sare ee Dalka gaar haan Fasalka 12aad.

Ilaahay ha idin la garab galo imtixaanada idinku soo wajahan.

Ilaahay ha idin daayo afarta cisho ee la nool yahay.

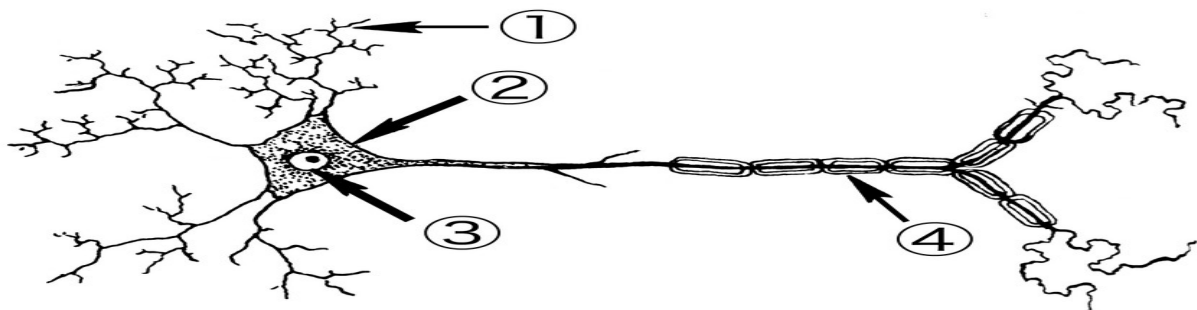
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"Marksata oo aad naftaada ku qufusho in aad tahay ruux qiimo leh qaadi karana awoodo waaweyn waxaad kasban kartaa qarniyo wax laguugu xasuusto".

Subject: Biology: Class Form Four: Academic year 2020-2021

CHOOSE THE CORRECT ANSWER FROM THE FOLLOWING ABOUT CHAPTER ONE:

The diagram below shows a neuron. Use the diagram to answer the questions that follow.



1. Which number indicates the structure from which the neuron receives information from other neurons?

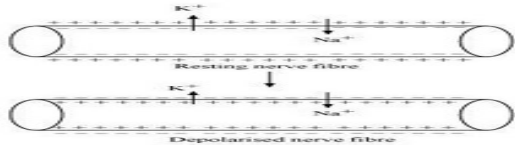
- a. 1
- b. 2
- c. 3
- d. 4**

2. Which is characteristic of the sympathetic division of the autonomic system?

- a. stimulates digestion
- b. slows the heart rate
- c. dilates the bronchi**
- d. converts glucose to glycogen

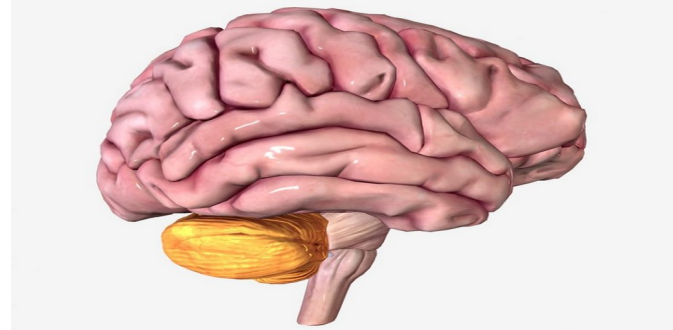
Use the diagram below to answer question 3

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3. What is occurring in the diagram above?
- a. K^+ ions are entering the neuron
 - b. Negatively charged proteins are leaving the neuron.
 - c. Na^+ ions are entering the neuron.**
 - d. The myelin coat has broken down, allowing ions to freely cross the plasma membrane.

Use the diagram below to answer question 4



4. If the portion indicated by the arrow was damaged due to trauma, what effects would this person most likely experience?
- a. Partial or complete memory loss
 - b. Trouble maintaining balance**
 - c. Body temperature fluctuations
 - d. Rapid breathing
5. Which nervous system is the hypothalamus most involved in regulating?
- a. Voluntary
 - b. Peripheral
 - c. Sensory
 - d. Autonomic**
6. If there were a power outage in a movie theater and only a few dim

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emergency lights were lit, which cells of the retina would be most important for seeing your way to the exit?

a. Rods

b. Cone

c. Rods and cones are equally important.

7. Which represents the correct sequence as sound waves travel in the ear to trigger an impulse?

a. Cochlea, incus, stape, eardrum

b. tympanum, bones in the middle ear, cochlea, hair cells

c. Auditory canal, tympanum, hair cells, cochlea

d. Hair cells, auditory canal, cochlea, malleus

8. With which sense are free nerve ending associated?

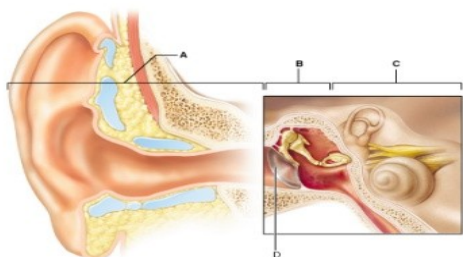
a. Taste

b. Hearing

c. Touch

d. Sight

Use the diagram below to answer question 9



9. Some rides at amusement parks cause a person to become dizzy when the ride stops. Which structure in the diagram is most likely involved with the dizzy feeling?

a. A

b. B

c. C

d. D

10. A functional reflex requires:

a. Only a sensory neuron and a motor neuron

b. A sensory neuron, the thalamus, and a motor neuron.

c. The cerebral cortex and a motor neuron

d. Only the cerebral cortex and the thalamus.

11. As you sit quietly reading this sentence, the part of the nervous system that is most active is the:

a. Somatic nervous system

b. Sympathetic nervous system

c. Parasympathetic nervous system

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d. None of the choices is correct.

12. A fight or flight response in the body is controlled by the:

a. Sympathetic division of the nervous system

b. Parasympathetic division of the nervous system

c. Release of acetylcholine from postganglionic neurons

d. Somatic nervous system

13. The _____ cannot be controlled by conscious thought:

a. Motor neurons

b. Somatic nervous system

c. Autonomic nervous system

d. Skeletal muscles

14. White matter is, and grey matter is:

a. Comprised of axons; comprised of cell bodies and dendrites

b. Myelinated; unmyelinated

c. Found in the CNS; also found in the CNS

d. All of the choices are correct.

15. A functional reflex requires:

a. Only a sensory neuron and motor neuron

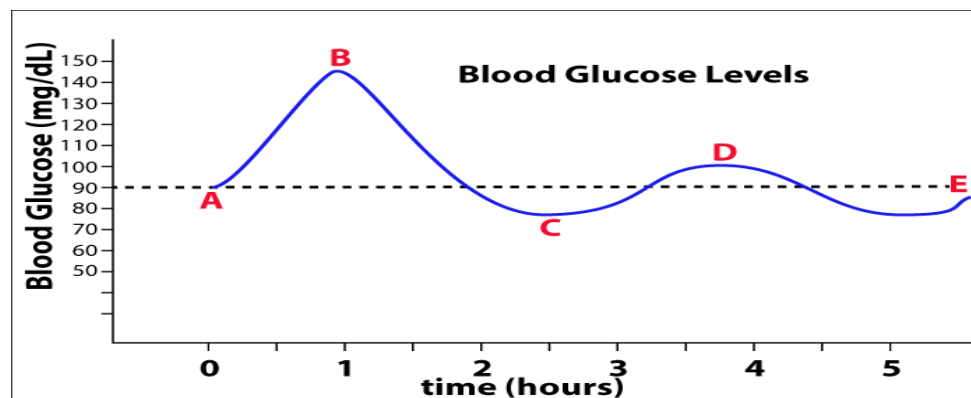
b. A sensory neuron, the thalamus, and a motor neuron

c. The cerebral cortex and a motor neuron

d. Only the cerebral cortex and the thalamus.

CHOOSE THE CORRECT ANSWER FROM THE FOLLOWING ABOUT CHAPTER TWO:

1: The graph shows blood glucose levels over a period of time. which hormone might have caused a sudden surge as indicated by the arrow?



a. Ant diuretic hormone

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b. Growth hormone

c. Glucagon

d. Insulin

2. Which hormones are released from nerve cells rather than endocrine glands?

a. Ant diuretic hormone and oxytocin

b. Growth hormone and thyroxine

c. Insulin and glucagon

d. Norepinephrine and epinephrine

3. Which pairs of hormones have opposite effects?

a. Calcitonin and parathyroid hormone

b. Epinephrine and norpinephrine

c. Growth hormone and thyroxine

d. Aldosterone and cortisol

4. Endocrine glands:

a. Function only after puberty

b. Function only before puberty

c. Release products through ducts

d. Release products into the blood stream

5. What happens after food is eaten? Study the graph below to answer this question:

a. Blood glucose levels increase

b. Blood glucose levels decrease

c. Blood glucose levels remain the same

d. Blood glucose levels decrease and then increase

6. Which hormones are primarily responsible for the changes in blood glucose levels about 2 hours after food is eaten? Study the graph below to answer this question:

a. Insulin

b. Estrogen and progesterone

c. Epinephrine and norepinephrine

d. Aldosterone and parathyroid hormones

7. Steroid hormones:

a. Can diffuse through the membrane without a carrier

b. Have a direct on gene expression

c. Bind to membrane receptors

d. Both a and b are correct

8. An organ is classified as part of the endocrine system if it:

a. Produces cholesterol

b. Is capable of converting amino acids into hormones

c. Has intracellular receptors for hormones

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d. Secretes hormones into the circulatory system

9. Complete the following analogy: neurotransmitters: nervous system: hormones:

a. Feedback system

b. Endocrine system

c. Circulatory system

d. Respiratory system

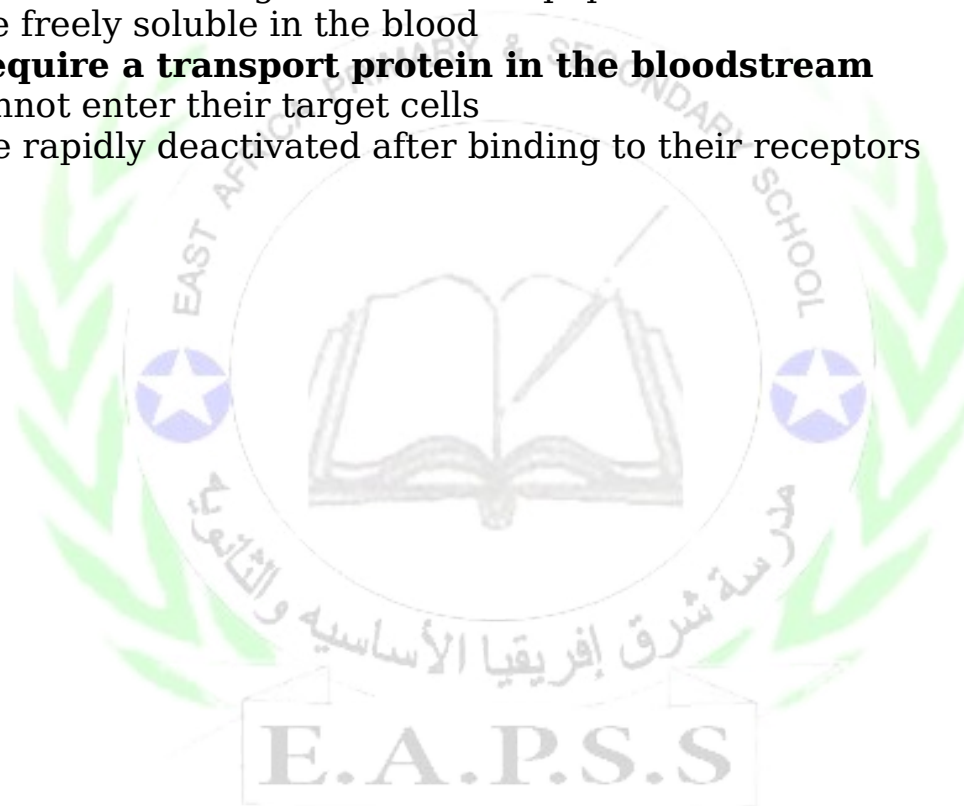
10. Which of the following is true about lipophilic hormones?

a. They are freely soluble in the blood

b. They require a transport protein in the bloodstream

c. They cannot enter their target cells

d. They are rapidly deactivated after binding to their receptors



CHOOSE THE CORRECT ANSWER FROM THE FOLLOWING ABOUT CHAPTER THREE:

1. Exoskeleton and endoskeletons differ in that:

a. An exoskeleton is rigid, and an endoskeleton is flexible

b. Endoskeletons are found only in vertebrates

c. Exoskeletons are composed of calcium, and endoskeletons are built from chitin

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d. Exoskeletons are external to the soft tissues, and endoskeletons are internal.

2. How can osteocytes remain alive within bone?

a. Bones are composed of only dead or dormant cells

b. Haversian canals are bone structures that contain blood vessels that provide materials for the osteocytes

c. Osteocytes have membrane extensions that protrude from bone and allow them to exchange materials with the surrounding fluids

d. Bones are hollow in the middle and the low pressure there draws fluid from the blood that nourishes the osteocytes.

3. Where would you find the type of joint shown below?



a. Hip

b. Vertebrae

c. Elbow

d. Skull

4. Which is not a function of bone?

a. Production of vitamin D

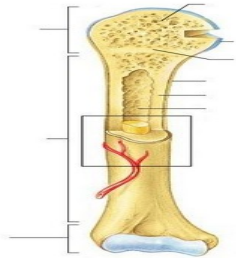
b. Internal support

c. Protection of internal organs

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d. Storage of calcium.

5. What is a characteristic of the portion of the bone indicated by the arrow?



a. It contains no living cells

b. It contains bone marrow

c. It is the only type of bone tissue in

d. It is made of overlapping osteon.

6. Which set of terms is mismatched?

a. Cranium-sutures

b. Wrist-pivot joint

c. Shoulder-ball-and -socket joint

d. Knee-hinge joint

7. Which is not part of the axial skeleton?

a. Skull

b. Ribs

c. Hip bone

d. Vertebral column

8. Which is part of the appendicular skeleton?

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a. A

b. B

c. C

d. D

9. The main structural protein in the extracellular matrix of bone that is responsible for its flexibility is:

a. Osteocyte

b. Collagen

c. Haversian canal

d. Osteon

10. Which type of bone is classified as irregular?

a. Leg bones

b. Skull

c. Vertebrae

d. Wrist bones.

