

Unit 305: Understand the Principles of Animal Biology

Revision Notes

TASK A: Animal Cells

What is a cell?

A cell is the basic building block of all living things. Animals are made up of millions of cells that work together to keep the body functioning.

Cell Organelles and Their Functions

Nucleus - Controls the activities of the cell and contains genetic information (DNA).

Nucleolus - Produces ribosomes which help make proteins.

Mitochondrion - Releases energy from food through respiration.

Ribosomes - Make proteins needed for growth and repair.

Endoplasmic Reticulum - Transports materials around the cell.

Golgi Apparatus - Packages and distributes proteins and other substances.

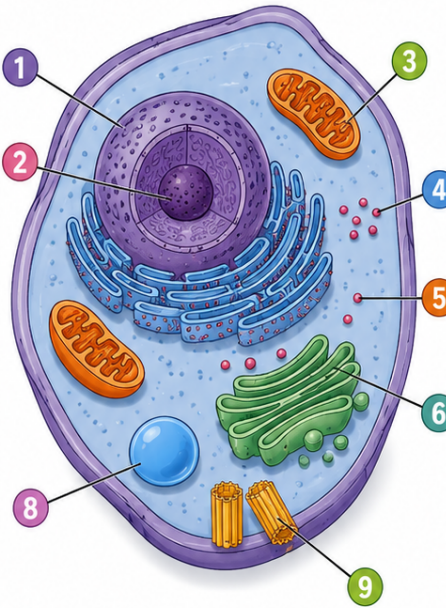
Cell Membrane - Controls what enters and leaves the cell.

Vacuole - Stores water, nutrients and waste materials.

Centrioles - Help organise cell division.

WHAT IS A CELL?

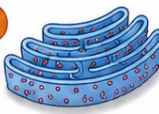
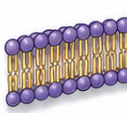
A cell is the basic building block of all living things. Animals are made up of millions of cells that work together to keep the body functioning.



KEY POINTS

- ✓ Cells come in different shapes and sizes.
- ✓ Each organelle has a special job.
- ✓ All organelles work together to keep the cell alive and healthy.
- ✓ Animal cells do not have a cell wall or chloroplasts.

CELL ORGANELLES AND THEIR FUNCTIONS

1		Nucleus	Controls the activities of the cell and contains genetic information (DNA).
2		Nucleolus	Produces ribosomes which help make proteins.
3		Mitochondrion	Releases energy from food through respiration.
4		Ribosomes	Make proteins needed for growth and repair.
5		Endoplasmic Reticulum	Transports materials around the cell.
6		Golgi Apparatus	Packages and distributes proteins and other substances.
7		Cell Membrane	Controls what enters and leaves the cell.
8		Vacuole	Stores water, nutrients and waste materials.
9		Centrioles	Help organise cell division.

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Mitosis

Mitosis produces two identical daughter cells.

