FORM 4

BIOLOGY

TOPIC 4: MOVEMENT AND SUPPORT IN PLANTS AND ANIMALS.

1. What is support?
To carry part of the weight/mass of an organism.

2. What is locomotion?
Progressive change in the position of an organism.

3. State the importance of support systems in living organisms.
-They provide a framework for the body of organisms and help to determine their shape.
-Organs are attached to the skeleton for support and stability to avoid entanglement and crushing each other.
-They protect very important and delicate organs whether inside or outside the body e.g. eyes, heart.
-In large plants, the rigid trunks of trees support the greater mass of leaves and fruits.

4. State the importance of locomotion in animals.
-In search of food -Search for mates
-Escaping predators

5. Name the tissues in higher plants that provide mechanical support
-Sclerenchyma
-Collenchyma (not lignified)
-Xylem/tracheid and vessels

6. State the importance of support in plants.
-Exposing the surface area of leaf to sunlight for photosynthesis.
-Ensure flowers are exposed to pollination agents.
-Expose fruits and seeds to agents of dispersal.
-To resist breakages due to their own weight and that of other organisms.
-For proper transport and translocation of materials.

7. Name the types of plant stems. **-Herbaceous e.g. shrubs.**
-Woody e.g. trees.
-Weak stems in creepers, twining plants and plants bearing tendrils.

8. Name the tissues in plants that are strengthened with lignin.
-Sclerenchyma
-Xylem vessels/tracheid/xylem

9. What makes young herbaceous plants remain upright?
-Turgidity
- Presence of collenchyma

10. State the ways by which plants compensate for lack of ability to move from one place to another.
-Ability to pollinate.
-Response to nastic and tropic movement.
-Ability to exploit localized nutrients. -Ability to disperse seed or fruit propagation.

11. Explain the ways in which erect posture is maintained in a weak herbaceous stem **- This is the function of turgidity and presence of collenchyma. -Cells take in water and become turgid.**

12. Explain how support in plants is achieved.
-Turgor pressure due to absorption of water keeps cells firm hence hold herbaceous plants upright.
-Collenchyma and sclerenchyma tissues are closely packed in stem and roots to provide support.
-Inelastic cuticle on epidermis is covered by a waxy layer hence keeping shape of plant and setting inward pressure against turgid cells and this causes a force to hold plant upright.
-Xylem vessels and tracheid are lignified to provide support to stems, roots and leaves.
-Climbing plants obtain mechanical support from other plants and objects. -They have climbing structures like tendrils which hold on to other objects.

13. Give the reasons why support is necessary in animals **-For attachment of muscles.**

-For attachment of other body organs.
-To protect delicate body organs.
-To maintain body shape/form.
-To enable movement/locomotion.

14. Why is movement necessary in animals? **-Enables animals to search for food.**
-Enables animals to search for shelter.
-Enables animals to escape predators/harmful conditions.
-Enables animals to search for water.
-Enables animals to search for mates. -Enables animals to search for breeding sites.

15. Name the organ used for support by animals
- Skeleton

16. Name TWO different types of skeletons in animals, giving an example of an animal for each type of skeleton named.
-Exoskeleton e.g. arthropod (crab, insect)
-Endoskeleton e.g. chordate (cat, fish)

17. State the difference between exoskeleton and endoskeleton
-Endoskeleton is a rigid framework covered by body tissues of an animal.
-Exoskeleton is a rigid framework found on the surface of an animal.

18. State the advantages of having an exoskeleton **-Supports/protects delicate inner parts.**
-Water proof/prevents drying up of body.
-Provided surface for muscle attachment.

19. Explain the importance of having an endoskeleton. **-Support the body.**
-Give body its shape.
-Protect delicate organs e.g. skull, brain, ribs.

-Used in locomotion e.g. bones serve as levers.
-Red blood cells are formed in bone marrow.
-Minerals are stored in bones e.g. calcium and phosphorus.

20. Explain how a fish is adapted to living in water **-Streamlined body for easy movement in water.**
-Swim bladder controls depth of swimming.
-Fins for movement, balance, direction and stability.
-Gills for gaseous exchange in water.
-Presence of lateral line to sense vibrations.
-Scales provide protection.
-Color which offers camouflage against predators.

