

Book Name: Selina concise

EXERCISE 1

MULTIPLE CHOICE TYPE

(Select the most appropriate option in each case).

Solution 1:

(b) neurolemma

Solution 2:

(d) Pons - consciousness

Solution 3:

(b) Contains both sensory and motor fibres

B. VERY SHORT ANSWER TYPE:

Solution 1:

- (a) Cerebrospinal fluid
- (b) Synapse
- (c) Cerebrum
- (d) Hypothalamus

Solution 2:

(a) Stimulus: Receptor:: Impulse: Effectors

(b) Cerebrum: Diencephalon:: Cerebellum: Medulla oblongata

(c) Receptor: Sensory nerve:: Motor nerve: Effector

Solution 3:

- (a) Sensory
- (b) Maintaining posture and equilibrium
- (c) Spinal cord



C. SHORT ANSWER TYPE:

Solution 1:

- (a) **Corpus Callosum** It is located located in the forebrain. It connects two cerebral hemispheres and transfers information from one hemisphere to other.
- (b) **Central canal** It is located in centre of the spinal cord. It is in continuation with the cavities of the brain. It is filled with cerebrospinal fluid and acts as shock proof cushion. In addition, it also helps in exchange of materials with neurons.

Solution 2:

- (a) False
- (b) False
- (c) True
- (d) True

Solution 3:

(a) Cerebrum	Cerebellum
The cerebrum controls all voluntary actions. It enables us to think, reason, plan and memorize	The cerebellum on the other hand maintains balance of the body and coordinates muscular activity.
(b) Sympathetic Nervous System	Parasympathetic Nervous System
Sympathetic nervous system prepares the body for violent action against the abnormal condition.	Parasympathetic nervous system is concerned with re-establishing normal conditions after the violent act is over.
(c) Sensory Nerve	Motor Nerve
Sensory nerve brings impulses from the receptors i.e. sense organs to the brain or spinal cord.	Motor nerve carries impulse from the brain or spinal cord to effector organs such as muscles or glands.
(d) Medulla Oblongata	Cerebellum
Medulla oblongata controls the activities of internal organs and many other involuntary actions	The cerebellum on the other hand maintains balance of the body and coordinates muscular activity.
(e) Cerebrum	Spinal Cord
The grey matter containing cytons lies in the cortex (outer region) while the white matter containing axons lies in the medullary region (inner region).	The grey matter containing cytons lies in the medullary region i.e. inner side while the white matter containing axons lies in the cortex i.e. the outer region.

Solution 4:

- (a) Cerebellum maintains balance of the body and coordinates muscular activity.
- (b) Myelin sheath acts like an insulation and prevents mixing of impulses in the adjacent axons.

Solution 5:

- (a) **Synapse**: It is a gap between the axon terminal of one neuron and the dendrites of the adjacent neuron. It transmits nerve impulse from one neuron to another neuron.
- (b) **Association Neuron**: It interconnects sensory and motor neurons.
- (c) Medullary sheath: It provides insulation and prevents mixing of impulses in the adjacent axons.
- (d) **Medulla Oblongata**: It controls activities of internal organs such as peristalsis, breathing and many other involuntary actions.
- (e) **Cerebellum**: It maintains balance of the body and coordinates muscular activity.
- (f) Cerebrospinal Fluid: It acts like a cushion and protects the brain from shocks.

Solution 6:

- (a) Sensory, motor and mixed nerves
- (b) Somatic and autonomic nervous system
- (c) Natural and conditioned reflexes
- (d) Sensory, motor and association neurons
- (e) Gray and white matter

Solution 7:

- (a) Stimulus --- receptor --- sensory neuron --- central nervous system --- motor neuron --- effector --- response
- (b) Resting --- depolarization --- repolarization
- (c) Dendrites --- Dendron --- perikaryon --- nucleus --- axon --- axon endings
- (d) Cerebrum --- diencephalon --- mid-brain --- cerebellum --- pons --- medulla oblongata



D. LONG ANSWER TYPE:

Solution 1:

(a) <u>Reflex action</u> is an autonomic, quick and involuntary action in the body brought about by a stimulus.

