

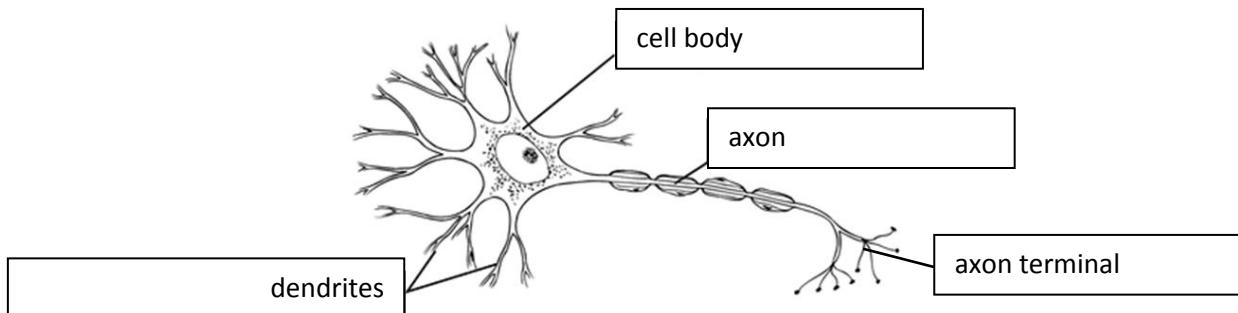
Review on Nervous System, Senses and Musculoskeletal System

1. The Nervous System

a) What is the function of nervous system?

The nervous system receives, processes, stores and transmits information that comes from various parts of the body and the external world.

b) Label the parts of the neuron.



c) What is the central nervous system? What is the peripheral nervous system?

The central nervous system consists of the brain and the spinal cord. It is the main control center. The peripheral nervous system is made up of our nerves that send nerve impulses from our sensory receptors to the central nervous system.

d) How do messages pass from one nerve to another?

A nerve impulse travels from neuron to neuron until it reaches its target, for example, a muscle.

It travels from dendrites to axon terminals. Nerve impulses travel from one neuron to another by NEUROTRANSMITTERS (chemical substances) secreted by axon terminals across the narrow space between two neurons (called the SYNAPSE).

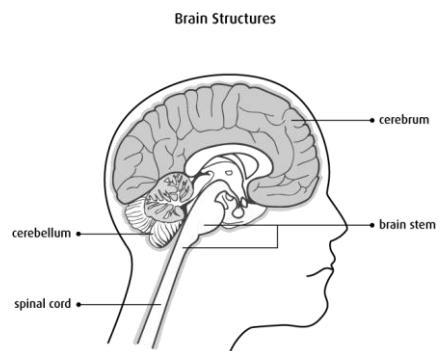
e) Label the diagram and give the function for each part.

The cerebrum is the control centre of voluntary movement, sensory interpretation and intelligence. It is also the centre of emotion.

The cerebellum is the centre of balance and movement coordination.

The brain stem is the control centre of internal stimuli as well as of involuntary movement (e.g., heart beating, digesting food).

The spinal cord is a nervous system organ that carries information from the various parts of the body to the brain. It is also the reflex centre.



- f) What's the difference between a voluntary movement, an involuntary movement, and a reflex? Give an example of each.

Voluntary movement	Involuntary movement	Reflex
Definition: acts that we think about doing. Voluntary acts are controlled by the cerebrum.	Definition: any movement or action we are unaware we are doing, we are not consciously thinking about it. controlled by the brain stem	Definition: a rapid and involuntary reaction to stimulus.
Example: writing, playing sports, talking, playing an instrument	Example: digesting food and our heart pumping	Example: When you place your hand on a burning hot stove and move it away quickly

- g) What is a reflex arc? Describe the path when you place your hand on a hot stove.

A reflex arc is the path taken by a nerve impulse during a reflex.

The reflex arc of the above situation would be the sensory nerve in the hand sends a nerve impulse (message) to the spinal cord. The spinal cord sends a nerve impulse to the motor nerves in the hand telling it to move.

2. The Musculoskeletal System

- a) Name the main parts of the skeleton and describe their function

Parts of Skeleton	Function
Head	Protects the brain
Thorax	Protects internal organs
Spinal column	Protects the spinal cord, allows trunk to move
Upper limbs	Allows for movement
Lower limbs	Allows for movement

- b) Describe the five main functions of bones

Provide support: Allows us to hold our posture, stand, sit and crouch.

Provide protection: Bones protect our internal organs (ex: ribs protect the heart and lungs).

Provide movement: Bones act as levers allowing us to move around.

Provide storage: Internal cavities of bones store fat, and bone tissue stores minerals.