21. Explain how a finned fish is adapted to locomotion in water.
-Streamlined body to reduce resistance/friction) to swim smoothly).
-The vertebral column consists of a series of vertebrae held together loosely so that it is flexible
- Myotomes /muscles associated with vertebral column produce movement
-The sideways and backwards thrust of the tail and body against water results in resistance of water pushing the fish sideways and forwards in a direction opposed to thrust -Heat not flexible so as to maintain forward thrust.
-Presence of fins help in propulsion/balance/paired fins (pectoral and pelvic) for controlling pitch and slow down movement/unpaired fins (dorsal, ventral, anal) for yawing and rolling (caudal) for swimming/propulsion and steering/change of direction.
-Presence of swim bladder to make fish buoyant.
-Scales tip towards the back to provide smooth surface.
-Body covered with mucus to reduce friction.
-Flattened surface for easy floating.

22. Name the main parts of the vertebral column giving the types of bones found in each part.
Axial skeleton
-forms the main axis of the body
-formed by the skull, sternum, ribs and vertebrae

Appendicular skeleton
-Composed of limbs and girdles
- The forelimbs are connected to the trunk by the pectoral girdles (shoulder bones)

-Hind limbs are connected to the pelvic girdle (hips)
-Bones are scapular, clavicle, humerus, ulna, femur, tibia, fibula, metacarpals, carpals, tarsals, metatarsals, phalanges, ilium, ischium and pubis

23. What are the vertebrae?
-Bones of the vertebral column.

24. State the functions of the vertebral column.
-Gives flexibility
-Absorbs shock
-Protects spinal cord
-Supports weight of body
-Provide surface for muscle attachment
-Between the vertebrae are soft discs which offer cushioning called intervertebral discs.

25. State the general characteristics of vertebrae.
-Have solid structure called centrum to support weight of body.
-Has transverse process lateral to centrum for muscle attachment.
-Neural spine is dorsal to centrum and provides surface area for muscle attachment. -Neural canal a passage for spinal cord and offers protection to it.
-Has facets for articulation with other vertebrae.
-Neural arch encloses neural canal.

26. Name the bones of the vertebral column.
- Cervical vertebra
- Thoracic vertebra
- Lumbar vertebra
- Sacral vertebra
- Caudal vertebra

27. What is a joint?
-The point where bones meet.

28. State the function of joints.
-Provides a point of articulation between bones

29. Name the main types of joints.
-Immovable joints e.g. skull, pelvic girdles and sacrum.
-Slightly movable joints e.g. between vertebrae.
-Freely movable joints e.g. knee, elbow.

30. Give the features of movable joints.
-Ends of bones covered with articular cartilage.
-Ends bound by capsules of ligaments.
-Have joint cavity filled with lubricating fluid called synovial fluid secreted by synovial membrane.
-They are called synovial joints.

31. State the functions of synovial fluid. **-Absorbs shock.**
-Reduces friction/gives lubrication.
-Nourishment. -Distributes
pressure.

32. Explain the following terms.
i). Ligament
-Connective tissue joining one bone to another.
ii.Cartilage
-Supporting soft tissue found at joints. -They
cushion the bones and absorb shock.
iii) Tendon
-Tissue that connects muscle to bones.

33. What is a muscle?
-Fleshy part of body.
-Composed of long cells enclosed in a sheath.
-Specialized cells capable of contracting.

34. State the functions of muscles **-Cover the skeleton.**
-Provide shape.
-Contract and relax to enable body to move.

35. State the functions of muscles. **-Cover the skeleton.**
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36. Describe the structure and function of various types of muscles
Skeletal muscles
-Also called voluntary/striated/stripped muscles
-They are attached to skeleton
-They consist of striated, multinucleated, ling fibers and are cylindrical shaped
-Found on legs, arms, eyes, neck where they cause movement
Involuntary muscles
-Also called smooth/visceral/unstrained/unstripped
-Their movement is not controlled by the will
-They are unstrained, nucleated, short fibred and spindle shaped
-Are found in alimentary canal, blood vessels, secretory glands, other tubular visceral organs, bladder, uterus, urinary tract, reproductive system, respiratory tract, cilliary,body, iris Cardiac muscles
-Also called myocardium.
-Found in the walls of the heart.
-Are not under control of the will.
-Composed of long cylindrical cells with special junctions.
-Myogenic i.e. generate their own contraction.
-They are not fatigued.
-Their function is contraction of the heart to pump blood.