Example	Type of Reflex
(i) Sneezing	Simple
(ii) Blushing	Simple
(iii) Contraction of eye pupil	Simple
(iv) Lifting up a book	Conditioned
(v) Knitting without looking	Conditioned
(vi) Sudden application of brakes of the cycle on sighting an obstacle in front	Conditioned

Solution 2:

The advantages of having a nervous system are as follows:

- (a) Keeps us informed about the outside world through sense organs.
- (b) Enables us to remember, think and reason out.
- (c) Controls and harmonizes all voluntary muscular activities such as running, holding, writing
- (d) Regulates involuntary activities such as breathing, beating of the heart without our thinking about them.

Solution 3:

The brain and the spinal cord lie in the skull and the vertebral column respectively. They have an important role to play because all bodily activities are controlled by them. A stimulus from any part of the body is always carried to the brain or spinal cord for the correct response. A response to a stimulus is also generated in the central nervous system. Therefore, the brain and the spinal cord are called the central nervous system.

Solution 4:

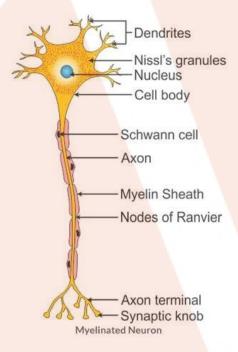
Reflex actions are involuntary actions which occur unknowingly. Voluntary actions on the other hand are performed consciously.

Picking up an apple and eating it is an example of voluntary action whereas withdrawal of hand on touching a hot object is an example of reflex action.



Reflex Action	Voluntary Action
Reflex actions are involuntary actions	Voluntary actions on the other
which occur unknowingly.	hand are performed consciously.
Commands originate in the spinal cord,	
autonomic nervous system and a few in	Commands originate in the brain.
the brain as well.	

Solution 5:



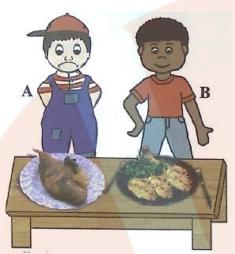
Solution 6:

Organ	Sympathetic System	Parasympathetic System
a g I ungs	Dilates bronchi and	Constricts bronchi and
e.g. Lungs	bronchioles	bronchioles
1. Heart	Accelerates heartbeat	Retards heartbeat
2. Pupil	Dilates	Constricts
3. Salivary gland	Inhibits the secretion of saliva causing the drying of the mouth	Stimulates the release of saliva



E. STRUCTURED / APPLICATION/SKILL TYPE:

Solution 1:



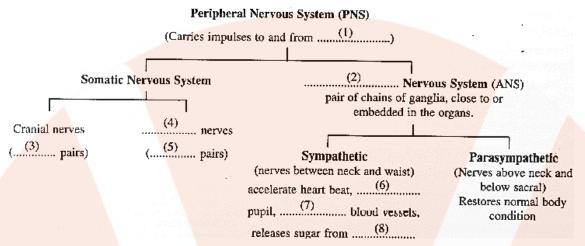
Salivation is an example of conditioned reflex that develops due to experience or learning. Saliva starts pouring when you chew or eat food. Therefore, this reflex will occur not just on the sight or smell of food. The brain actually needs to remember the taste of food. Boy B started salivating because he must have tasted that food prior unlike boy A.

Solution 2:

Situation	<mark>Org</mark> an/body part	(hange/action	Part of autonomic nervous system involved
1. You have entered a dark room	Eye	Pupil dilates	Sympathetic
2. Your body is consuming lot of glucose while running a race		Glycogen is converted into glucose in liver	Sympathetic
3. You are chewing a tasty food	Salivary gland	Salivation increases	Parasympathetic
4. You are running a race	Adrenal gland	Release of adrenaline and noradrenaline increases	Sympathetic
5. You are retiring to bed for sleep	Heart	Heart rate slows down	Parasympathetic Parasympathetic
6. You are shivering in intense cold	Body hairs	Hair raised	Sympathetic



Solution 3:



Fill in the following information in the diagram. 1 Central Nervous System

- 2 Autonomic
- 3 12
- 4 spinal
- 5 31
- 6 dilates
- 7 constricts
- 8 liver

REVIEW QUESTIONS:

A. MULTIPLE CHOICE TYPE:

(Select the most appropriate option in each case).