11. How do the muscles moves your hand through space?

a. By contraction

b. By contraction

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c. By lengthening

d. Both a & b are correct

12. Which of the following statements best describes the sliding filament mechanism of muscle contraction?

a. Actin and myosin filaments do not shorten, but rather, slide past each other

b. Actin and myosin filaments shorten and slide past each other

c. As they slide past each other, actin filaments shorten, but myosin filaments do not shorten

d. As they slide past each other, myosin filaments shorten, but actin filaments do not shorten.

13. Which requires ATP?

a. Muscle contraction

b. Muscle relaxation

c. Both muscle contraction and relaxation

d. Neither muscle contraction nor relaxation.

14. Which is a characteristic of fast-twitch muscle fibres?

a. They contain more myoglobin than slow-twitch fibres

b. They are resistant to fatigue

c. They have fewer mitochondria than slow-twitch fibers

d. They require high amounts of oxygen in order to function.

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15. What muscles shown below are classified as voluntary muscles?



a. The muscle type shown in A

b. The muscle shown in B

c. The muscle type shown in C

d. All muscles

16. An injection is administered through the skin using a hypodermic needle.

Identify the first integumentary structure through which the needle will pass:

a. Reticular layer

b. Epidermis

c. Papillary layer

d. Hypodermis

17. Sebaceous glands are located in all of the following areas, except the:

a. Palms and soles

b. Scalp

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c. Abdominal region

d. Thoracic region

18. The epidermis is composed of which of the following tissues?

a. Stratified columnar epithelial tissue

b. Keratinized stratified squamous epithelial tissue

c. Dense irregular connective tissue

d. Areolar connective tissue

19. What is the primary function of melanin?

a. To produce vitamin D

b. To waterproof the skin

c. To produce sebum

d. To provide protection against the sun's UV rays.

20. Which of the following is most important in determining skin coloration?

a. Collagen

b. Melanin

c. Carotene

d. Keratin

21. Which of the following is NOT a function of the skin?

a. Respiratory gas exchange

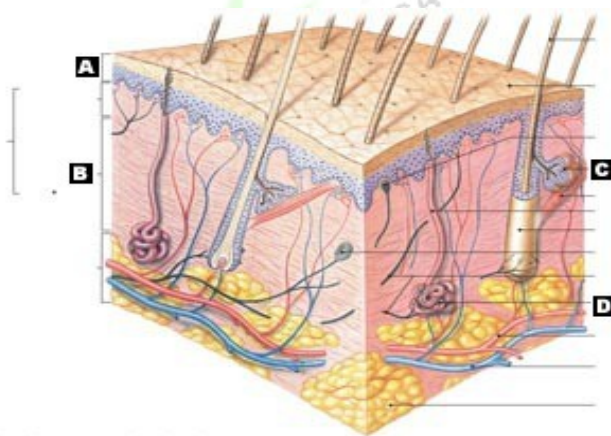
b. Preventing unnecessary water loss

c. Excretion

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d. Regulation of body temperature.

Use the diagram below to answer question 7.



22. Which tissue type is responsible for the standing the hair upright?

- a. A
- b. B**
- c. C
- d. D

23. When are blackheads formed?

- a. When sebaceous glands become clogged**
- b. When there is an excess of keratin produced
- c. When grooves in the epidermis gather dirt
- d. When hair follicles grow inward rather than outward.

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24. How does the skin regulate body temperature?

- a. **By increasing sweat production**
- b. By retaining water
- c. By producing vitamin D
- d. By regulating fat content in the epidermis.

25. Which are not found in the dermis?

- a. Muscles
- b. Sweat and oil glands
- c. Nerve cells
- d. **Fat cells**



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CHOOSE THE CORRECT ANSWER FROM THE FOLLOWING ABOUT CHAPTER FOUR:

1. For which of the following is DNA responsible?
 - a. Directing RNA to make lipids
 - b. Directing RNA to produce glucose
 - c. Encoding information for making proteins**
 - d. Encoding information for changing the genetic code.
2. Where is RNA found?
 - a. Only in protein
 - b. Only in the nucleus
 - c. Only in the cytoplasm
 - d. In the nucleus and cytoplasm.**
3. What is the basic unit of DNA called?
 - a. Sugar
 - b. Nucleotide**
 - c. Phosphate
 - d. Nucleic acid.

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4. Which of the following nucleic acids is involved in translation?

- a. DNA only
- b. mRNA only
- c. DNA and mRNA
- d. mRNA and tRNA**

5. Within each organism, which nucleotides are found in similar percentages?

- a. A and T, G and C**
- b. A and C, G and T
- c. A and C, G and U
- d. A and G, T and U.

6. Which of the following is not a component of DNA?

- a. The pyrimidine uracil**
- b. Five-carbon sugars
- c. The purine adenine
- d. Phosphate groups.

7. The basic mechanism of DNA replication is semi-conservative with two new molecules:

- a. Each with new strands
- b. One with all new strands and one with all old strands
- c. Each with one new and one old strand**
- d. Each with a mixture of old and new strands.

8. The bonds that hold two complementary strands of DNA together are:

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a. Hydrogen bonds

b. Peptide bonds

c. Ionic bonds

d. Phosphodiester bonds

9. If one strand of a DNA is 5' ATCGTTAAGCGAGTCA 3', then the complementary strand would be:

a. 5'TAGCAATTCGCTCAGT3'

b. 5'ACTGAGCGAATTGCTA 3'

c. 5'TGACTCGCTTAACGAT 3'

d. 5'ATCGTTAAGCGAGTCA 3'

10. Pre-mRNA contains which of the following?

a. Exons only

b. Introns only

c. Both introns and exons

d. Neither introns nor exons

11. In the genetic code, one codon:

a. Consists of three bases

b. Specifies a single amino acid

c. Specifies more than one amino acid

d. Both a and b are correct

12. An anticodon would be found on which of the following types of RNA?

a. mRNA

b. rRNA

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c. tRNA

d. None of all

13. During translation, the codon in mRNA is actually "read" by:

a. The A site in the ribosome

b. The P site in the ribosome

c. The anticodon in a tRNA

d. The anticodon

15. The splicing process:

a. Occurs in prokaryotes

b. Joins introns together

c. Can produce multiple mRNA as from the same transcript

d. Only joins exons for each gene in one way.

15. If the sequence of (AGC) is a part of the DNA, what is the complementary codon of mRNA?

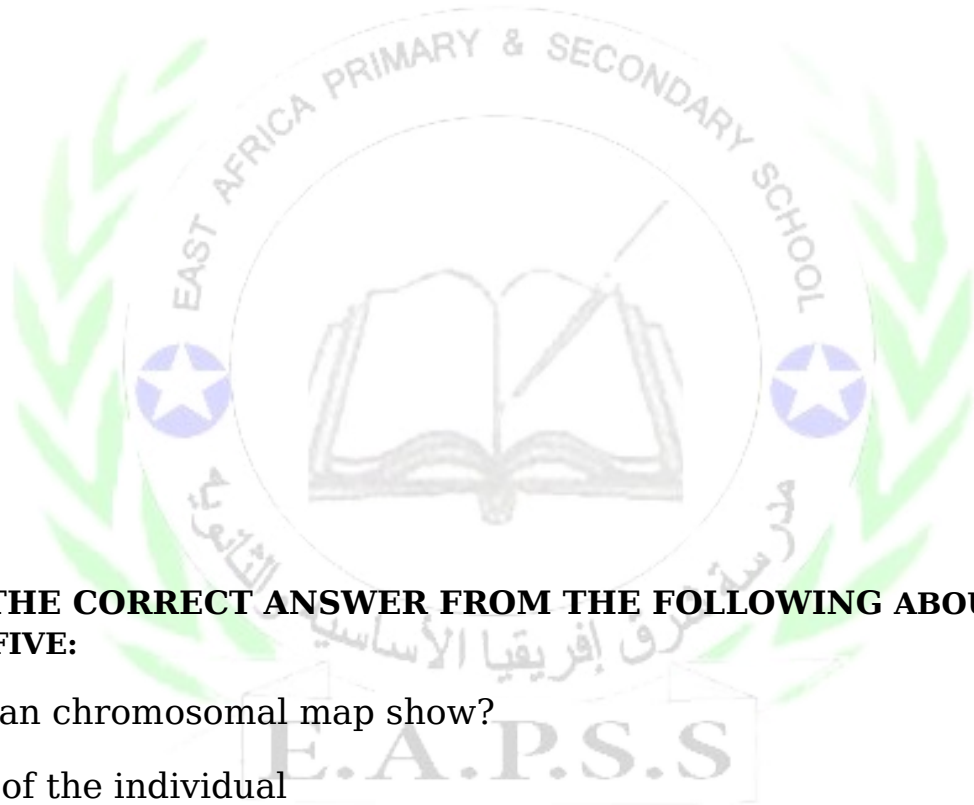
a. GGC

b. AGC

c. UCG

d. GCU

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CHOOSE THE CORRECT ANSWER FROM THE FOLLOWING ABOUT CHAPTER FIVE:

1. Which can chromosomal map show?
 - a. The sex of the individual
 - b. The positions of genes on a chromosome**
 - c. The presence of mutant alleles
 - d. Whether a gene is autosomal or receive.
2. Which can result from the deletion of a single nucleotide?
 - a. Trisomy
 - b. Non-disjunction
 - c. A translocation

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d. frameshift mutation.

3. The table below shows the genotypes and phenotypes of pattern baldness. Use the table to answer the question that follows:

Genotypes and Phenotypes of Pattern Baldness		
Genotype	Phenotype	
	Female	Male
BB	Bald	Bald
Bb	Not bald	Bald
bb	Not bald	Not bald

3. Which statement best explains why men and women express the Bb genotype differently?

- a. The trait is polygenic
- b. Pattern baldness is a sex-linked trait
- c. The trait has multiple alleles

d. Pattern baldness is a sex-influenced trait.

4. In garden peas, purple flowers (P) are dominant to white (p) flowers, and tall plants (T) are dominant to short plants (t). If a purple tall plant (PpTt) is crossed with a white short plant (pptt), what is the result phenotypic ratio?

a. 1:1:1:1 purple tall to purple short to white tall to white short

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b. 9:3:3:1 purple tall to purple short to white tall to white short

c. 3: 2 purple tall to purple short

d. All purple tall.

5. Which does not contribute to genetic variation?

a. Chromosome number

b. Meiosis

c. Crossing over

d. Random mating

6. Which concept is considered an exception to Mendel's law of independent assortment?

a. Crossing over

b. Polyploidy

c. Gene linkage

d. Law of segregation

Use the figure below to answer questions 7 and 8



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7. Houseflies, as shown in the photo above, have six pairs of chromosomes. If two houseflies are crossed, How many possible types of fertilized eggs could result from the random lining up of the pairs?

- a. 256
- b. 1024
- c. 4096**
- d. 16,384

8. For the housefly with its six pairs of chromosomes, how many possible combinations of gametes can be produced by the random lining up of pairs in meiosis?

- a. 32
- b. 48
- c. 64**
- d. 120

9. If a black cattle (Bb) were crossed with a white cattle (bb) what would be the resulting phenotypic ratio:

- a. 0:1 black to white
- b. 1:0 black to white
- c. 1:1 black to white**
- d. 3:1 black to white

10. What determines gender in humans?

- a. The x and y chromosome**
- b. Chromosome 21
- c. Codominance
- d. Epistasis

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11. Which two terms best described the inheritance of human blood types?

- a. Incomplete dominance and codominance
- b. Incomplete dominance and multiple alleles
- c. Codominance and multiple alleles**
- d. Codominance and epistasis.

Use the photos below to answer question. 12

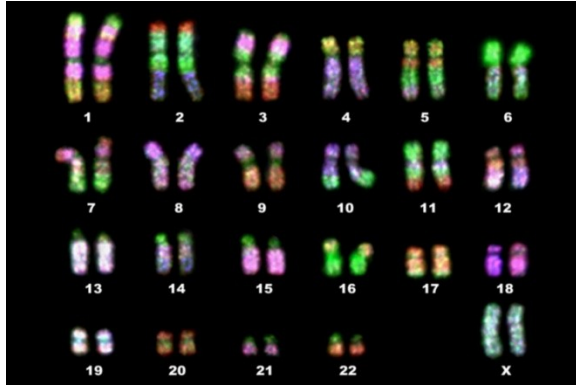


12. In radishes, color is controlled by incomplete dominance. The figure above shows the phenotype for each color. What phenotypic ratios would you expect from crossing two heterozygous plants?

- a. 2:2 red: white
- b. 1:1:1 red: purple: white
- c. 1:2:1 red: purple: white**
- d. 3:1 red: white

Use the photo below to answer question 14:

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14. What disorder can be identified in the karyotype?

a. Turner's syndrome

b. Down syndrome

c. Klinefelter's syndrome

d. The karyotype shows no disorder.

15. Why does non-disjunction occurs?

a. Cytokinesis does not occur properly

b. The sister chromatids do not separate

c. The nucleoli do not disappear

d. The chromosomes do not condense properly.

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CHOOSE THE CORRECT ANSWER FROM THE FOLLOWING ABOUT CHAPTER SIX:

1. What is the basis of separating of different DNA fragments by gel electro phoresis?

a. The positive charge on DNA

b. The size of the DNA fragments

c. The sequence of the fragments

d. The presence of a dye.

2. Which of the following statements is accurate for DNA replication in your cells, but not PCR?

a. DNA primers are required

b. DNA polymerase is stable at high temperatures

c. Ligase is essential

d. dNTPs are necessary.

3. Why is the polymerase chain reaction used?

a. To amplify DNA

b. To cut DNA

c. To ligate DNA

d. To separate DNA.

4. For what purpose is DNA fingerprinting used?

a. To sequence DNA from bacteria

b. To separate DNA fragments

c. To identify individuals who have committed crimes

d. To identify single nucleotide polymorphisms

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5. Which of the following is used to cut DNA molecules in specific locotains?

- a. Cloning vectors
- b. Cloning enzymes
- c. Restriction enzymes**
- d. Polymerase chain

6. What is the term used for inserting a health copy of a gene into a person who has a defective gene?

- a. Cloning vector
- b. Gene therapy**
- c. Recombinant DNA
- d. Polymerase chain reaction (PCR).