Purpose: Growth, Repair, Replacement of damaged cells

Stages: Prophase Metaphase Anaphase Telophase Cytokinesis

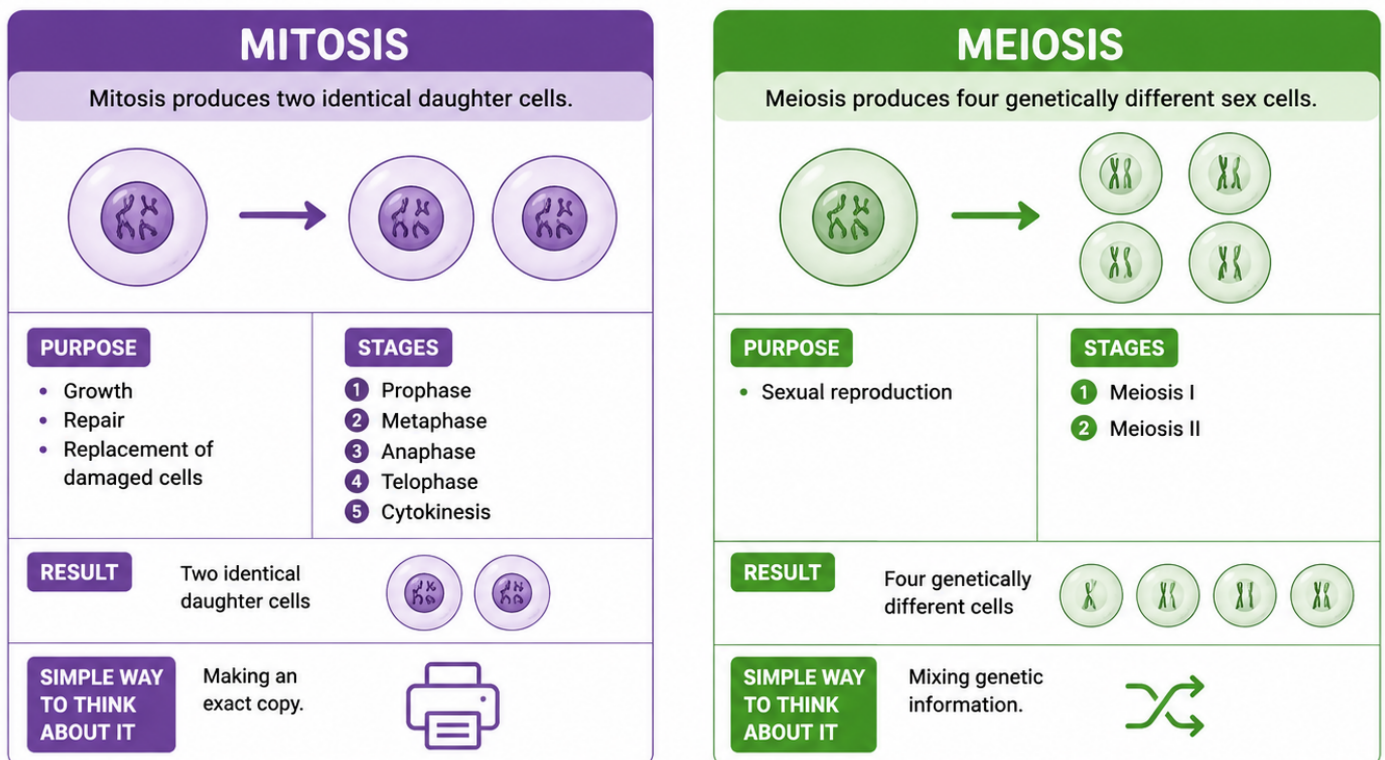
Meiosis

Meiosis produces four genetically different sex cells.

Purpose: Sexual reproduction

Stages: Meiosis I Meiosis II

CELL DIVISION: MITOSIS vs MEIOSIS



KEY DIFFERENCES

Feature	MITOSIS	MEIOSIS
Number of cells produced	2 cells	4 cells
Are the cells identical?	Yes – identical	No – genetically different
Main purpose	Growth, repair and replacement	Sexual reproduction
Type of cells	Body cells (somatic cells)	Sex cells (gametes)

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TASK B: Animal Tissues

What is a tissue?

A tissue is a group of similar cells working together to perform a specific function.

Epithelial Tissue

Structure: Closely packed cells forming layers.

Function: Protection, Absorption, Secretion

Examples: Skin, Lining of organs

Connective Tissue

Structure: Cells spread through a matrix containing fibres.

Function: Support, Protection, Binding tissues together

Examples: Bone, Cartilage, Blood, Fat

Muscle Tissue

Structure: Long fibres that can contract and relax.

Function: Movement, Posture, Heat production

Examples: Skeletal muscle, Cardiac muscle, Smooth muscle

Nervous Tissue

Structure: Neurons with long extensions.

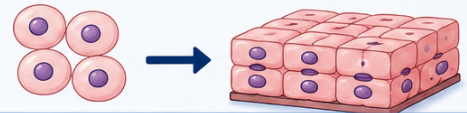
Function: Transmit electrical impulses around the body.

Examples: Brain, Spinal cord, Nerves

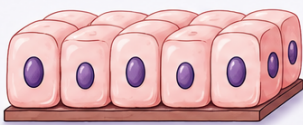
TASK B: ANIMAL TISSUES

WHAT IS A TISSUE?

A **tissue** is a group of similar cells working together to perform a specific function.



EPITHELIAL TISSUE



STRUCTURE

Closely packed cells forming layers.



FUNCTION

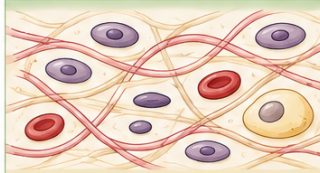
- Protection
- Absorption
- Secretion



EXAMPLES

- Skin
- Lining of organs

CONNECTIVE TISSUE



STRUCTURE

Cells spread through a matrix containing fibres.