Solution 1:

(b) Cornea

Solution 2:

(b) Cochlea

Solution 3:

(c) eutachian tube, tympanum and utriculus

Solution 4:

(a) retina



B. VERY SHORT ANSWER TYPE:

Solution 1:

- (a) Rhodopsin
- (b) Eustachian tube
- (c) Hammer
- (d) Dura mater
- (e) Eustachian tube
- (f) Cornea
- (g) Auditory nerves
- (h) Rods and cones
- (i) Hypermetropia

Solution 2:

(a) Cones: Iodopsin:: rods: rhodopsin

(b) Sound: ear drum:: dynamic balance: semi-circular canals

Solution 3:

Column I	Column II
(i) The blind spot	(h) no sensory cells
(ii) the yellow spot	(g) centre of the retina
(iii) Ciliary muscle	(b) shape of the lens
(iv) Iris	(d) basic unit of brain (e) free of rod cells
(v) Meninges	(c) protective covering of the brain

C. SHORT ANSWER TYPE:

Solution 1:

(a) **Myopia** results when the eye ball is lengthened from front to back or the lens is too curved.

Hyperopia results from either too shortening of the eyeball from front to back or when the lens is too flat.

- (b) **Rods** are sensitive to dim light but do not respond to colour. **cones** are sensitive to bright light and are responsible for colour vision.
- (c) **cochlea** is responsible for hearing; it can perceive the senses of hearing.
- (d) **Semicircular canals** are responsible for perceiving the senses to maintain the body balance.
- (e) **Rod cells** contain rhodopsin whereas the **cone cells** contain iodopsin.
- (f) **Dynamic balance** is when the body is in motion whereas **static balance** is positional balance with respect to gravity.



Solution 2:

(a) False

Correct statement: Deafness is caused due to rupturing of the eardrum.

(b) False

Correct statement: Semicircular canals are concerned with dynamic balance.

Solution 3:

- (a) **Fovea centralis** is located at the back of the eye almost at the centre of the eyeball. It is the region of the brightest vision and also of the colour vision.
- (b) Organ of corti is located in the inner ear. It contains sensory cells which process hearing.

Solution 4:

- (a) True
- (b) False/ Ciliary muscles regulate the size of the lens.
- (c) True
- (d) False/The auditory nerve responsible for sound as well as for the body balance.
- (e) True
- (f) False/ flavour is a combination of taste and smell.
- (g) False/ short-sightedness is myopia and hyperopia is long-sightedness.
- (h) True

Solution 5:

- (a) Auditory canal, tympanum, ear ossicles, oval window, cochlea
- (b) Conjunctiva, cornea, lens, retina, optic nerve

Solution 6:

- (a) Organ of Corti and hearing
- (b) Olfactory nerve and smell
- (c) Retina and vision
- (d) Taste bud and taste

Solution 7:

- (a) Lacrimal gland is a tear gland located at the upper sideward portion of the eye orbit. Its secreation lubricates the surface of the eye, washes always the dust particles and kills germs
- (b) Yellow spot is the region of brightest vision and contains maximum sensory cells whereas a blind spot contains no sensory cells and this is the point of no vision.
- (c) **Presbyopia** is an age-old eye defect. In this condition, the lens loses flexibility resulting in far-sightedness.
 - **Cataract** is also very common in old people, the cornea becomes opaque and the vision is cut down even to blindness.
- (d) The process of focusing the eye at different distances is called the **power of accommodation**.
- (e) The **image formed on the retina** is inverted and real.

Solution 8:

An optical illusion is the life-like continuous movement on the screen. Television is an example of optical illusion, where the scanning beam of a picture frame of the TV camera moves so rapidly on the viewing screen of the TV set that our eyes cannot keep pace with it.