7. Which best describes molecule A?

- a. It is an insulin gene
- b. It is recombinant DNA
- c. It is a bacterial plasmid**
- d. It is a disease-causing virus.

8. Compare the following analogy. Proteomics: Proteins: :genomics:

- a. Lipids
- b. Genes**
- c. Protein
- d. Carbohydrates

9. Which nucleotide sequence must the sticky end labeled 2 have if it is to bond with the sticky end labeled 1?

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a. UGGCCU

b. TCCGGA

c. **ACCGGT**

d. CTTAAG

10. What is this machine used for?



a. Polymerase chain reaction

b. Gel electrophoresis

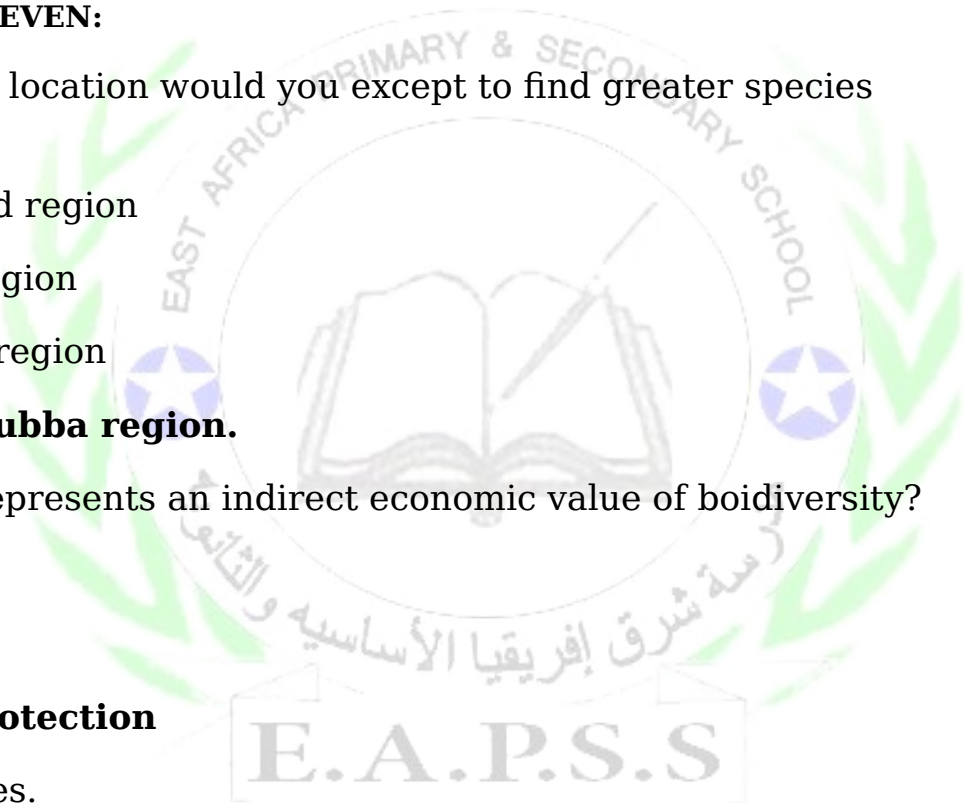
c. **DNA sequencing**

d. Incubation of bacterial culture

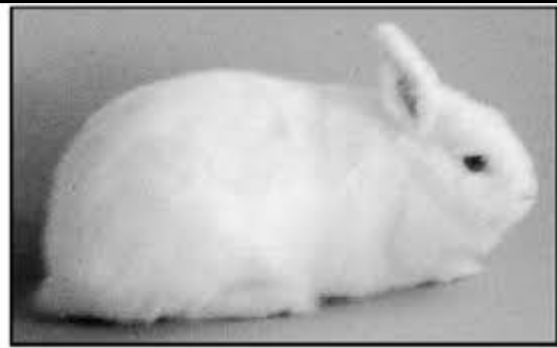
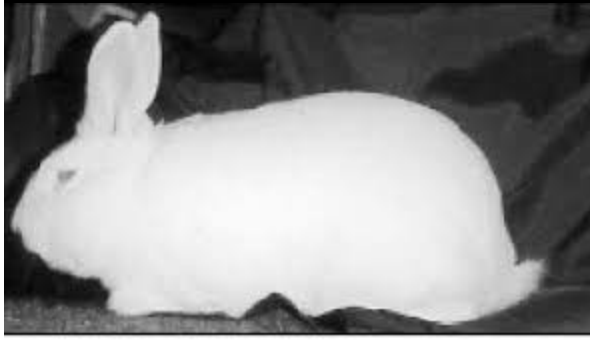


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CHOOSE THE CORRECT ANSWER FROM THE FOLLOWING ABOUT CHAPTER SEVEN:

- 
1. In which location would you expect to find greater species diversity?
 - a. Galgadud region
 - b. Nugal region
 - c. Benadir region
 - d. Lower jubba region.**
 2. Which represents an indirect economic value of biodiversity?
 - a. Food
 - b. Clothing
 - c. Food protection**
 - d. Medicines.
 3. Which term best describes this collection of locations: a forest, a freshwater lake, an estuary, and a prairie?
 - a. Ecosystem diversity**
 - b. Extinction
 - c. Genetics
 - d. Species diversity.
 4. Which term best describes what the two rabbits in the photo below demonstrate?

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a. Ecosystem

b. Genetic diversity

c. Species richness

d. Species diversity.

5. Which is not a way in which species lose their habitat?

a. Background extinction

b. Destruction

c. Disruption

d. Pollution

6. What is the term for the natural ability of Earth's atmosphere to trap energy from the sun?

a. Global warming

b. Ozone depletion

c. Greenhouse effect

d. Biological magnification.

7. What does Earth's ozone layer shield its inhabitants from?

a. Solar heating

b. Meteor impacts

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c. Ozone depletion

d. Ultraviolet radiation.

8. Which of the following groups of organisms contains the largest estimated member of species?

a. Birds

b. Plants

c. Insects

d. Mammals.

9. What term describes a measure of the number of species in an area?

a. Species richness

b. Species evenness

c. Bio-indicator

d. Biological magnification.

10. What is the term commonly used to describe the trend shown in the graph below?

a. Water pollution

b. Global warming

c. Ozone depletion

d. Biodiversity crisis.

11. Conservation hotspots are best described as:

a. Areas with large numbers of endemic species, in many of which species are disappearing rapidly.

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b. Areas where people are particularly active supporters of biological diversity

c. Islands that are experiencing high rates of extinction

d. Areas where native species are being replaced with introducing species.

12. Which one causes biological magnification?

a. Pesticides

b. wastewater

c. Carbon dioxide

d. Greenhouse gases.

Twenty Questions And Answers About Chapter One:

Q1: For each pair of terms, explain the relationship between the terms:

- a. Stimulants and depressant
- b. Motor neuron and sensory neuron
- c. Brain stem and diencephalon
- d. Resting potential and action potential

Answer One: a) Stimulants and depressants are almost opposites. The only commonality between the two is that they both have an altering effect on the body and mind. But the effects they have on the body and the mind are expressed in profoundly different ways. While stimulants work to activate the central nervous system (CNS), depressants work to quiet it. That's why stimulants are known as "uppers" and depressants are known as "downers."

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- a) **Sensory and motor neurons** are both found in the central nervous system (CNS). They both have similar morphology—they have a cell body which contains the nucleus. They have dendrites to receive information, and they both have axons that transmit the information. They both have similar machinery (nucleus, mitochondria, microtubules, etc.) They both carry neurotransmitters and transmit electrical impulses called action potentials.
 - b) **The brainstem** is the structure that connects the cerebrum of the brain to the spinal cord and cerebellum. It is composed of four sections in descending order: the diencephalon, midbrain, pons, and medulla oblongata. **The diencephalon** is the most superior portion of the brainstem and connects to the midbrain inferiorly.
 - c) The **resting potential** tells about what happens when a neuron is at **rest**. An **action potential** occurs when a neuron sends information down an axon, away from the cell body.
- Q2:** Use each of the following terms in a separate sentence: neuron, dendrite, myelin sheath, and synapse?

Answer Two: a) Neurons are specialized cells that transmit chemical and electrical signals in the brain; they are the basic building blocks of the central nervous system.

b) Dendrites are branch-like structures extending away from the cell body, and their job is to receive messages from other neurons and allow those messages to travel to the cell body.

c) Myelin sheath: A white, fatty material composed of lipids and lipoproteins that surrounds the axons of nerves and facilitates swift communication.

d) Synapse: The junction between the terminal of a neuron and either another neuron or a muscle or gland cell, over which nerve impulses pass.

Q3: Use each of the following terms in a separate sentence: thalamus, hypothalamus, pons, and medulla oblongata?

Answer Three: a) The thalamus is a small structure within the brain located just above the brain stem between the cerebral cortex and the midbrain and has extensive nerve connections to both.

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b) The hypothalamus is a part of the brain that has a vital role in controlling many bodily functions including the release of hormones from the pituitary gland.

c) The pons is a portion of the brain stem, located above the medulla oblongata and below the midbrain.

d) Medulla oblongata the lowest or hindmost part of the brain, continuous with the spinal cord.

Q4: Word roots and origins the word pons is derived from the latin pons, which means "bridge". Using this information, explain how pons is an appropriate term for the part of the brain it describes?

Answer Four: a) The pons (Latin for "bridge") Because This region of the brainstem includes neural pathways and tracts that conduct signals from the brain down to the cerebellum and **medulla, and tracts that carry the sensory signals up into the thalamus.**

Q5: Discuss the structure of a neuron?

Answer Five: Structure of Neurons have four specialized structures that allow for the sending and receiving of information: the cell body (soma), dendrites, axon and axon terminals (see lowest figure).

Cell body or soma: The cell body is the portion of the cell that surrounds the nucleus and plays a major role in synthesizing proteins.

Dendrites: Dendrites are short, branched processes that extend from the cell body. Dendrites function to receive information, and do so through numerous receptors located in their membranes that bind to chemicals, called neurotransmitters.

Axon: An axon is a large process that extends from the cell body at a point of origin-called the axon hillock-and functions to send information.

Axon terminals: Once an axon reaches a target, it terminates into multiple endings, called axon terminals. The axon terminal is designed to convert the electrical signal into a chemical signal in a process called synaptic transmission.

Q6: Describe the chemical conditions within a neuron during resting potential and during action potential?

Answer Six: During rest inside the neuron: negatively charged (due to the presence of negatively charged proteins)

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Outside the neuron: positively charged (due to the presence of positively charged sodium

Ions)

During action potential inside the neuron: positively charged (due to the presence of positively charged sodium ions)

Outside the neuron: negatively charged (due to the lack of as many sodium ions)

Q7: Explain how action potentials are transmitted from a neuron to another cell?

Answer Seven: The synapse is a neuronal junction which acts as the site for transmission of nerve impulse between two neurons. This synapse along with its neurotransmitters acts as a physiological valve, directing the conduction of nerve impulses in regular circuits and prevents random and chaotic stimulation of nerves.

The arrival of a nerve impulse at the presynaptic terminal causes a movement towards the synaptic vesicles. These fuse with the membrane and release neurotransmitters. The neurotransmitters transmit the nerve impulse to the post synaptic fibre, by diffusing across the synaptic cleft and binding to receptor molecules on the post synaptic membrane.

This results in a series of reactions that open "channel shaped" protein molecules. Electrically charged ions then flow through the channels in or out of the neurons. If the net flow of positively charged ions is large enough, it leads to the generation of a new nerve impulse called action potential.

Q8: Describe the roles of the two main organs of the central nervous system?

Answer Eight: The role of the two main organs of the central nervous system can be functionally divided into 3 actions: sensation, integration, and response.

Sensation. The first major function of the nervous system is sensation —receiving information about the environment to gain input about what is happening outside the body (or, sometimes, within the body).

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Integration. Stimuli that are received by sensory structures are communicated to the nervous system where that information is processed.

Response. The nervous system produces a response on the basis of the stimuli perceived by sensory structures.

Q9: Define the roles of our portions of the brain?

Answer Nine: 1. Cerebrum: High Intellectual Functions Occur in the Cerebrum

2. The Cerebellum. Body Movements and Maintains Balance

3. The Brain Stem Relays Signals Between the Brain and Spinal Cord and Manages Basic Involuntary Functions

4. Diencephalon: The Thalamus Mediates Sensory Data and Relays Signals to the Conscious Brain.

Q10: Summarize the roles of the sensory and motor divisions of the peripheral nervous system?

Answer Ten: Sensory neurons are the neuron which carries the signal (stimulus) from the effector organs to the central nervous system.

Motor neurons are the neurons which carry the signal (response) from the central nervous system to the effector organs.

Q11: Relate the relationship between motor neurons, interneurons, and sensory receptors?

Answer Eleven: Sensory relay and motor neurons have similar morphology—they have a cell body which contains the nucleus. They have dendrites to receive information, and they both have axons that transmit the information. They have similar machinery (nucleus, mitochondria, microtubules, etc.) They carry neurotransmitters and transmit electrical impulses called action potentials.

Q12: Describe the role of chemo-receptors in taste and smell?

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Answer Twelve: The role of chemoreceptors in taste and smell is to convey messages about what they've found to our brains to get a response. These responses may tell us not to eat something that's rotten or to flee from the smell of smoke.

Q13: List five different types of sensory receptors in the human body?

- **Answer Thirteen:** Chemoreceptors detect the presence of chemicals.
- Thermoreceptors detect changes in temperature.
- Mechanoreceptors detect mechanical forces.
- Photoreceptors detect light during vision.
- More specific examples of sensory receptors are baroreceptors, proprioceptors, hygroreceptors, and osmoreceptors.

Q14: Identify the parts of the ear responsible for hearing and for balance?

Answer Fourteen: The inner **ear** is composed of two **parts**: the cochlea for **hearing** and the vestibular system for **balance**.

Q15: Compare how rods and cones respond to light?

Answer Fifteen: **Rods** are responsible for vision at low **light** levels (scotopic vision). They do not mediate color vision, and have a low spatial acuity. **Cones** are active at higher **light** levels (photopic vision), are capable of color vision and are responsible for high spatial acuity.

Q16: Describe how the eye receives light stimulus and sends a signal to the brain?