Production of blood cells: Bone marrow (found in certain bones) produces the formed elements of blood.

c) What are the three muscle types and where are they located?

Muscle	Where are they found	Characteristics of the muscle
skeletal	Attached to bones	the only voluntary muscle
smooth	Make up the walls of certain internal organs (bladder, stomach, uterus),	an involuntary muscle
cardiac	Makes up the heart	an involuntary muscle

d) What is a tendon?

_ Tendons attach muscle to bone

e) What is a ligament?

_ Ligaments attach bone to bone

f) Name three ways joints move and give an example of each.

Joint Movement	Example
Extension/Flexion	Extension increases the angle between two bones. Flexion decreases this angle
Abduction/Adduction	Abduction increases the distance between a limb and the body's midline position. Adduction decreases this distance.
Rotation	Rotation is the movement of a bone around an axis.

3. The Senses

a) What is a stimulus?

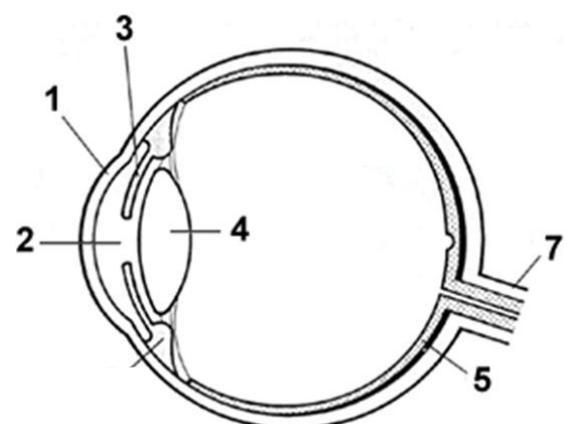
A stimulus is something that cases a response. A loud sound can be a stimulus, a soft feather can be a stimulus.



VISION

b) Label the following diagram:

- | | |
|-------------|-----------------|
| 1- _cornea_ | 2- _pupil_ |
| 3- _iris_ | 4- _lens_ |
| 5- _retina_ | 7- _optic nerve |



c) Choose 3 parts of the eye and explain their function.

Cornea	Extension of the sclera in front. Protects the eye
Pupil	Works with iris to regulate amount of light entering the eye
Iris	Regulates the amount of light entering the eye
Lens	Structure that changes its shape to focus light rays on the retina
Retina	Covered with nerve cells that transform incoming data into nerve impulses

d) Where are the sensory receptors found in the eye? What are they called?

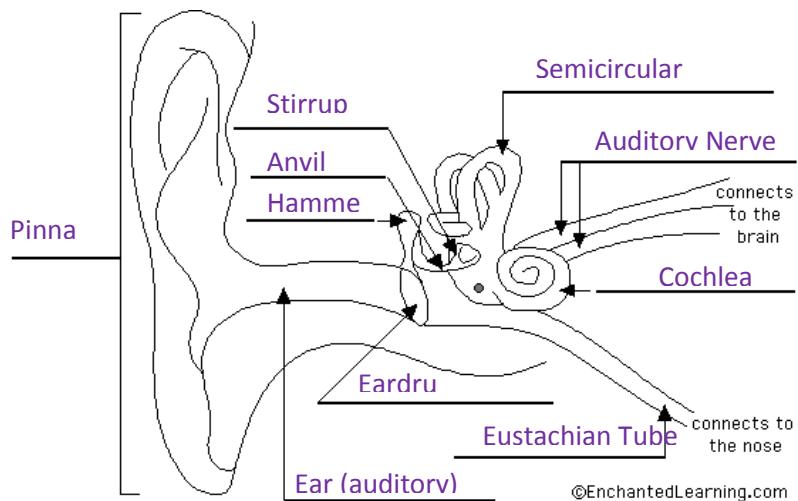
The sensory receptors in the eye are called photoreceptors (rods and cones). They are located in the retina.

e) What two conditions affect eye sight? How do they impair vision?

Myopia (nearsightedness) and Hyperopia (farsightedness). Someone with myopia cannot clearly see objects at a distance. Someone with hyperopia cannot clearly see objects close up.

HEARING AND BALANCE

f) Label the following diagram:



g) Choose 2 parts and describe their function.

Pinna	Shaped like a funnel to pick up sound vibrations easily from the air
Ossicles	Sound vibrations transported from eardrum to cochlea via ossicles vibrations
Eardrum	vibrates to the rhythm of sound wave vibrations
Cochlea	covered with nerve cells that transform data into nerve impulses
Eustachian tube	Equalizes pressure on either side of the eardrum during swallowing
Semicircular canals	Regulate balance when the body is in motion

h) Where are the sensory receptors found in the ear? What are they?