Solution 9:

- (a) **Oval window** is located in the middle ear. It helps in setting the fluid in the cochlear canals into vibration.
- (b) **Cochlea** is located in the inner ear. It helps in transmitting impulses to the brain via the auditory nerve.
- (c) **Semicircular canals** are located in the inner ear. These help in maintaining the dynamic equilibrium of the body.
- (d) **Utriculus** is located in the inner ear. It joins the semi-circular canals to cochlea. It also helps in maintaining static balance of the body.

Solution 10:

The four principal tastes are sweet, salt, bitter and sour.



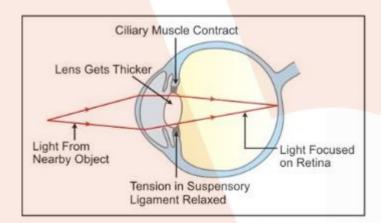


Solution 11:

Structure	Function
Yellow Spot	Region of the brightest vision
Auditory nerve	Transfers impulse from inner ear to brain
Ciliary muscle	Helps to change the focal length of the eye lens
Spinal cord	Conducts impulses
Oval window	Sets fluid in cochlear canal into vibration
Semicircular canals	Dynamic equilibrium

D. LONG ANSWER TYPE:

Solution 1:



While reading a book, the lens is more convex or rounded due to contraction of ciliary muscles because the book is usually read from a short distance. When we raise our head and look at a distant object, the ciliary muscles relax to build the tension on the suspensory ligament so that they can stretch the lens. This change in the curvature of the lens makes us focus on distant object.

Solution 2:

The brain sees the vivid picture of the dream through the eyes. Our eyes have actually never seen the vivid picture. This is an example of optical illusion. The area of dream is controlled by the cerebrum of the central nervous system. So sometime we can remember the vivid picture seen in the dream.

Solution 3:

If we look at a bright object and then close our eyes, the sensation of light persists for a short period. This is known as persistence image or the after image. It lasts for one-tenth of a second. Therefore by closing the eyes and gently pressing them with your palms, you see some specs of brilliant light.

Solution 4:

Adaptation is the ability to adjust vision in bright and dark areas. When we enter a dark room from bright light, the rhodopsin pigment broken down in bright light is regenerated. It dilates the pupil and allows more light to enter the eyes. This is called dark adaptation. On the other hand, if we enter bright area from a dark room, the rhodopsin pigment is bleached. This constricts the pupil and reduces the light entering the eyes. This is called 'light adaptation' Accommodation is the process of focusing the eye at different distances. This is mainly brought about by a change in the curvature of the lens. When the ciliary muscles contract, the lens becomes thicker and we are able to focus a nearby object. On the other hand when the ciliary muscles relax, the lens remains stretched i.e. the normal condition and we are able to focus on distant object.

Solution 5:

Our eyes are designed to focus at a great variety of distances. To focus constantly at a short distance can make the lens focusing muscles fatigued. Therefore, we do not enjoy watching a movie from a very short distance from the screen in cinema hall.

Solution 6:

Defect of vision	Cause	Corrective measure
Myopia	Lengthening of eye ball from front to back or the lens is too curved.	Using suitable concave lens
Hyperopia	Shortening of eye ball from front to back or the lens is too flat.	Using suitable convex lens
Astigmatism		Using suitable cylindrical lenses
Presbyopia	Loss of flexibility of lens	Using suitable convex lens
Cataract	Lens turning opaque	Surgery or use of convex lens or implantation of plastic lens.
Colour blindness	Genetic defect	No control measure
Squint	Pormation of cross-eve	Surgery and suitable exercise



Solution 7:

The three ear ossicles are: Malleus (hammer), Incus (anvil) and Stapes (stirr up). The last ear ossicle, stapes, vibrates and transmits the vibration to the oval window. The role of other two ear ossicles is to magnify the vibration of stapes as a result of their lever like action.

Solution 8:

The process of focusing the eye at different distances is called the power of accommodation. The ciliary muscles are responsible for the power of accommodation.