Answer Sixteen: All vision is based on the perception of electromagnetic rays. These rays pass through the cornea in the form of light; the cornea focuses the rays as they enter the eye through the pupil. Behind the pupil is the lens, which is similar in shape and function to a camera lens. Together with the cornea, the lens adjusts the focal length of the image being seen onto the back of the eye, the retina. Visual reception occurs at the retina where photoreceptor cells called cones and rods give an image color and shadow. The image is transduced into neural impulses and then transferred through the optic nerve to the rest of the brain for processing.

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Q17: State the type of receptors that function in taste and smell?

Answer Seventeen: Taste receptors can be divided into five distinct subtypes, including sweet, bitter, salty, sour, and umami,

Q18: Explain the role of skin in sensing touch, temperature, and pain?

Answer Eighteen: The skin sense that allows us to perceive pressure and related sensations, including temperature and pain.

The sense of touch is located in the skin, which is composed of three layers: the epidermis, dermis, and hypodermis. Different types of sensory receptors, varying in size, shape, number, and distribution within the skin, are responsible for relaying information about pressure, temperature, and **pain**

Q19: State the types and roles of the peripheral nervous system?

Answer Nineteen: The **PNS** is divided into two major **systems**, called the autonomic **nervous system** and the somatic **nervous system**.

The main **role of** the **PNS** is to connect the CNS to the limbs and organs, essentially serving as a relay between the **brain** and spinal cord and the rest of the body.

Q20: Outline the diseases of nervous system?

Answer Twenty: Disorders of the nervous system may involve the following:

- **Vascular disorders**, such as stroke, transient ischemic attack (TIA), subarachnoid hemorrhage, subdural hemorrhage and hematoma, and extradural hemorrhage
- **Infections**, such as meningitis, encephalitis, polio, and epidural abscess

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- **Structural disorders**, such as brain or spinal cord injury, Bell's palsy, cervical spondylosis, carpal tunnel syndrome, brain or spinal cord tumors, peripheral neuropathy, and Guillain-Barré syndrome
- **Functional disorders**, such as headache, epilepsy, dizziness, and neuralgia
- **Degeneration**, such as Parkinson disease, multiple sclerosis, amyotrophic lateral sclerosis (ALS), Huntington chorea, and Alzheimer disease



Thirteen Questions and Answers about Chapter Two:

Q1: How do the hypothalamus and the pituitary gland interact to control the release of some of the hormones in the endocrine system?

Answer One: The hypothalamus secretes releasing hormones which stimulate the anterior pituitary to secrete its hormones which in turn control the secretion of other endocrine glands.

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Q2: List six major endocrine glands and the function of these hormones?

- **Answer Two:** Pituitary gland: secretes hormones with various functions which in turn regulate the secretions of other glands.
- Pancreas: mostly contain exocrine cells, but its endocrine part function to regulate blood glucose level by releasing insulin and glucagon.
- Thyroid gland: secretes thyroid hormones which controls basal metabolic activity, and calcitonin which plays a role in maintaining proper levels of calcium in the blood.
- Parathyroid gland: secretes parathyroid hormones which increase blood calcium level.
- Adrenal glands: contains two parts: the adrenal medulla which secretes epinephrine and norepinephrine hormones, and the adrenal cortex which produce the steroid hormones cortisol and aldestrone.
- Gonads: the testes release androgens (majorly testosterone) which regulate male secondary sex characteristics. The ovaries secrete estrogen and progesterone.

Q3: How do feedback mechanisms help maintain homeostatis?

Answer Three: To maintain homeostatis, feedback mechanisms control hormone secretion.

Q4: How do negative feedback mechanisms differ from positive feedback mechanisms?

Answer Four: Negative feedback mechanism tends to return the body to homeostatis balance while positive feedback mechanism tends to increase the stimulus.

Q5: Compare the effects of glucagon and insulin on blood glucose level?

Answer Five: Glucagon increases blood sugar level while insulin decreases blood glucose level.

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Q6: Name four functions of hormones?

- **Answer Six:** Hormones maintain homeostasis
- Control basal metabolic rate
- Regulate blood sugar level
- Growth and development.

Q7: How do endocrine glands differ from exocrine glands?

Answer Seven: Endocrine glands are ductless glands that secrete hormones into bloodstream while exocrine glands secrete substances through ducts.

Q8: Explain how most amino acid-based hormones affect their target cells?

Answer Eight: Amino acid based hormones must bind to receptors found on the plasma membrane of a target cell because they cannot diffuse through the plasma membrane.

Q9: Explain how steroid and thyroid hormones affect their target cells:

Answer Nine: All steroid hormones and thyroid hormones diffuse through the plasma membrane and bind to a receptor found inside the target cells. The hormone and receptor that are bound together bind to DNA in the nucleus, which activates specific genes and initiate protein synthesis.

Q10: Explain why the pancreas is considered to be both an exocrine gland and an endocrine gland?

Answer Ten: The pancreas consists of exocrine part which secretes enzymes into ducts and an endocrine part called islets of Langerhans which secrete hormones into the bloodstream.

Q11: Why pituitary gland is called the master gland?

Answer Eleven: Because the pituitary gland controls the secretion of other endocrine glands?

Q12: Describe the conditions of gigantism and dwarfism, their causes and treatment methods?

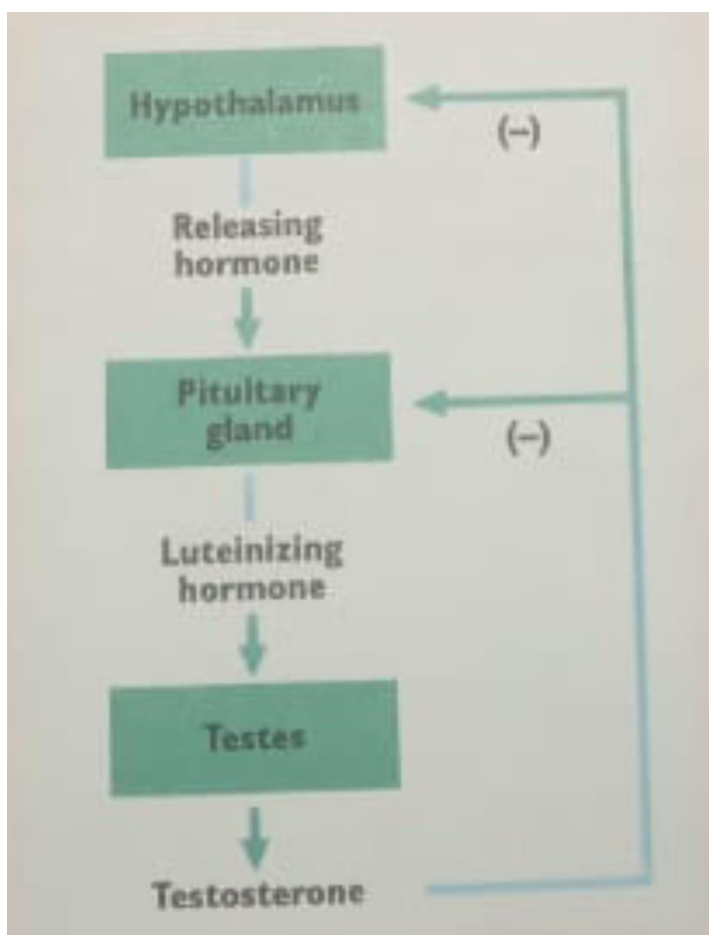
Answer Twelve: Gigantism is a condition that occurs when growth hormone is too high (more than normal) in children who are still

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growing. It can be caused by a tumor of the pituitary gland. It can be treated by octreotide or lanreotide which inhibit growth hormone secretion.

Dwarfism is a condition of too low growth hormone (below normal) in children who are still growing. It has many causes such as a disorder called achondroplasia. It is treated with injections of synthetic growth hormone.

Q13: Identify and describe the type of feedback mechanism operating in the diagram shown below:



Answer Thirteen: The type of feedback mechanism in the diagram is negative feedback mechanism. It is a type of feedback mechanism in which the final step in a series of events inhibits the initial signal in the series.

Twenty Four Questions and Answers about Chapter Three:

Q1: Differentiate between:

- a. Axial skeletons and appendicular skeletons
- b. Bone and cartilage
- c. Exoskeleton and endoskeleton

Answer One: A) Axial skeletons forms the vertical centre axis of the body and includes the skull, veterbral column, ribs and sternum while the **appendicular skeleton** forms the bones that include the upper limbs and lower limbs.

B) Bone is a strong and durable type of connective tissue while **cartilage** is an elastic supportive tissue.

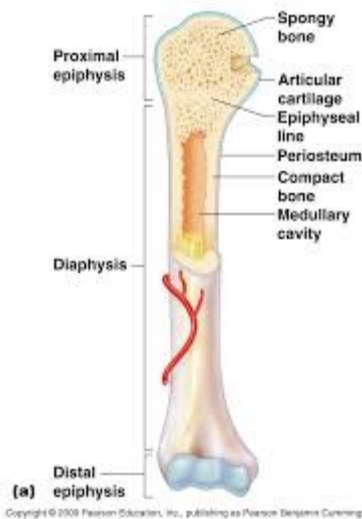
C) Exoskeleton is a rigid, hard case of external skeleton that surrounds the body. It is found on invertebrates while **endoskeleton** is a rigid internal skeleton that forms the body's framework. It is found in vertebrates.

Q2: Describe the shapes of bones and bone formation?

Answer Two: Bones are classified as long, short, irregular, flat and sesamoid. Bone is formed from cartilage. During fetal development, cells in fetal cartilage develop into bone-forming cells called osteoblasts.

Q3: Draw a labeled diagram of the structure of a long bone?

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Q4: Identify the types of joints with respect to form and function?

- **Answer:** Fixed joints: Fixed joint helps absorb impact to prevent the bones from breaking.
- Semi-movable joints: Semi-movable joints permit only limited movement.
- Movable joints: These joints enable the body to perform a wide range of movements and activities.

Q5: Outline the functions of skeletal system?

- **Answer:** Support: Almost all bones support muscles.
- Protection: Protect internal organs.
- Formation of bone cells.
- Reservoir: Stores calcium and phosphorus.
- Movement: Attached muscles pull on bones of arms and legs.

Q6: Describe arthritis. What are the two common forms of arthritis? and which type of arthritis is not related to age?

- **Answer:** Arthritis is an inflammation of the joints. Two of the most common types are: osteoarthritis and rheumatoid arthritis.
- Rheumatoid arthritis is not related to age.

Q7: For healthy bones, sun exposure is advised, justify that?

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Answer: The skin contains 7-dehydrocholesterol which is lipid-base substance in the skin and is converted to vitamin D by sunlight. This vitamin is used with calcium and phosphate in the formation and maintenance of bone.

Q8: What is osteoporosis?

Answer: Osteoporosis is the production in the strength of the bone that leads to an increased risk of fracture.

Q9: What is the significance of synovial fluids?

Answer: Synovial fluids help protect the ends of bones from damage by friction.

Q10: What are the major kinds of joints in the human body?

Answer: Hinge joints, ball and socket joint, pivot joint, the saddle joint and gliding joints

Q11: Define ossification.

Answer: Ossification is the process by which the cartilage is slowly replaced by bones, as a result of deposition of minerals.

Q12: Compare between the types of muscles with respect to form and function?

Form	Function	
Long cylindreal fibre, striated	Voluntary movement, produce	
Skeletal muscle	Many peripherally located nuclei	Heat
Smooth muscle	Short spindle shaped, no striate, single nucleus in each fiber,	Involuntary movement, moves, food control of respiration, regulates blood flow in the arteires by contraction.
Cardiac muscle	Short branched striated	Contracts to pump blood.

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single central nucleus

Q13: Describe microscopic structure of striated muscle fibers?

Answer: Microscopic structure of striated muscle fibers is sarcolemma.

Q14: Explain the mechanism of muscular contraction or the sliding filament theory?

Answer: When a muscle contracts, myosin filaments and actin filaments interact to shorten the sarcomere.

Q15: Give an account of the common muscle injuries inflicted on football players?

Answer: Muscle strain, muscle contusion, muscle cramp and muscle soreness.

Q16: Differentiate between fast-twitch and slow-twitch muscle?

Fast-twitch muscle	Slow-twitch muscle
Have a fewer capillaries and mitochondria than slow-twitch fibers and not as much myoglobin.	Have a rich capillary supply, numerous mitochondria and aerobic respiratory enzymes, and a high concentration of myoglobin pigment.

Q17: Contrast the functions of flexors and extensors?

Answer: A flexor, a muscle that bends a joint while an extensor, a muscle that straightens a joint.

Q18: What causes muscles to become fatigued? and why do you think the heart muscle never suffers from fatigue?

Answer: Muscle fatigue is a result of a relative depletion of ATP. Heart muscle has special muscles and more mitochondria that produce more ATP.

Q19: Explain briefly the structure and function of the skin?

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- **Answer:** The skin consists of two main layers of the skin; the epidermis, which covers the dermis.
- **Epidermis** is the most superficial layer and is composed of stratified keratinized squamous epithelium.
- **The dermis** is the inner layer of skin; it is composed of living cells and specialized structures, such as sensory neurons, blood vessels, muscle fibers, hair follicles and glands.
- **Functions of the skin:** protection, regulation of body temperature, formation of vitamin D, sensation and exertion.

Q20: Describe the derivatives of skin?

Answer: The derivatives of skin are: glands, sweat glands, sebaceous glands (oil glands), hair and nail.

Q21: Identify two types of glands found in the skin, and describe their functions?

- **Answer: Sweat glands:** Produce sweat that helps regulate body temperature.
- **Sebaceous glands (oil glands):** Secrete the fatty substance sebum that preventing excess water loss and softening the skin and hair.

Q22: Describe the structure of nails and hairs?

- **Answer: The structure of nails:** Free edge, nail plate, cuticle and lunula.
- **The structure of hairs:** Hair follicle, papilla of the hair and hair shaft.

Q23: Recognize the diseases and disorders are eczema and acne?

- **Answer:** Two common disorders are eczema and acne.
- There are other disorders, include seborrheic dermatitis (on the scalp), psoriasis, cold sores, impetigo, scabies, hives, and warts.

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Q24: Identify the substance that prevents the hair and skin from drying out, and the gland where this substance is produced?