37. Explain how muscles cause movement of the human arm
-The muscles which bring about these movements are called biceps and triceps
-Biceps are attached to scapula and radius for bending
-Triceps are attached to scapula, humerus and ulna for stretching
-When the biceps contracts, it pulls the radius (forearm) and the hand bends
-The triceps relaxes at the same time
-When the triceps contracts and biceps relaxes (extends) the arm is stretched
-Biceps flexes the arm (flexor) and triceps extend (extensor muscle) the arm

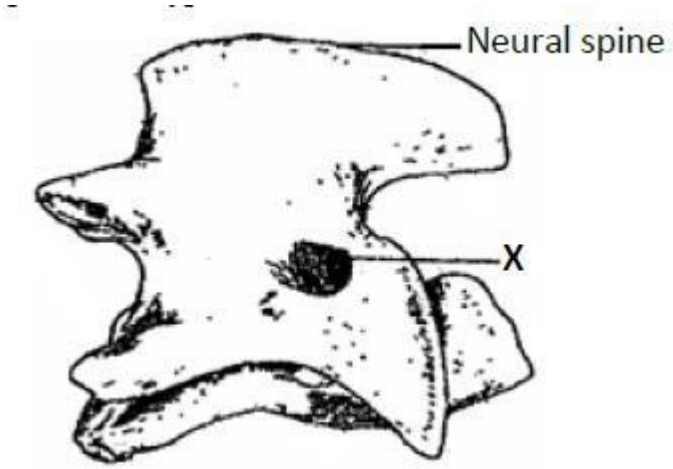
38. Name the cartilage found between the bones of the vertebral column.

-Intervertebral disc.

39. What are the functions of the intervertebral disc?
-Acts as a cushion/absorbs shock.
-Reduces friction.
-Flexibility of vertebral column.

40. Name the fins that prevent the following movements of fish during swimming.
(i) Yawing
Dorsal, / anal fins
(ii) Pitching
Pectoral / pelvic fin
(iii) Rolling
Dorsal / ventral / caudal fin

41. The diagram below represents a type of bone in the mammalian skeleton.



a).Identify the bone illustrated in the diagram.
Axis
b) Give a reason for your answer in (a) above. **Has odontoid process.**

42. State two ways in which skeletal muscles fibres are adapted to their function. -
Have actins and myosin which facilitate contraction & relaxation.
- Have high density of mitochondria to provide energy for contraction.

- Have elongated fibres to allow change in length.

43. State two structural differences between biceps muscles & muscles of the gut.

Biceps(skeletal muscles)	Gut muscles(smooth muscles)
Striated	Un-striated
Multi nucleated	Un-nucleated
Long fibre	Short fibre
cydrical	Spindle shaped

44. The diagram below shows a bone that was obtained from a mammal.

a).Identify the bone.

Ulna.

b).i) Name the type of joint formed at the part marked P.

Hinge joint; ii) State one characteristic of the joint named in b) i) above.

-Presence of cartilage at the articulation areas;

- Has synovial fluid;

- Presence of ligaments holding the two bones;

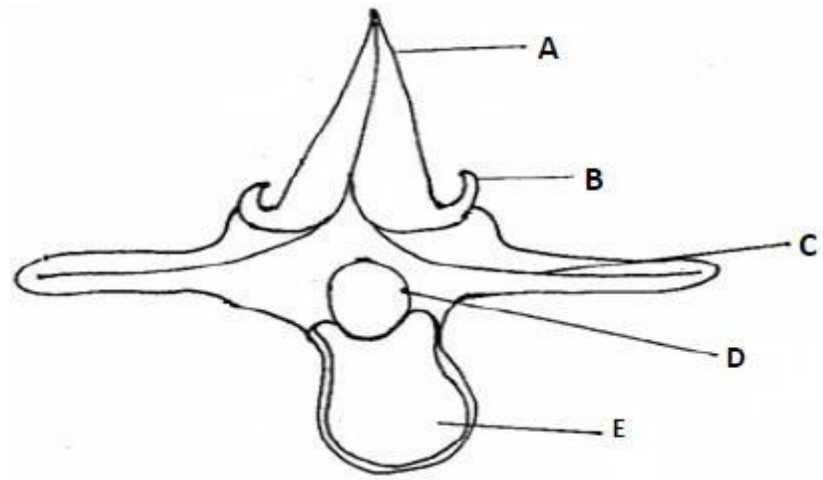
- Movement in one plane only (180⁰)

45. Name the type of muscles found in the gut. **Smooth muscles;**

46. Name the strengthening substance in sclerenchyma tissue.

Lignin;

47. The diagram **below** represents the anterior view of a certain vertebra.



a).With a reason, identify the type of vertebra shown **above**.
Lumbar;
Reason
- Has large/ broad transverse processes;
- Has large neural spine;
- Broad Centrum;
- Has metapophyses;
b) Name the parts labeled.
i) **A: Neural spine;** ii)
D: **Neural canal;**
(c) State the function of part **E**.