FUNCTION

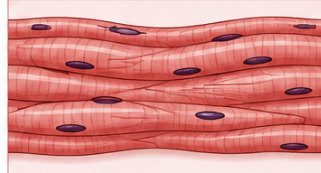
- Support
- Protection
- Binding tissues together



EXAMPLES

- Bone
- Cartilage
- Blood
- Fat

MUSCLE TISSUE



STRUCTURE

Long fibres that can contract and relax.



FUNCTION

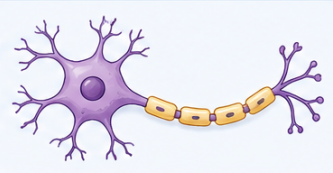
- Movement
- Posture
- Heat production



EXAMPLES

- Skeletal muscle
- Cardiac muscle
- Smooth muscle

NERVOUS TISSUE



STRUCTURE

Neurons with long extensions.



FUNCTION

Transmit electrical impulses around the body.



EXAMPLES

- Brain
- Spinal cord
- Nerves

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TASK C: Animal Skeletal Systems

What is the skeletal system?

The skeleton is the framework of bones that supports the body.

Main Functions of the Skeleton

- Support - Provides shape and support for the body.
- Protection - Protects vital organs.
- Movement - Works with muscles to produce movement.
- Mineral Storage - Stores calcium and phosphorus.
- Blood Cell Production - Produces blood cells in bone marrow.

Main Bones

- Skull - Protects the brain.
- Atlas - Supports the skull.
- Axis - Allows head rotation.
- Cervical Vertebrae - Support the neck.
- Thoracic Vertebrae - Support the ribs.
- Lumbar Vertebrae - Support the lower back.
- Sacral Vertebrae - Connect the spine to the pelvis.
- Coccygeal Vertebrae - Form the tail.
- True Ribs - Protect the heart and lungs.
- Scapula - Shoulder blade.
- Humerus - Upper forelimb bone.
- Radius - Forelimb bone below the humerus.
- Ulna - Forelimb bone that forms part of the elbow.
- Carpus - Wrist bones.
- Metacarpals - Bones of the paw, hand or hoof region.
- Pelvis - Supports the hind limbs.
- Femur - Upper hind limb bone.
- Tibia - Main lower hind limb bone.
- Fibula - Supports the lower hind limb.
- Tarsus - Ankle or hock bones.
- Metatarsals - Bones below the hock.
- Phalanges - Toe or digit bones.

Skeletal Adaptations

Horse - Long limbs and strong muscles for speed.

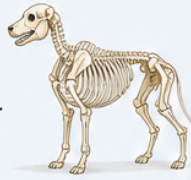
Bat - Light skeleton and elongated finger bones for flight.

Whale - Forelimbs modified into flippers for swimming.

TASK C: ANIMAL SKELETAL SYSTEMS

WHAT IS THE SKELETAL SYSTEM?

The skeleton is the framework of bones that supports the body.



MAIN FUNCTIONS OF THE SKELETON



SUPPORT

Provides shape and support for the body.



PROTECTION

Protects vital organs.



MOVEMENT

Works with muscles to produce movement.