Answer: This substance is called sebum it is produced by sebaceous glands.



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Ten Questions and Answers about Chapter Four:

Q1: Name the three parts of a nucleotide?

Answer: Five carbon sugar, phosphate group and nitrogenous bases.

Q2: State the base-pairing rules in DNA?

Answer: The base-pairing rules in DNA (A- T), (C-G)

Q3: A template strand of DNA has the following sequence:

3' CGTTACCCGAGCCGTACGATTAGG -5'

a. The predicated sequence of the mRNA for this gens.

b. The predicated amino acid sequence of the protein.

Answer: a) GCA AUG GGC UCG GCA UGC UAA UCC.

Code	Amino acid
GCA	Alanine
AUG	Methionine
GGC	Glycine
UCG	Serine
GCA	Alanine
UGC	Serine
UAA	Stop code
UCC	Serine

Q4: What is the meaning of: genetic code, codon, anticodon, intron, exon, transcription and translation?

❖ **Answer: Genetic code:** is a sequence of nucleotides in the DNA.

❖ **Codon:** are triple bases or nucleotides of the mRNA are called the codon.

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- ❖ **Anticodon:** are triple bases or nucleotides of the mRNA are called the codon.
- ❖ **Intron:** is the non-coding regions in pre-mRNA.
- ❖ **Exon:** are the coding regions in pre-mRNA .

Q5: Compare types of RNA according structure and function?

Types of RNA	Structure	Function
mRNA	Single helix	A carries the genetic "message" from DNA in the nucleus to the ribosomes in the cytosol.
tRNA	Clover shaped	Transfers amino acids to the ribosome to make a protein.
rRNA	Single strand, folded back on itself to form single and double helix	Forms important part of both subunits of ribosomes.

Q6: Describe the role of helicases and DNA polymerases during DNA replication?

- ❖ **Answer:** Role of helicases: moves along the DNA double helix, breaking the torsion and separating the two chain.
- ❖ Role of DNA polymerases: bind the new nucleotides with older chains as a complementary.

Q7: State why DNA replication is a semi-conservative process?

Answer: Because each new molecule is made one old DNA strand and one new DNA strand.

Q8: Summarize the flow of genetic information?

Answer: DNA $\xrightarrow{\text{transcription}}$ RNA $\xrightarrow{\text{Translation}}$ Protein

Q9: Sequence the main steps of transcription?

Answer: Initiation, elongation and termination.

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Q10: List the four ways in which the structure of RNA differs from that of DNA?

	DNA	RNA
1.	Double helix	Single helix
2.	Has deoxyribose sugar	Has ribose sugar
3.	Has thymine	Has uracil
4.	In the nucleus	In the nucleus and cytoplasm

Eleven Questions and Answers about Chapter Five:

Q1: Explain the difference between the terms in the following sets:

- i) Dominance and recessive ii) genotype and phenotype

- ❖ **Answer: Dominance:** is the allele which express in the f1 hybrid.
- ❖ **Recessive:** is the allele which suppressed in the f1 hybrid.
- ❖ **Genotype:** is the genetic makeup (constitution) of an organism that is expressed by letters TT.
- ❖ **Phenotype:** the external (outward) appearance of an organism I.e. dwarf of tall.

Q2: Which terms describes a person who is heterozygous for a recessive disorder?

Answer: Carriers.

Q3: How is the inheritance pattern between parents and offspring represented diagrammatically?

Answer: Pedigree.

Q4: Predict the genotype of the children of a father with huntington's disease and an unaffected mother?

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Answer: The father does not carry the huntington's allele, so he does not have the disease. The chance of them producing a child with huntington's disease is 2 in 4, or 50%.

H is the Huntington's allele		father	
		h	h
mother	H	Hh	Hh
	h	hh	hh

Use the photo below to answer question 5



Q5: Describe the fetal test that results in the karyotypenshown above?

Answer: Karyotypes can be used to screen for and confirm chromosomal abnormalities such as Down's syndrome and Cat Eye Syndrome, and there are several different types of abnormalities

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which may be detected.

Q6: What characteristics are associated with down syndrome?

- ❖ **Answer:** Around faces with a flat profile and small nose and mouth.
- ❖ A large tongue that may protrude from the mouth.
- ❖ Slant eye appearance.
- ❖ Always mentally deficient.
- ❖ Short body with stubby fingers.
- ❖ Cardiac malfunction.

Q7: In pea plants yellow seed color is the dominant trait, and green seed color is the recessive trait. use a punnett square to show the result of a cross between a heterozygous yellow- seed plant and a green- seed plant?

	Y	y
Y	Yy	Yy
y	Yy	yy

2-yellow-seed plant and 2- a green-seed plant

Q8: Based on your punnett square from question 10 what percentage of the offspring would have a homozygous genotype? Explain your answer?

Q9: Colour blindness is caused by a sex-linked, recessive gene, if a woman whose father was color blind, marries a man with normal color vision, at percentage of a male children and female children?

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		Female Gametes	
		1 X 100% = 25 of the females are carrier	
	4	X^B	X^b
Male normal Gametes		1 X 100% = 25 of the females are	
	4	X^B	X^b
X^b		1 X 100% = 25 of the males are	
Y		$X^B Y$	$X^b Y$
	4	1 X 100% = 25 of the males are colorblind	
	4		

Q10: Assume that the gene for seed color and seed shape is located on the same chromosome. A plant heterozygous for both gene is test crossed wrinkled green with the following results?

Answer: Green, wrinkled 645
 Green, round 36
 Yellow, wrinkled 29
 Yellow, round 590

Q11: What are the genotype of the parents, and how far apart are these genes?

Answer: $RrYy$

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Fifteen Questions and Answers about Chapter Six:

Q1: Define the following terms:

a) Biotechnology b) Plasmid c) Genetic engineering d) Transformation

- ❖ **Answer:** a) Biotechnology is the application of biology in which microorganism are used for the benefit to human being.
- ❖ b) Plasmid is a genetic structure in a cell that can replicate independently of the chromosome.
- ❖ c) Genetic engineering is the direct manipulating of an organism gene using biotechnology.
- ❖ d) Transformation is the genetic alternation of a cell resulting from the direct uptake and incorporation of exogenous genetic material for its surrounds.

Q2: List two types of medical products that can be produced using DNA technology?

Answer: Human growth hormone and colony strand stimulating factors

Q3: Relate bioethics to the continued development of genetic engineering techniques?

Answer: Bioethics is the study of ethical issues related to DNA technology. Many scientists and non-scientists are involved in identifying and addressing any ethical, legal, and social issues.

Q4: Describe two major goals of the human genome project?

- ❖ **Answer:** To identify all the approximately 20,000-25,000 genes in human DNA.
- ❖ To determine the sequences of the 3 billion base pairs that make up human DNA.

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- ❖ To transfer related technologies to other sectors, such as industries.

Q5: Distinguish between proteomics and genomics?

- ❖ **Answer:** Genomics is the study of an organisms genome.
- ❖ Proteomics is the study of the structure and functions of proteins in the human.

Q6: Outline the different applications of biotechnology?

- ❖ **Answer:** Medical applications.
- ❖ agricultural applications.
- ❖ Environmental cleanup.
- ❖ Bioethics.

Q7: List some techniques of genetic engineering?

- ❖ **Answer:** Isolating of a specific deoxyribonucleic acid (DNA) molecule or molecules to be replicated (the passenger DNA).
- ❖ The joining of this DNA with a DNA vector (also known as a vehicle or a replication).
- ❖ The transfer, via transformation or transfection of the recombinant molecule into a suitable host.
- ❖ Isolation of passenger DNA.

Q8: Delineate the transgenic organism and their significance?

Answer: Transgenic organism is organism that contain foreign gene or DNA its significance is used to explore the gene function it is also related to the medical practise of gene therapy.

Q9: Explain the procedure f for the following:

a) PCR b) Gel electrophoresis c) Gene therapy

Answer: a) Procedure of PCR:

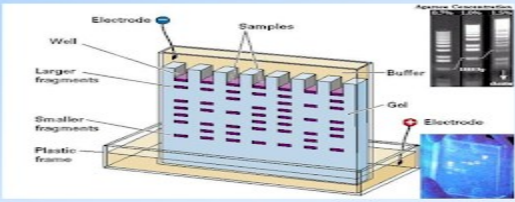
- ✓ Denaturation:
- ✓ This step involves heating the reaction mixture to 94°C for 15-30 seconds:

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- ✓ Annealing:
- ✓ The reaction temperature is rapidly lowered to 54-60°C for 20-40 seconds:
- ✓ Elongation:

Steps Involved in Gel Electrophoresis

1. "Cut" DNA sample with restriction enzymes.
2. Run the DNA fragments through a gel.
3. Bands will form in the gel.
4. Everyone's DNA bands are unique and can be used to identify a person.
5. DNA bands are like "genetic fingerprints".



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c) Gene therapy works by replacing disease causing genes.

Q10: Describe human genome project and main goals?

Answer: Human genome project (HGP) was an international scientific research project which got successfully completed in the year 2003 by sequencing the entire human genome of 3.3 billion base pair. The HGP led to the growth of bioinformatics which is a vast field of research. The successful sequence of the human genome could solve the mystery of many disorders in humans and gave us a way to cope up with them.

Goals of the human genome project include:

- ✓ Optimization of the data analysis.
- ✓ Sequencing the entire genome.
- ✓ Identification of the complete human genome.
- ✓ Creating genome sequence databases to store the data.
- ✓ Taking care of the legal, and social issues that the project may pose.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Q11: Discuss the drastic environmental projection impacts of oil spills and how the microbes like bacteria can help mitigate the problem?

Answer: Oil spill is the discharge of some volume of oil (crude or refined) that is capable of polluting the land, air and water environment. Its occurrence brings about contamination of the environment and as such, threatens the health of all inhabitants of the environment. Environmental pollution is the release of harmful substances into the natural environments that cause adverse change. It's a careless release of contaminants that that poses threats to the environment and human health.

Q12: Give an account of significance of transgenic organism in food industry?

Answer: To increase the productivity of milk or meat in an animal. Scientists developed mouse as a transgenic animal for the first in the history of science.

Q13: Describe the uses of DNA fingerprinting?

Answer: a) To observe the distinct banding patterns they are unique to every individual.

b) To identify suspects and victims in criminal cases.

c) To determine paternity and to identify soldiers killed in war.

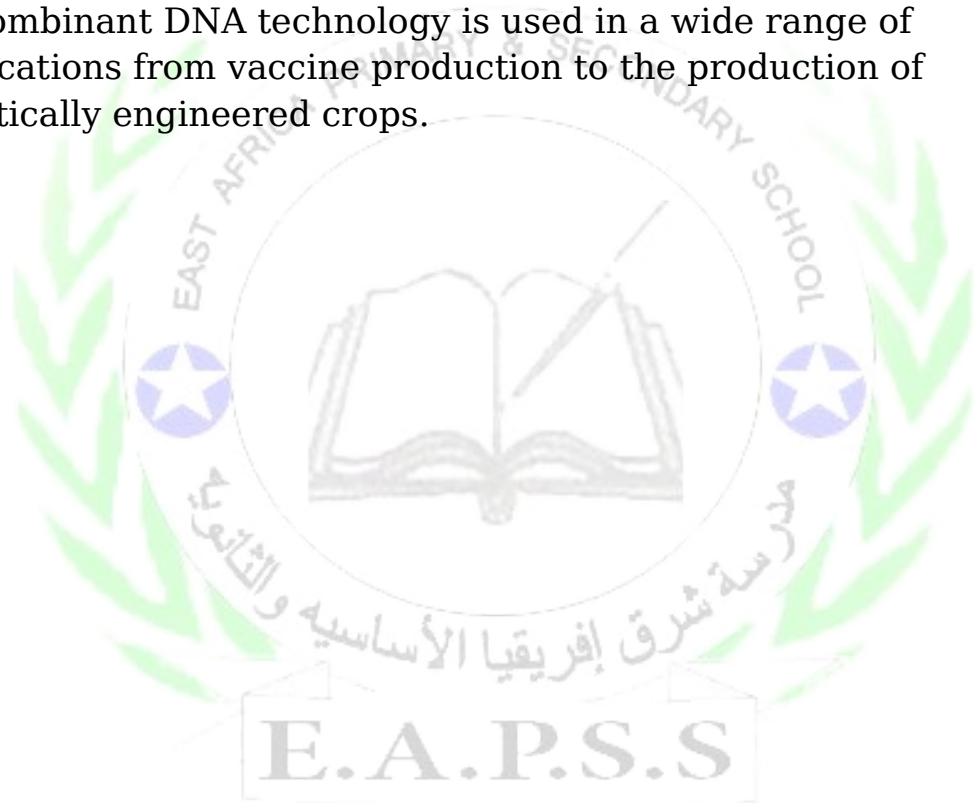
Q14: What is gene cloning?

Answer: Gene cloning involves the production in vitro of new DNA molecules which contain novel combinations of genes or oligonucleotides and the propagation in vivo of the replicative mechanisms of bacteria and other organisms.

Q15: Elaborately discuss recombinant DNA technology and its usefulness?

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

- ❖ **Answer:** Recombinant DNA, or RNA that is formed by combining DNA from different sources through a process called genetic recombination. Often, the sources are from different organisms. Generally speaking, DNA from different organisms has the same chemical general structure. For this reason, it is possible to create DNA from different sources by combining strands.
- ❖ Recombinant DNA technology is used in a wide range of applications from vaccine production to the production of genetically engineered crops.