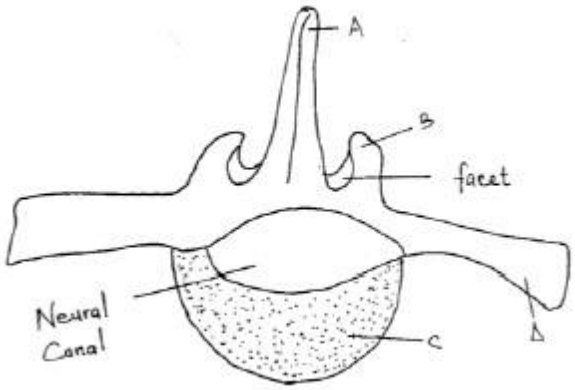
Supports the trunk;

48. Xylem vessels do not collapse even when they are not conducting water.Explain. **Lignified to prevent collapsing;**

49. Name the type of joint found between:
(a) Humerous and ulna
Hinge joint
(b) Femur and Pelvic Girdle

Ball and socket

50. Study the diagram shown below of the anterior view of a lumbar vertebra of a mammal.



a).Name the parts labelled: A, B, C.

A - Neural spine;

B - Metapophysis;

C - Centrum;

b) State the function of the part labelled **D**.

- To offer a large surface area for attachment of abdominal muscles; c) State **three** roles of skeletons in organisms.

- Provides sites for attachment of muscles and organs;

- To protect inner organs;

- To maintain the body shape;

- To enable movement;

- To provide support;

d) State how the part labelled **D** in adapted for the function stated in (b) above.

- It is elongated to provide a large surface area for muscle attachment.

51. Define the following terms in reference to fish locomotion.

(a) Pitching

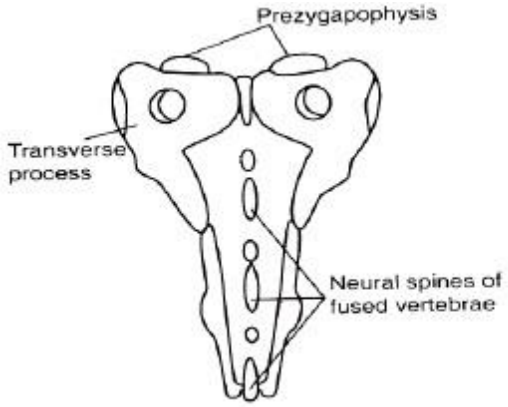
-Ploughing into water with headfirst;

(b) Rolling

-The rotation of the fish around its own axis rocking from side to side; (c) Yawing

-Lateral deflection of the body;

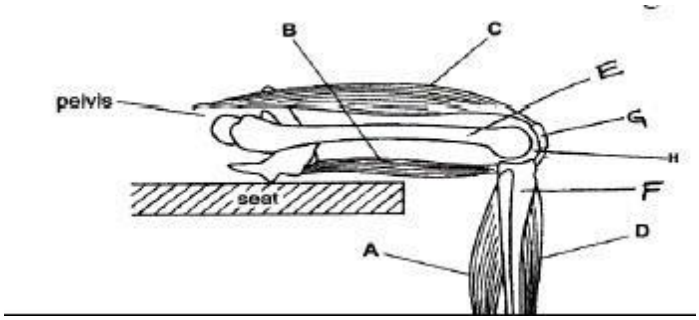
52. The diagram below shows type of vertebrae fused to form a rigid structure.



a).What is the name of the rigid structure?
Sacrum;

b) What is the importance of the rigid structure in human beings?
-Strong and firm to bear body weight; and spread it to the legs through the pelvic girdle;

53. The diagram below shows the bones and muscles of a human leg when seated.



a).Name the bones E and F **E**
– Femur; F – Tibia
b) Muscles in the leg work antagonistically to muscle A
i) What is meant by antagonistic?
When one muscle contracts the other relaxes ii) State two structural difference between muscle A and muscle found in the esophagus.

Muscle A	Smooth muscle
- Striated	not striated
- Multinucleated	mononucleate cells
- Voluntary	involuntary

c) (i) Name the type of joint formed by the articulation of bones E, F and G
Hinge joint

(ii) State one difference between the joint named in C (ii) and the one which bone E make at the proximal end.