MINERAL STORAGE

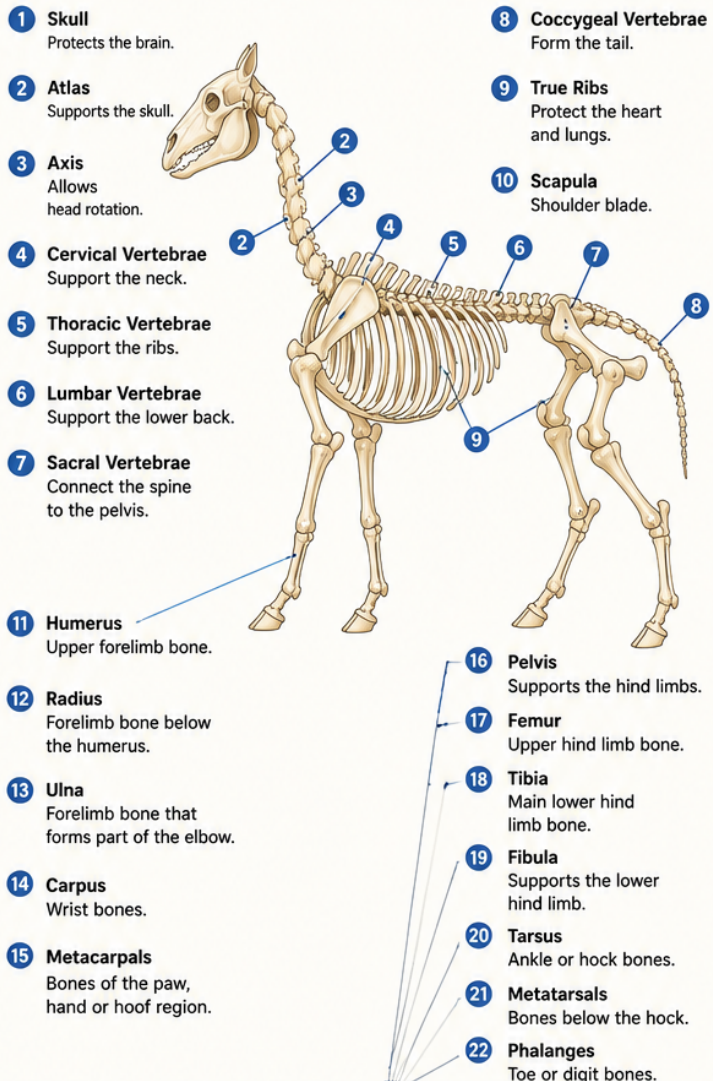
Stores calcium and phosphorus.



BLOOD CELL PRODUCTION

Produces blood cells in bone marrow.

MAIN BONES



SKELETAL ADAPTATIONS

HORSE

Long limbs and strong muscles for speed.



BAT

Light skeleton and elongated finger bones for flight.



WHALE

Forelimbs modified into flippers for swimming.



KEY POINTS TO REMEMBER

- The skeleton supports the body and protects vital organs.
- It works with muscles to allow movement.
- Bones store minerals and make blood cells.
- Different animals have skeletons adapted to their environment and way of life.



TIP

Skeletal adaptations help animals survive in their specific environments by making their bodies better suited to their lifestyle.

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TASK D: Sensory Organs

What are sensory organs?

Sensory organs detect changes in the environment and send information to the brain.

Eyes

Function: Detect light, colour and movement.

Main Structures: Cornea, Lens, Retina, Optic nerve

Ears

Function: Hearing and balance.

Main Structures: Outer ear, Middle ear, Inner ear

Nose

Function: Detects smells.

Main Structures: Nasal cavity, Olfactory receptors

Tongue

Function: Detects taste.

Main Structures: Taste buds

Skin

Function: Detects touch, pressure, pain and temperature.

Main Structures: Receptors in the skin

Why Sensory Organs Matter

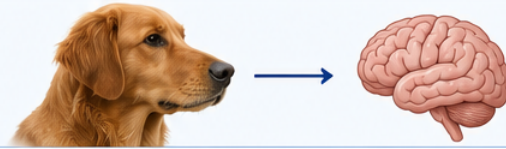
They help animals:

- Find food
- Avoid danger
- Communicate
- Navigate their environment
- Survive

TASK D: SENSORY ORGANS

WHAT ARE SENSORY ORGANS?

Sensory organs detect changes in the environment and send information to the brain.



EYES 	FUNCTION: Detect light, colour and movement. 	MAIN STRUCTURES: • Cornea • Lens • Retina • Optic nerve
EARS 	FUNCTION: Hearing and balance. 	MAIN STRUCTURES: • Outer ear • Middle ear • Inner ear
NOSE 	FUNCTION: Detects smells. 	MAIN STRUCTURES: • Nasal cavity • Olfactory receptors
TONGUE 	FUNCTION: Detects taste. 	MAIN STRUCTURES: • Taste buds
SKIN 	FUNCTION: Detects touch, pressure, pain and temperature. 	MAIN STRUCTURES: • Receptors in the skin

WHY SENSORY ORGANS MATTER

FIND FOOD 	AVOID DANGER 	COMMUNICATE 	NAVIGATE THEIR ENVIRONMENT 	SURVIVE
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Sensory organs give animals the information they need to live and thrive in their environment.