Ten Questions and Answers about Chapter Seven:

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

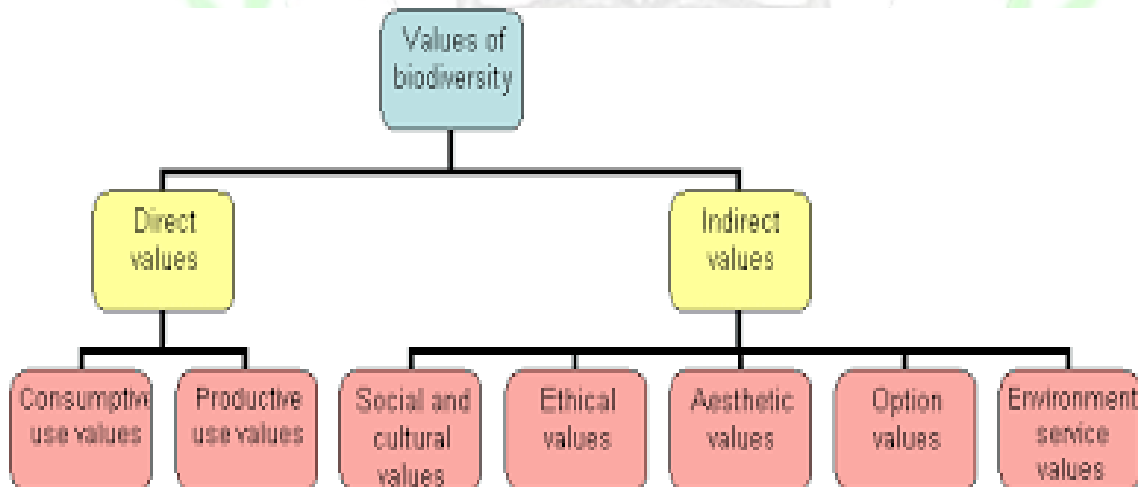
Q1: Compare species diversity and genomic diversity?

- ❖ **Answer:** Genetic diversity could be defined as the variations within and among species in the form of the genetic makeup.
- ❖ Species diversity is the variation and variability of species in a particular area or volume at a particular time.

Comparisons between them are:

- Both are levels of biodiversity, but each has its level limited to genetic and species as the name indicates.
- Genetic diversity can be measured by evaluating the number of genes while species diversity can be measured by evaluating the number of species and their evenness.
- Genetic diversity has more potential to affect the species diversity than not.

Q2: List several reasons to value biodiversity?



Q3: How does the green house affect occur?

Answer: The green house effect is a process that occurs when gases in Earth's atmosphere trap the sun's heat. This process makes earth much warmer than it would be without an atmosphere. The greenhouse effect is one of the things that makes earth a comfortable place to live.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Q4: Identify the primary causes of modern species extinction?

- ❖ **Answer:** Habitat destruction is an important cause of known extinction.
- ❖ Over hunting
- ❖ Destruction of habitat.

Q5: Describe how pesticides, such as DDT, undergo the process of biological magnification?

Answer: Biological magnification caused a crisis with eagles, where DDT was used to control mosquitoes and other pests. Birds would accumulate toxic levels of DDT in their bodies which would cause their egg to become fragile and break. The eagle almost became extinct, but lawmakers banned DDT and the eagle is now in recovery.

Q6: Choose a species that might be effected by global warming and predict how that species might be affected?

Answer: Green turtles, like many animal species, are sensitive to the changes in temperature caused by global warming. And, because a baby turtle's sex depends on the temperature of the sand where their egg is laid, climate change has an impact on these turtle's development too. The warmer areas produce female turtle's. So, with climate change causing an increase in temperature, more females than males are hatching. And this reduces the number of male green turtles around. This may affect the population growth of green turtles in the future since it means fewer mating partners for female turtles.

Q7: Contrast conservation biology with restoration biology?

- ❖ **Answer:** Conservation biology integrates ecology, evolutionary biology, physiology, molecular biology, genetics, and behavioural ecology to conserve biological diversity at all levels.
- ❖ Restoration ecology applies ecological principles in an effort to return degraded ecosystems to conditions as similar as possible to their natural, predegraded state.

Q8: Explain why reserves protect biodiversity?

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Answer: One main reason why we have nature reserves is to protect our biodiversity the degree of variation of life. A sufficient biodiversity is required to keep our ecosystem in natural balance. With sufficient biodiversity, the loss of any part of the food chain will not lead to a serious disruption and effects on the other organisms.

Q9: Explain causes biological and effect of acid rain?

- ❖ **Answer:** Acid rain is made up water droplets that are unusually acidic because of atmospheric pollution, most notably the excessive amount of sulfur and nitrogen released by cars and industrial processes. Acid rain is also called deposition because this term includes other forms of acidic precipitation (such as snow).
- ❖ Effects of acid rain.
 - ✓ It causes respiratory issues in animals and humans.
 - ✓ When acid rain falls down and flows into the rivers and ponds it affects the aquatic ecosystem.
 - ✓ Acid rain also causes the corrosion of water pipes. With further results in leaching of heavy metals such as iron, lead and copper into drinking water.
 - ✓ It damages the buildings and monuments made up of stones and metals.

Q10: Give an account of the factors that threaten biodiversity?

- ❖ **Answer:** Overexploitation
- ❖ Habitat loss

General Revision Questions and Answers About Chapter One:

Q1: Define nervous system

A: The nervous system is a highly organized network of cells that detects changes and controls metabolic processes, mental and physical activities and maintain homeostatis.

Q2: How many neurons that the nervous system made up?

A: The nervous system is made up of billions of highly specialized cells called neurons.

Q3: What are the components of the nervous tissue?

A: The nervous tissue is composed of neurons and neuroglia.

Q4: Differentiate **Neurones** and **Neuroglia**.

A: **Neurones** (nerve cells) are the working units of the nervous that generate and transmit nerve impulses. While **Neuroglia** do not conduct nerve impulse instead they support and protect the nerve cells.

Q5: Neurons differ in where?

A: Size, length, and shape , as they may range from several millimeters to about a meter in length.

Q6: The single neuron consist of three main regions, what are they? Outline their functions?

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

A: The dendrites, a cell body, and an axon.

A: Dendrites receive signals called impulses from other neurons and conduct the impulses to the cell body.

A: The nucleus of the neuron and many of the cell organelles are found in the cell body.

A: Lastly, an axon carries the nerve impulse from the cell body to other neurons and muscles.

Q7: What carries the neurons with myelin and with not myelin?

A: Neurons with myelin carry impulses that are associated with sharp pain; Neurons that lack myelin carries impulses associated with dull, throbbing pain.

Q8: Neurons are classified according to number of dendrites that arise from the cell body into what?

A: Anaxonic, unipolar, bipolar, multipolar

Q9: Functionally, there are three types of neurons, what are they?

A: Motor neurons, sensory neurons and relay neurons.

Q10: Where the sensory neurons get information?

A: These neurons get information about what is going on inside and outside of the body and bring that information into the brain or spinal cord in order to be processed.

Q11: Relay neurons also known as what?

A: Connector or intermediate even associated.

Q12: Where relay neurons receive information?

A: They receive information from other neurons (either sensory neurons or interneurons) and transmit information to other neurons (either motor neurons or interneurons).

Q13: What the nerve consist of?

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A: A nerve consists of numerous neurons collected into.

Q14: Most large nerves are covered by, what?

A: Protective Connective tissue.

Q15: The nerves have three layers, what are they?

A: They are: endoneurium, perineurium and epineurium.

Q16: Define nerve impulse.

A: A nerve impulse is an electrical charge travelling the length of a neuron.

Q17: What an impulse results from?

A: An impulse results from a stimulus, such as a touch or perhaps a loud bang that causes you to jump.

Q18: Differentiate resting potential and action potential?

A: A non-conducting nerve fibre is described to be in a resting potential while A conducting nerve fibre is described to be action potential

Q19: How many neurons involved the transmission of nerve impulse?

A: There is always more than one neuron involved in the transmission of a nerve impulse from its origin to its destination, whether it is sensory or motor.

Q20: Define synapse.

A: A synapse is the junction between dendrites of two adjacent neurons.

Q21: GABA stands for what?

A: Gammaaminobutyric acid.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Q22: The nervous system consists of two major divisions namely:

A: The central nervous system and The peripheral nervous system.

Q23: In how many parts are divided into central nervous system?

A: Two steps and they are: Brain and Spinal cord.

Q24: What are the two parts of peripheral nervous system?

A: The following are: Sensory and Motor

Q25: List the three layers of tissue that they consists of the meninges?

A: They are: Dura mater, Arachnoid mater and Pia mater.

Q26: Define the brain

A: The brain is one of the most important organs of the human body.

Q27: How many neurons that the brain consist of?

A: It consists of 100 billion neurons, it occupies most of the space of the skull.

Q28: How much the mass of the brain?

A: It is mass in the human adult is about 1.4kg.

Q29: What is the only food for brain cells?

A: Glucose is the only food for brain cells.

Q30: The brain consist of what?

A: The cerebrum, the diencephalon, the brain stem and the cerebellum.

Q31: The cerebrum constitutes of the brain's volume, how?

A: The cerebrum constitutes about 90% of the brain's volume.

Q32: There are three types of activities associated with the cerebral cortex, what are they?

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A: Higher order functions, Sensory perception and initiation and control

Q33: Name the part of the brain that connects the cerebrum and the midbrain?

A: Diencephalon

Q34: What the diencephalon consist of?

A: The thalamus and hypothalamus.

Q35: Where the thalamus is situated?

A: The thalamus is situate within the cerebral hemisphere just below the corpus callosum.

Q36: Define the hypothalamus

A: The hypothalamus is a small but important structure.

Q37: Hypothalamus controls, what?

A: It controls the output of hormones from pituitary glands.

Q38: List three main function of hypothalamus?

A: Appetite, satiety, thirst and water balance.

Q39: The brain stem consist of what?

A: Mid brain, pons and medulla oblongata.

Q40: The mid brain possessed what?

A: It is processed in visual and auditory information, such as moving the eye, neck and head toward a source of sudden sound.

Q41: What is the meaning of pons?

A: Bridge

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Q42: What is the most interior region of the brain stem?

A: The medulla oblongata, or simply the medulla.

Q43: Define reflex action

A: Reflex action is a rapid automatic response to a certain stimulus.

Q44: There are two types of reflex action, what are they?

A: The simple reflex action and conditional reflex action.

Q45: Differentiate simple reflex actions and conditioned reflex actions?

A: In a simple reflex action there is a specific single and automatic response to a particular stimulus.

A: This is an automatic response which can be evoked from an animal by unrelated stimulus substituted for the one which normally elicits the response.

Q46: What is the simplest form of reflex actions?

A: It is the simplest form of reflex actions and does not depend on learning.

Q47: Give two examples of simple reflex actions and conditioned reflex actions?

A: Coughing and sneezing are simple reflex actions and walking and driving.

Q48: The PNS consist of what?

A: Cranial nerves and spinal nerves.

Q49: Differentiate cranial nerves and spinal nerves?

A: These are nerves that arise from the brain and innervate areas in the head and face.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

A: These are nerves that arise from the spinal cord and innervates the limbs and the trunk.

Q50: How cranial and spinal nerves are there in the human body?

A: There are 12 pairs of cranial nerves in human.

A: There are 31 pairs of spinal nerves in humans.

Q51: Motor neurons in the peripheral nervous system can be classified father as being, what?

A: The somatic nervous system and the autonomic nervous system.

Q52: What autonomic nervous system carrier?

A: This system carries impulses from the central nervous system to the heart and other internal organs.

Q53: There are two branches of autonomic nervous system, what are they?

A: These are: the sympathetic nervous system and the parasympathetic nervous system.

Q54: What is dementia?

A: Dementia is caused by progressive, irreversible degeneration of the cerebral cortex and results in mental deterioration, usually over several year.

Q55: Alzheimer disease is commonly affected, who?

A: It commonly affects people with down syndrome by the age of 40 years.

Q56: In Alzheimer disease death usually occurs between how?

A: Death usually occurs between 2 and 8 years after onset.

Q57: Define meningitis

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

A: The term meningitis usually refers to inflammation of the subarachnoid space and is most commonly transmitted through contact with an infected individual.

Q58: Name the microbes that cause meningitis in children the age 2-5 years and above 5 years?

A: Haemophilus and Neisseria.

Q59: What the meningitis can affect?

A: Meningitis can also affect the dura mater.

Q60: What the sensory receptors enable you?

A: To taste, smell, hear, see, and touch, and detect motion and temperature.

Q61: Where the taste and smell stimulus are located?

A: Specialized receptors located high in the nose response to chemicals in the air and send the information to the olfactory bulb in the brain.

Q62: Define taste buds

A: Taste buds are areas of specialized chemical receptors on the tongue that detect the tastes of sweet, sour or salty and bitter.

Q63: Light first enters the eye through where?

A: A transparent.

Q64: Mention the function of cornea.

A: Cornea helps to focus the light through an opening called the pupil.

Q65: Differentiate cones and rods

A: Rods are light-sensitive cells that are excited by low levels of light.

A: Cones function in bright light and provide information about color to the brain.

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Q66: What are the two functions of the ear?

A: Hearing and balance are the two major functions of the ear.

Q67: The canals in the ear are responsible, what?

A: The canals in the inner ear are responsible for your sense of balance, or equilibrium.

Q68: When hearing comes?

A: Hearing comes when sound waves cause particles in the air to vibrate.

Q69: What the sound waves causes the tympanum?

A: The sound waves causes the tympanum to vibrate.

Q70: What is the function of hair cells in the cochlea?

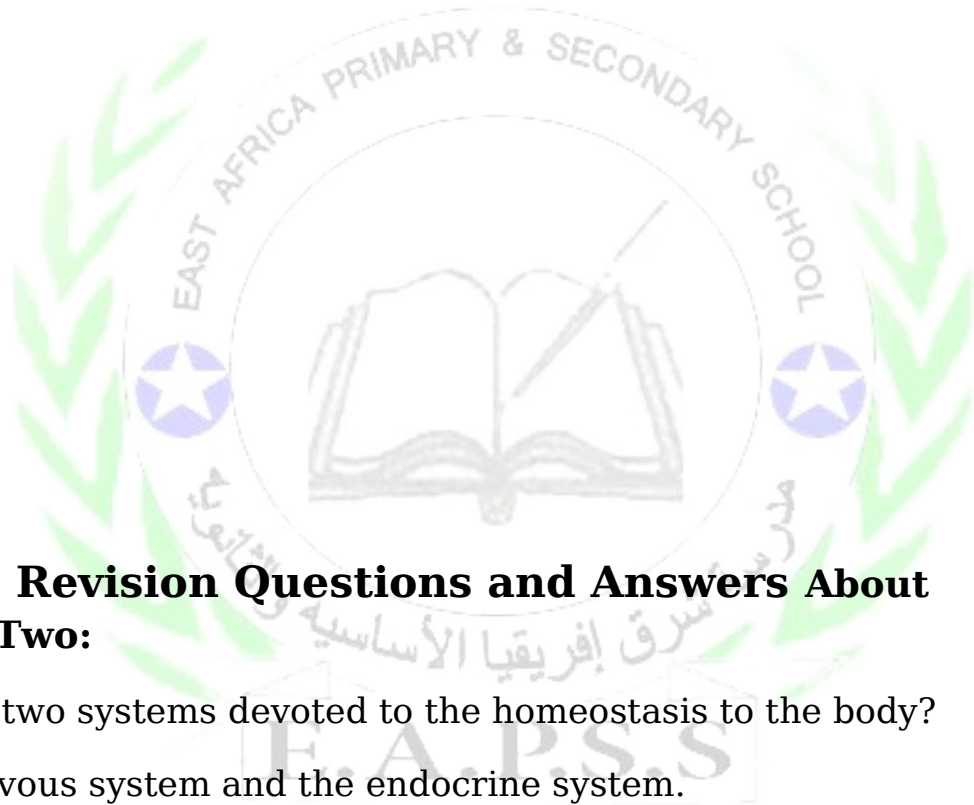
A: Hair cells in the cochlea generate nerve impulses, which are sent to the brain through the auditory nerve.