Hinge joint	Ball and
-Max stretch is 180^0/ one plane	allows movement in all planes

(d) State the function of the substance found in part labeled H. **Lubrication/ shock absorber;**

54. State **three** distinguishing features of mammalian rib bone.

- Long and narrow;

- Curved shafts;

- Presence of capitulum and tubuculum;

55. Give a reason why lumbar vertebrae have long and broad transverse processes.

For attachment of powerful back muscles that maintain posture / flex the vertebral column / support abdominal organs;

56. Which type of joint is found at articulation of pelvic girdle and femur? **Ball and socket joint;**

57. Distinguish between tendons and ligaments.

Tendons are fibres which attach muscles to bones while ligaments are fibres which attach bone to bone at a joint to strengthen the joint;

58. State the reason why the pelvic girdle is more enlarged in females than males.
Females have a more enlarged pelvic girdle than males to facilitate passage of the head of a baby during birth; while males do not give birth;

59. Name the structure on the pelvic girdle that allows entry of blood vessels and nerves. -

Obturator foramen;

60. Describe the characteristics and functions of the three types of muscle found in mammalian body.

Skeletal muscles

- Attached on the skeleton.
- Have strips running across them thus called striped or striated muscles.
- Are multinucleated;
- The covering of muscle fibre is called sarcolemma; - The functional unit of the muscle is the myofibrils;
- The muscle innervated by the voluntary part of the nervous system.

Smooth muscle

- Found on the walls of tubular visceral organs.
- Cells are spindle shaped with a single nucleus.
- Lack of striations.
- Innervated by the autonomous part of nervous system (are involuntary)

Cardiac muscle

- Each muscle fibre consist of short cells with centrally placed nuclei and numerous striated fibrils.
- Ends of cells marked by intercalated discs.
- Are myogenic and independent of nervous stimulations.
- Capable of continuous contraction without fatigue;

61. Name a cell organelle that would be abundant in a skeletal muscle.

Mitochondria;

62. State the major role of the following features of the mammalian vertebra. i) Odontoid process.

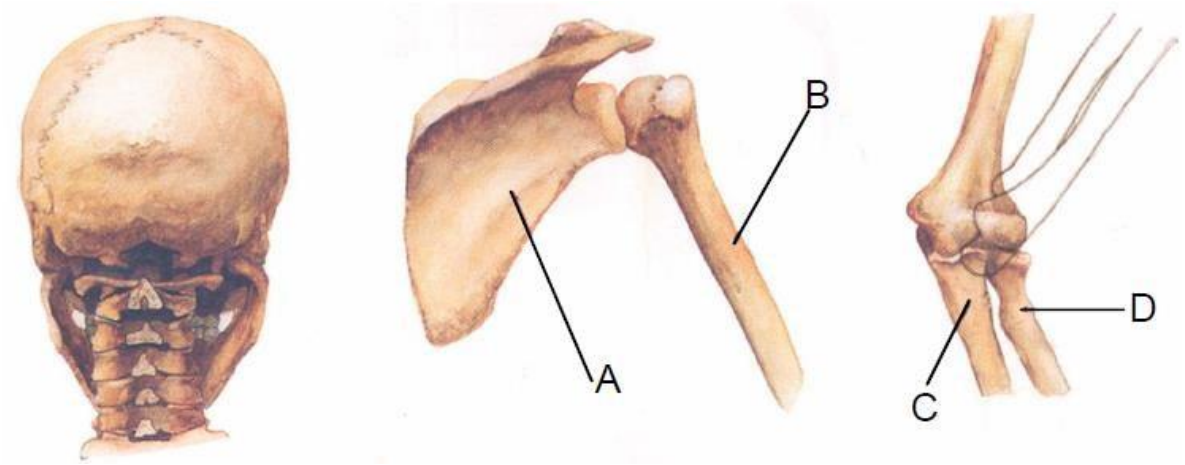
- Fits in the neural canal of the atlas to form a joint which allows for the rotation / turning of the head from side to side; ii) Neural canal.

Passage of the spinal cord;

iii) Vertebraterial canal

For the passage of vertebral artery;

63. Use the photographs below to answer the question which follow.



a).Name four types of joints found in the photographs.
- Immovable joint;
- Ball and socket;
- Hinge joint; - Gliding joint;
b) Name the bones labelled A, B and C.
A - Scapula*;*
B - Humerus;
C - Ulna; D - Radius;
c) Name the cavity where
i) Bone B fits into bone A. -
Glenoid cavity*;* ii) Bone B fits into bone C and D.
Sigmold notch*;*

64. i) Name the fluid which is found in the joint area of two bones.
Synovial fluid; ii) State the function of the fluid named above.

Reduce friction as the bones move*;*