The sensory receptors in the ear are nerve cells located in the cochlea.

i) What part of the ear controls balance and coordination?

The semicircular canals control balance and coordination.

TOUCH, TASTE AND SMELL

j) Where are the sensory receptors found in the skin? What are they able to perceive?

The sensory receptors in the skin are found in the dermis (a layer of our skin). They can perceive touch, pressure, heat, cold and pain.

k) Where are the sensory receptors found in the tongue? What are they able to perceive?

The sensory receptors in the tongue are taste buds found in the papillae. They can detect different tastes (sweet, sour, salty, bitter and umami) from the chemicals in food or drink we are ingesting.

l) What are the 5 flavours the tongue transforms and transmits?

Flavours

- Sweet
- Sour
- Salty
- Bitter
- Umami

m) Where are the sensory receptors found in the nose? How is smell associated with the sense of taste?

The sensory receptors in the nose are olfactory cells (or receptors) found in the nasal cavity. Taste and smell are interrelated. The smell of food rises to the nose and stimulates the olfactory receptors which then identify the food and send the message to the brain

4. Biotechnology

a) What is the difference between technology and biotechnology?

Biotechnology is the collection of technologies (tools) that are applied to living organisms or substances that are derived from living organisms (such as bacteria, genes) to meet a need or a want.

b) What am I?

1) To replicate, I have to get into a cell and use its structures.	virus
2) I help accelerate chemical reactions in the body.	enzymes
3) I am a unicellular organism without a nucleus.	bacteria
4) I am a unicellular mould.	yeast
5) I am a ring-shaped segment of genetic information.	plasmid
6) I am a molecule containing an individual's genetic information.	DNA

PASTEURIZATION

c) Describe the pasteurization process.

The pasteurization process involves heating food to a specific temperature for a particular length of time, depending on the nature of the food product. Heating time and temperature settings are established to kill most unwanted microorganisms without changing the taste or nutritional properties of the food.

d) What are the 3 main reasons for using pasteurization?

- To provide healthier food
- To prolong the shelf life of food
- To preserve the nutritional properties of food

VACCINES

e) How do you produce a live vaccine?

Cultures of the infectious agent are chemically treated to remove their ability to cause illness. Then these cells are mixed with pharmaceutical products to improve their shelf life. The infectious agent is still alive, but unable to cause disease.

f) How do you produce an inactive vaccine?

Inactive vaccines use only parts or parts of an infectious agent that can still be recognized by antibodies. The first step is to identify the disease-causing antigens. They are then isolated and chemically treated to make them harmless. The weakened antigens are then mixed with chemical products to improve shelf life.

ASSISTED REPRODUCTION

g) What are the 4 different techniques for assisted reproduction.

Technique	Description
Ovarian stimulation	Uses medication to stimulate ovaries into developing one or more mature follicles and eggs in a single ovarian cycle. Used for women who rarely or never ovulate.
Artificial insemination	Technique consists of injecting semen directly into the uterus on the day of ovulation. Used when sperm cannot pass through the cervix or when sperm count is low.
In vitro fertilization	Involves fertilization of an ovum by a sperm cell in a lab instead of in the fallopian tubes. After two to seven days of growth in a culture, the embryo(s) are implanted in the uterus to continue development.
Microinjection	Similar technique as in vitro fertilization, except that in the lab, the physician injects the sperm cells directly into the ova with a microsyringe. Used when there is low sperm count.

h) What is the purpose of artificial insemination? Give 3 reasons.

- sperm cannot pass through the cervix
- low sperm count
- sperm have low mobility

CELL CULTURES

i) Name the parameters to be controlled in the case of cultured cells.

- | | |
|-------------------|------------------------------------|
| • Water level | • Nutrient composition |
| • Mineral level | • Oxygen and carbon dioxide levels |
| • Temperature | • pH |
| • Amount of light | |

GMOs

j) What does GMO stand for?

Genetically Modified Organism

k) What are some advantages and disadvantages of GMOs?

Advantages	Disadvantages
Can produce desired results after only one generation	Risk that GMOs hazardous to humans and other species could be accidentally created since gene behaviour is not yet fully understood
Can transfer a useful gene from one species to another	Risk of creating new allergies
Could establish a gene bank	Risk that biodiversity will be affected (reduced) by only cultivating transgenic plants
Can improve harvests due to the development of GMOs that are resistant to herbicides or insecticides	Risk that insect pest resistance of certain transgenic plants could lead to the disappearance of useful insects
Can produce more nutritional food	Risk that the resistance of some GMOs to herbicides could be transferred to weeds
Can produce less allergenic food	Risk that GMO pollen could invade other crops and so control over GMOs would be threatened