Q71: The semicircular canals transmit, what?

A: Semicircular canals transmit information about body position and balance to the brain.

Q72: Where the pain receptors are found?

A: The pain receptors are found in the epidermis and dermis of the skin.



General Revision Questions and Answers About Chapter Two:

Q1: Name two systems devoted to the homeostasis to the body?

A: The nervous system and the endocrine system.

Q2: What the endocrine glands consists of?

A: The endocrine system consists of glands widely separated from each other with no physical connections.

Q3: Define the endocrine glands.

A: The endocrine glands are groups of secretory cells surrounded by an extensive network of capillaries that facilitates diffusion of hormones (chemical messengers) from the secretory cells into the bloodstream.

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Q4: Why endocrine glands referred to as ductless glands?

A: Because hormones diffuse directly into the bloodstream.

Q5: Hormones influence almost every of what?

A: Hormones influence almost every cell and organ in our body.

Q6: What are hormones?

A: Hormones are substances secreted by cells that act to regulate the activity of other cells on the body.

Q7: What are carried by the blood to where?

A: Hormones are carried by the blood to target cells with the appropriate receptor for a given hormone.

Q8: Define exocrine glands.

A: Exocrine glands secrete substances through ducts (tube-like structures).

Q9: Give all examples of exocrine glands?

A: Sweat glands, mucous glands, salivary glands, and other digestive glands are examples of exocrine glands.

Q10: How many classified hormones according its mechanism of action?

A: Steroid hormones and non-steroid hormones.

Q11: Give two examples of steroid hormones?

A: Estrogen and testosterone are two examples of steroid hormones.

Q12: Non-steroid hormones also known as what?

A: Amino acid hormones.

Q13: Steroid hormones are soluble in where?

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

A: Steroid hormones are soluble in lipids.

Q14: Differentiate between lipophilic and hydrophilic?

A: Lipophilic which are fat-soluble while hydrophilic which are water-soluble.

Q15: The lipophilic hormones what these include?

A: These include the steroid hormones and thyroid hormones.

Q16: What is the function of hydrophilic hormones?

A: Hydrophilic hormones are freely soluble in blood but cannot through the membrane of target cells.

Q17: What is the function of lipophilic hormones?

A: Lipophilic hormones travel in the blood attached to transport proteins.

Q18: Define homeostasis

A: Homeostasis is defined as a stable internal environment.

Q19: Why endocrine system play an important role in maintenance of homeostasis?

A: Because hormones regulate the activities of cell, tissues, and organs throughout the body.

Q20: What is a feedback mechanism?

A: A feedback mechanism is one in which the last step in a series of events controls the first feedback mechanism.

Q21: What are the types of feedback mechanisms?

A: Feedback mechanisms can be negative or positive feedback.

Q22: Most hormone systems use, which system?

A: Negative feedback.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Q23: What the thyroid hormones regulate?

A: The thyroid hormones regulate cellular metabolic rates through several negative feedback mechanisms.

Q24: Give example of negative feedback and positive feedback?

A: Thyroid hormones and estrogen.

Q25: Define antagonistic hormones?

A: A number of hormones work together in pairs to regulate the levels of critical substances.

Q26: Why antagonistic hormones are referred to as opposite?

A: Because their actions have opposite effects.

Q27: Write down two examples of antagonistic hormones?

A: Glucagon and insulin are examples of antagonistic hormones.

Q28: The endocrine system includes all the glands that secrete hormones list?

A: Pituitary, thyroid, parathyroid, adrenal glands, the pancreas, ovaries, testes, pineal gland and the thymus gland.

Q29: What is pituitary gland?

A: The pituitary gland is a small gland with the diameter of 1cm that is located the base the hypothalamus.

Q30: What is consists of anterior pituitary gland?

A: It consists of specialized glandular cells that secrete hormones with various functions which in turn regulate the secretions of other glands.

Q31: What is stimulates growth hormone?

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A: It stimulates cell division and growth especially bone and muscular in child hood and adolescence.

Q32: What is the function of thyroid-stimulating hormone?

A: Stimulates the thyroid gland to produce the hormone thyroxine.

Q33: What is the function follicle-stimulating hormone?

A: Function development of ovarian follicles in females. In males it is required for the development of sperm.

Q34: What appears posterior pituitary gland?

A: Appears fibrous.

Q35: Why posterior pituitary gland appears fibrous?

A: Because it contains axons that originate in cell bodies within the hypothalamus.

Q36: What is made antidiuretic hormone?

A: (ADH) are made by nerve cells in the hypothalamus.

Q37: Explain why the consumption of alcohol leads to frequent urination?

A: Alcohol use causes frequent urination because of chemical changes in the kidneys and an increased amount of fluid from alcoholic beverages. Alcohol use can cause harmful byproducts and dehydration. Long-term alcohol abuse can lead to kidney problems.

Q38: What contains pancreas?

A: The pancreas mostly contains exocrine cells.

Q39: What is the function glucagon?

A: Stimulates release of glucose into the bloodstream by liver cells.

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Q40: How does insulin lower blood sugar?

A: This hormone, insulin, causes the liver to convert more glucose into glycogen (this process is called glycogenesis), and to force about 2/3 of body cells (primarily muscle and fat tissue cells) to take up glucose from the blood through the GLUT4 transporter, thus decreasing blood sugar.

Q41: Compare between Alpha cells and Beta cells?

A: The cells that produce glucagon hormone is known as Alpha cells while the cells that produce insulin hormone is known Beta cells.

Q42: The thyroid gland secretes three hormones, tell them?

A: They are the following: primarily thyroxine, Calcitonin and Parathyroid glands.

Q43: Where the adrenal glands are located?

A: Just above each kidney.

Q44: Differentiate adrenal medulla and adrenal cortex?

A: The adrenal medulla produces two amino acid-base hormones While the adrenal cortex responds to adrenocorticotrophic hormone.

Q45: The adrenal medulla produces two hormones what are they? and what they increase?

A: They are: epinephrine and norepinephrine. These hormones increase heart rate, blood pressure, blood glucose level, and blood flow to the heart and lungs.

Q46: ACTH stands for what? and where it secreted by?

A: Adrenocorticotrophic hormone, which is secreted by the anterior pituitary.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Q47: What is the different between cortisol and aldosterone?

A: **Cortisol** promotes the production of glucose from proteins making usable energy available to cells while **Aldosterone** helps raise blood pressure and volume by stimulating salt and water retention by the kidney.

Q48: Define gonads.

A: Gonads----- the ovaries in females and the testes in males.

Q49: Where LH and FSH stimulated by?

A: In females, LH and FSH stimulate secretion of **estrogen** and **progesterone** from the ovaries.

Q50: Estrogen regulates, what?

A: Estrogen also regulates female secondary sex characteristics.

Q51: Progesterone prepares what?

A: In preparation for a possible pregnancy.

Q52: Define testosterone

A: **Testosterone** is an androgen that regulates male secondary sex characteristics.

Q53: Define diabetes.

A: Diabetes is a disease that results from the body not producing enough insulin or not properly using insulin.

Q54: How is the treatment of type I diabetes?

A: Treatment for these patients consists of exogenous insulin injection.

Q55: Have type II diabetes treatment?

A: Yes, because can often control their diabetes through diet and exercise.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Q56: Outline three symptoms of hyperthyroidism and hypothyroidism?

A: Symptoms of hyperthyroidism include weight loss, high blood pressure and heart rate.

A: Symptoms of hypothyroidism include weight gain, low heart rate and body temperature.

Q57: GHD stands for what? A: Growth Hormone Deficiency.

Q58: What is the different between **dwarfism** and **gigantism**?

A: In children who are still growing, too low growth hormone can cause a condition called **dwarfism**.

A: In children who are still growing, too much growth hormone can cause a condition called **gigantism**.

General Revision Questions and Answers About Chapter Three:

Q1: What are the types of skeletal system found in animals?

A: Endoskeleton and Exoskeleton.

Q2: How many bones are found in human adult?

A: 207 bones.

Q3: What are parts skeletal system?

A: Axial skeleton (80 bones) includes skull, vertebral column, sternum and ribs.

A: Appendicular skeleton (126 bones) includes lower and upper limb.

Q4: What are the functions of skeletal system?

- A: To support and protect the soft organs.
- To give muscles somewhere to attach and something to pull against.
- To manufacture blood cells.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

- To provide storage for phosphorus and calcium.

Q5: Define skull.

A: Is a bony structure which encases the brain and gives form to the head and face.

Q6: How many bones are there in the skull? Then classify them?

A: 22 bones are there in the skull, 14 bones are facial while the rest 8 bones are cranial bones.

Q7: How many bones are there in vertebral column?

A: The adult vertebral (spinal) column consists of 26 (33) bones that are grouped.

Q8: What are the types of vertebral column?

- A: 7 cervical vertebrae in the neck.
- 12 thoracic vertebrae that articulate with the 12 pairs of ribs.
- 5 lumbar vertebrae of the lower back.
- 1 sacrum which is actually a fusion of 5 sacral vertebrae.
- 1 coccyx which is a fusion of 4 coccygeal.

Q9: What are the functions of vertebral column?

- A: Providing vertical support for the body.
- Supporting the weight of the head.
- Helping to maintain upright body position.
- Helping to transfer axial skeletal weight to the appendicular skeleton of the lower limbs.

Q10: How many bones are there in the ribcage?

A: 24 bones of ribs and 1 bone of sternum.

Q11: Define sternum.

A: The sternum is a bony structure that supports the ribs and protects the organs in the thoracic cavity.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

Q12: What are the types of ribs?

- A: True ribs (the first 7 pairs of ribs articulating directly with sternum).
- False ribs (the 8-10 ribs).
- Floating ribs (the last two ribs).

Q13: Distinguish between clavicle and scapula?

- A: Clavicle is a long bone that serves as a structure between the shoulder blade and the sternum.
- Scapula is the bone that connects the humerus with the clavicle.

Q14: Define pelvic girdle.

A: Is a ring like bony structure located in the lower part of the trunk.

Q15: How many bones are there in lower limbs and upper limbs? tell them?

- ❖ A: Upper limbs are 64 bones refer to the bones page 61 figure 3.1 in your book.
- ❖ Lower limbs are 62 bones refer to the bones page 61 figure 3.1 in your book.

Q16: List types of bones?

- A: Long bones: The bones of the arms, legs, hands and feet.
- Short bones: The bones of the wrists and ankles.
- Flat bones: The ribs, shoulder blades, hip bones and cranial bones.
- Irregular bones: The vertebrae and facial bones.

Q17: Define bone.

A: Bone is a connective tissue that has many shapes and size.

Q18: There are two types of bone marrow what are they?

A: Red bone marrow and yellow bone marrow.

Q19: What are osteoblasts?

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A: Osteoblasts are the cells that form new bones and are responsible for the growth and repair of bones.

Q20: Define cartilage.

A: Cartilage is an elastic supporting tissue that can withstand constant pressure and friction.

Q21: Define joints.

A: Joints are the places where two bones meet, known as joints.

Q22: What is the difference between ligament and tendon?

- ❖ A: Ligaments are tough bands of connective tissue that attach one bone to another.
- ❖ Tendon is a flexible cord of strong fibrous collagen tissue attaching a muscle to a bone.

Q23: In how many types of joints are found in humans?

- ✓ A: Fixed joint
- ✓ Semi-movable joint
- ✓ Movable joint.

Q24: List the health complications of the skeletal system?

- ✓ A: Bone fracture
- ✓ Osteoporosis
- ✓ Arthritis.

Q25: Define muscle? In how many muscles are there in the human body?

- ❖ A: Is a group of muscle tissue which contracts together to produce force.
- ❖ The human body has approximately about 600 muscles.

Q26: What are the three types of muscles?

A: Cardiac muscle, Smooth muscle and Skeletal muscle.

Q27: What is a sarcomere?

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A: Sarcomere is the smallest subunit of muscle contraction.

Q28: Distinguish between flexor and extensor?

- A: Flexor is a muscle that bends a joint.
- Extensor is a muscle that straightens the limbs.

Q29: What is twitch?

A: Twitch is a muscle stimulated with a single electric shock quickly contracts and relaxes in a response.

Q30: What is the difference between slow-twitch fibers and fast-twitch fibers?

- A: Slow-twitch fibers have a rich capillary supply, numerous mitochondria and aerobic respiratory enzymes.
- Fast-twitch fibers have fewer capillaries and mitochondria and can respire anaerobically by using a large store of glycogen.

Q31: What are health complications of muscles?

- ✓ A: Muscle cramps
- ✓ Muscle fatigue
- ✓ Muscle strain
- ✓ Muscle tearing.

Q32: What consists of the integumentary system?

A: The integumentary system consisting of skin, hair and nails.

Q33: What is skin?

A: The skin is the largest organ in the body and has a surface area of about $1.5-2\text{m}^2$ in adults.

Q34: What are the two main layers of the skin?

- A: Epidermis is the most superficial layer and is composed of stratified keratinized squamous epithelium.

EAST AFRICA PRIMARY AND SECONDARY SCHOOL

- Dermis is the inner layer of the skin, it composed of living cells and specialized structures such as sensory neurons and etc.

Q35: List the main functions of the skin?