E. STRUCTURED / APPLICATION / SKILL TYPE:

Solution 1:

- (a) The ability of the eye to focus sharply on things which are near to the eye as well as far off is known as the power of accommodation.
- (b) Shape of the eye:
 - Near vision flattened
 - Distant rounded or more convex
- (c) Ciliary muscles and suspensory ligament
- (d) In the dark: Cells rod cells, Pigment rhodopsin In the light: Cells cone cells, Pigment iodopsin

Solution 2:

- (a) The middle ear or membranous labyrinth has two structures inside it, the cochlea and the semi-circular canals.
- (b) Malleus, incus and stapes
- (c) Static balance Utriculus and sacculus (inner ear)
 Hearing Internal ear
 Dynamic balance Semi-circular canals (inner ear)
 Collectively they are termed as ossicles.

Solution 3:



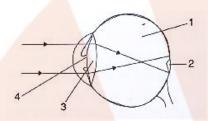
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Given below is a diagram depicting a defect of the human eye. Study the same and answer the questions that follow:



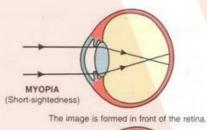
- (a) Cornea is comparable to the lens cover of the camera. The iris and pupil act like the aperture of a camera.
- (b) The cornea is the eye's main focusing element. It takes widely diverging rays of light and bends them through the pupil; the rays are further converged by the lens.

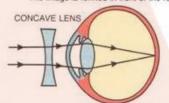
Solution 4:



- (a) Myopia
- (b) The two possible reasons for myopia are either the eye ball is lengthened from front to back or the lens is too curved.
- (c) 1 vitreous humour, 2 blind spot, 3-lens, 4-pupil
- (d) Concave lens

(e)



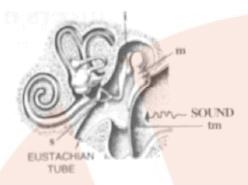


A concave lens diverges the light rays. As a result, the image is now formed on the retina

Fig. 9.15 : Short-sightedness (Myopia) and its correction by a CONCAVE LENS

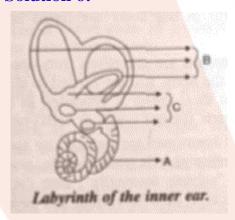


Solution 5:



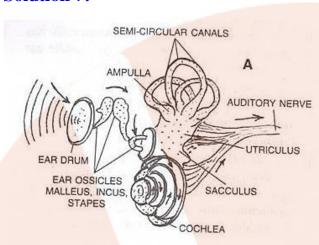
- (i) Ear
- (ii) m malleus, i incus and s stapes respectively. These are collectively called as ear ossicles.
- (iii) Cochlea. The vibrating movements in the hair of the sense cells of cochlea transmit the impulse for hearing to the brain via auditory nerve.
- (iv) Tympanic membrane. It vibrates and then sets the ear ossicles into vibration in the process of hearing.

Solution 6:



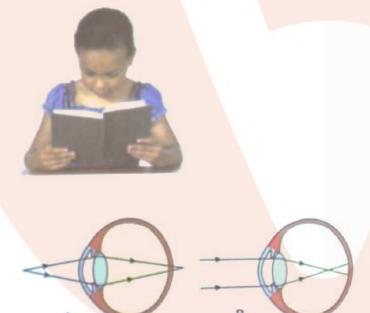
- (i) Ear ossicles
- (ii) A Cochlea, B Semicircular canals, C Ear ossicles
- (iii) Cochlea helps in transmitting impulses to the brain via the auditory nerve. Semicircular canals help in maintaining dynamic equilibrium of the body.
- (iv) Organ of Corti

Solution 7:



Utriculus and Sacculus are responsible for maintaining static balance in human beings.

Solution 8:



- (a) Myopia
- (b) --Normal eye, B-Myopia
- (c) Looking glasses with the concave lens are required here.

Chapter 9 – The Nervous System

Class X

Biology

(c) What kind of looking glasses she needs?	