- A: Protects our bodies from trauma.
- Wound healing.
- Acts as barrier to bacteria and viruses.
- Produces vitamin D, essential for growth and bone maintenance.
- Prevents us absorbing and losing excess water.
- Secretes waste products.
- Regulates our body temperature (thermo receptors, sweat, vasodilation).
- Sense what is happening in our external environment (touch, pressure, heat).

FG: Pigments as well as hair on our heads protect us from the sun.

Q36: List two ways skin disorders?

- o A: Eczema: is an allergic reaction that manifest as dry, itchy, patches of skin that resemble rashes.
- o Acne: skin disturbance that typically occurs on areas of the skin that are rich in sebaceous glands.

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General Revision Questions and Answers About Chapter Four:

Q1: What is genetic?

A: Genetic is a branch of biology that study of hereditary and variation.

Q2: Define variation.

A: Variation observable difference among the living organisms.

Q3: What is hereditary?

A: Hereditary is the passing of characteristics from parent to their offspring.

Q4: In how many types of variation? and what are they?

A: They are the following: continuous variation and discontinuous variation.

Q5: Compare the difference between continuous variation and discontinuous variation?

- A: Discontinuous variation is type of variation which has definite distinct group with no intermediate form.
- Continuous variation also is type of variation which exhibits a wide range of differences for the same characteristics from one extreme end to another end.

Q6: List ways that causes of variation?

- o A: Gamete formation
- o Fertilization
- o Mutation.

Q7: Who is the father of genetics?

A: An Austrian Monk known as Gregor Mendel.

Q8: Why Mendel is considered to be the father of genetics?

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A: Because of this pioneering work on inheritance.

Q9: Mendel carried out various breeding experiments and observed the variations in different characteristics of the garden pea. List these characteristics.

A: Height of the stems - tall or dwarf

- Texture of seed coat - round or wrinkled
- Colour of seeds - purple or white
- Texture of pods - smooth or wrinkled
- Colour of pods - green or yellow
- Position of flower - axial or terminal

Q10: Name Mendel's first law of hereditary?

A: The law of Segregation.

Q11: What the factors attributed that the Mendel to success?

1. A: He used favourable materials, i.e. the pea plant which is normally self-fertilised. This made it easy for him to employ cross-fertilisation at will.
2. The pea plant he used had several observable contrasting characteristics (traits).
3. His study focused on particular traits while those before him had been attempting to determine wholesome heredity of each organism.
4. He kept accurate data on all his experiments and from the analysis of his data he was able to formulate definite hypotheses.

Q12: What chromosomes made up of?

A: DNA and protein (histone protein).

Q13: What are nucleotides?

A: Nucleotides are the building units of nucleic acids. It consist of five carbon sugar, phosphate group and nitrogenous base.

Q14: Distinguish ribose sugar and deoxyribose sugar?

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A: Ribose sugar which is found in the structure of RNA While deoxyribose sugar which is found in the structure of DNA.

Q15: What are nitrogenous bases?

A: Adenine, Guanine, Cytosine, Thymine and Uracil.

Q16: What is importance of nucleic acid ?

- o A: Is the main component of the chromosome.
- o It is responsible for determining the inherited traits and its transmission from one generation to another generation.

Q17: List types of RNA?

- ★ A: Messenger RNA (mRNA).
- ★ Transfer RNA (tRNA).
- ★ Ribosomal RNA (rRNA).

Q18: State at least three difference between DNA and RNA?

DNA	RNA
1. DNA contains the sugar deoxyribose. 2. DNA is a double stranded molecule. 3. DNA is stable under alkaline condition. 4. DNA is responsible for storing and transferring genetic information. 5. DNA uses the base adenine, thymine, cytosine and guanine.	1. RNA contains the sugar ribose. 2. RNA is a single stranded molecule. 3. RNA is not stable. 4. RNA directly codes for amino acids and as acts a messenger between DNA and ribosome to make protein.

Q19: List ways mechanism of DNA replication?

- ★ A: Unwinding the double helix.
- ★ Linking of nitrogenous bases.
- ★ Reconnecting of the chain.

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Q20: Define mutation.

A: Mutation is a sudden change in the genetic material that controls certain characteristics.

Q21: Define mutagens? and tell them examples of mutagens?

A: A chemical or physical agent in the environment that could cause mutation. Examples are chemicals and radiations.

Q22: What are the two types of mutation?

A: Chromosomal mutation and gene mutation.

Q23: Compare between chromosomal mutation and gene mutation?

- A: Chromosomal mutation are mutation involves changes in whole chromosome set, chromosome number or parts of the chromosome.
- Gene mutation these are due to the change in the structure of the gene.

Q24: What is gene?

A: Gene is a segment of DNA that is isolated on a chromosome and that codes for a hereditary character.

Q25: The process of protein synthesis occurs into two stages? What are they? For give each one a definition?

- ❖ A: Transcription is the process by which the genetic instructions in specific gene are transcribed in to an RNA molecule.
- ❖ Translation is the process of converting the information of mRNA (codons) in to a sequence of amino acids in the process of protein synthesis.

Q26: Distinguish between genetic code and code?

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- ♥ A: Genetic code is the sequence of nucleotides in the DNA.
- ♥ Code is the triple base of nucleotides of the mRNA.

Q27: In how many codons are there in mRNA?

A: 64 Codons.

Q28: Compare between introns and exons?

- ♥ A: Introns are non coding regions.
- ♥ Exons are coding regions.

Q29: List the three stages of translation?

- ❖ Initiation
- ❖ Elongation
- ❖ Termination.

General Revision Questions and Answers About Chapter Five:

Q1: Define the following terms: a) Genotype b) Phenotype

- A: Genotype: the genetic makeup (constitution) of an organism that is expressed by letters TT.
- B: Phenotype: the external (outward) appearance of an organism I.e dwarf or tall.

Q2: What is breeding?

A: Breeding is the application of genetic principles in animal husbandry, agriculture and horticulture to improve desirable qualities.

Q3: What is the law of Segregation state?

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A: Law of Segregation states that a pair of corresponding factors (alleles) for a single genetic trait is randomly separated when forming gametes during the process of mitosis (meiosis).

Q4: What is the law of independent assortment state?

A: States that two or more genes assort independently during gamete formation.

Q5: What is test cross?

- A: Test cross involves the breeding an organism that has the unknown genotype with one that is homozygous recessive for the desired trait.
- The crossing of an organism, with an unknown genotype to a homozygous recessive organism.

Q6: What is dominance and recessive?

A: Dominance in genetics is a relationship between alleles of one gene, in which one allele is expressed over a second allele at the same locus While the second over is called recessive.

Q7: Explain complete dominance and incomplete dominance?

A: When one of the alleles is totally dominated is called complete dominance While when both alleles express themselves equally is called incomplete dominance.

Q8: Compare the difference between homozygous and heterozygote?

A: When the allelic genes are identical as in TT or tt, this condition is called homozygous While the individual whose allelic genes tT Tt is referred to as heterozygote.

Q9: What is the difference between diploid and haploid?

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A: When number of chromosomes in the cell are 46 or $2n$ is called diploid number and also when number of chromosomes of the cell are 23 or n is called haploid number.

Q10: List disorders of chromosomal mutation specially non-disjunction?

- ♥ A: Disorders of chromosomal mutations specially through non-disjunction includes:
- ♥ Down's syndrome
- ♥ Klinefelters syndrome
- ♥ Turner's syndrome
- ♥ Polyploidy syndrome.

Q11: Distinguish between Klinefelters syndrome and Turner's syndrome?

- A: Klinefelters syndrome individuals have extra sex chromosome. They have total of 47 chromosomes in their cells i.e. male (xxy) and female (xxx).
- While turners' syndrome is where an individual lacks one (1) sex chromosome. 46 chromosome (xo or yo) in the cells instead of normal 46 chromosome. $45y0$ = Turners' syndrome in male and $45x0$ turners' syndrome in female.

Q12: List symptoms of these:

a) Klinefelter's syndrome in male b) Turners' syndrome in female

- ❖ A: Symptoms of klinefelter's in male include:
- ❖ Infertility due to the lack of sperm production.
- ❖ Underdeveloped testes and reduced facial hair.
- ❖ B: Symptoms of turner's syndrome in female include:
- ❖ Undeveloped testes and reduced facial hair.
- ❖ Infertile due to lack of ovaries and small uterus.
- ❖ No breast developments and short in height.

Q14: Where occur klinefeter's syndrome in human being?

A: Can occur in either during spermatogenesis or oogenesis.

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Q15: List disorders due to the gene mutation in human?

- ✓ A: Albinism
- ✓ Sick-cell anemia
- ✓ Hemophilia
- ✓ Color-blindness
- ✓ Condrodystrophic dwarfis.

Q16: What are genetic disorders?

A: 1. Alternation of chromosome structure examples are:

- ♥ Krabbe disease
- ♥ Phenylketonuria

2. Alternation of chromosome number.

Q17: Define inbreeding.

A: In breeding: breeding closely related individuals to increase chances of desired qualities being exhibited.

Q18: What is cross breeding?

A: Cross breeding: cross between tow genetically dissimilar lines to reduce chances of harmful recessive alleles.

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General Revision Questions and Answers About Chapter Six:

Q1: Define biotechnology.

A: Involves manipulating biological systems to generate useful products or to improve environmental, medical and agriculture process.

Q2: What is engineering?

A: Genetic engineering is the direct manipulating of an organism gene using biotechnology.

Q3: List ways methods of suing genetic engineering?

- ★ A: Restricting
- ★ Gel electrophoresis
- ★ Recombinant DNA technology
- ★ Gene cloning
- ★ DNA sequence
- ★ Polymerase chain reaction
- ★ DNA fingerprinting.

Q4: Define clone.

A: Clone is an exact copy of a DNA segment a whole cell, or complete organism.

Q5: What is used for the sequence of gene?

- ❖ A: To predict the function of the gene.
- ❖ To compare genes it similar sequences from other organisms.
- ❖ To identify mutations or errors in the DNA sequence.

Q6: Define polymerase chain reaction (PCR).

A: Is a method of making many copies of a specific segment of DNA, it is used for amplification of DNA.

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Q7: List major steps of (PCR)?

- A: Denaturation - heat is used to separate strands of double strands DNA.
- Annealing of primers - primers provide the 3OH required for elongation by DNA polymerase.
- Synthesis - DNA polymerase makes new DNA.

Q8: What is fingerprinting?

A: Fingerprinting involves separating these DNA fragments using gel electrophoresis in order to observe the distinct banding patterns they are unique to every individual.

Q9: What is transgenic organisms?

A: Transgenic organisms are organisms which contain foreign DNA that has been introduced using biotechnology.

Q10: List ways applications of biotechnology?

- ♥ A: Medical applications
- ♥ Agricultural applications
- ♥ Environmental cleanup
- ♥ Bioethics.

Q11: What is gene therapy?

A: A technique aimed at correcting mutated genes that causes human disease.

Q12: Differentiate between genomics and proteomics?

- ★ A: Genomics is the study of an organisms genome.
- ★ Proteomics is the study of the structure and functions of proteins in the human body.

Q13: Define the following terms:

A) bioethics

B) Genetically modified organism (GMO)

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- ❖ A: Is the study of ethical issues related to DNA technology.
- ❖ B: GMO is a transgenic organism which has artificially acquired one or more genes from another species or even from another variety of the same species.

General Revision Questions and Answers About Chapter Seven:

Q1: Define biodiversity.

A: Biodiversity is the variability among living organism --- animals, plants, their habitat and their gens.

Q2: List types of biodiversity?

- ♥ A: Genetic diversity is the variety of gene characterizes that are present in a population.
- ♥ Species diversity is the number of different species and the relative abundance of each species in a biological community.
- ♥ Ecosystem diversity is the variety of ecosystem that are present in the biosphere.

Q3: What is the background extinction?

A: Background extinction is the gradual process of species becoming extinct.

Q4: What are factors that threaten biodiversity?

A: Overexploitation, Habitat loss and Pollution.

Q5: Describe natural resources.

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A: Natural resources are all materials and organisms found in the biosphere, including minerals, fossil fuels, nuclear fuels, plants, animals, soil and etc.

Q6: What is biological magnification?

A: Biological magnification is the increasing concentration of toxic substance in organisms as trophic levels of a food chain or food web.

Q7: Define a food chain.

A: A food chain is the linear sequence in which a living organism serves as a food from another, starting with the producers- consumers and decomposers.

Q8: State food web.

A: The flow of interconnecting food chains is called food web.

Q9: What is conservation biology?

A: Conservation biology is the management of nature and of earth's biodiversity with the aim of protecting species, either habitat and ecosystem from excessive rates of extinction.

Q10: List the common way protected areas in Somalia?

- ♥ A: Daallo mountain
- ♥ Hobyo grasslands and shrublands
- ♥ Kismayo national park
- ♥ Lag badan national park

Q11: Define pollution.

A: The release of substances or forms of energy into the environment by human activities in such quantities whose effects are either harmful or unpleasant to humans or other living organisms.

Q12: Describe pollutant.

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A: The harmful substances that pollute the environment.

Q13: There are three main categories of pollution, tell them?

- ✓ A: Air
- ✓ Water
- ✓ Soil pollution

Q14: List the causes of air pollution?

- ★ A: Sulphur based chemicals e.g. sulphur (IV) oxide (SO_2) and hydrogen sulphide.
- ★ Oxides of nitrogen e.g. nitrogen (II) oxide (NO) and nitrogen (IV) oxide (NO_2).
- ★ Smoke and fumes: they contain carbon (II) oxide (CO), carbon (IV) oxide (CO_2) carbon particles.
- ★ Dust: it is composed of small particles emitted from cement and lime producing industries such as cement works, and also from quarries, road constructions and dusty dry weather roads.
- ★ Lead (Pb).

Q15: State water pollution.

A: The pollution of water involves addition of substances or energy forms into water bodies in quantities that are harmful to the living organisms dependent on that water.

Q16: List sources of water pollution?

- ♥ A: Domestic Effluents
- ♥ Industrial Effluents
- ♥ Heat
- ♥ Oil Spillage
- ♥ Agro-chemicals.

Q17: What are the sources of soil pollution?

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- A: Oxides of sulphur e.g. sulphur (IV) oxide
- Petroleum products
- Inorganic fertilisers agricultural fertilisers containing phosphates and nitrates
- Solid waste.

Q18: How can be controlled by water pollution?

A: Legislation.

