

## Chapter 9. Nervous System

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### **Solution 1:**

1. Central Nervous System
2. Autonomic Nervous System
3. Conus medullaris / Medullary cone
4. Mixed neurons
5. Neuroscience
6. Sensory neurons
7. Motor neurons
8. White matter
9. White matter
10. Dura mater
11. Neuron
12. Meninges
13. Cranium
14. Neocortex / Neopallium
15. Limbic system
16. Corpora quadrigemina
17. Olfactory Lobes
18. Median fissure
19. Agraphia
20. Brain
21. Aphasia
22. Trigeminal nerve
23. Sympathetic nervous system
24. Dendrites
25. Bipolar neuron
26. Sclera
27. Myopia
28. Semicircular canal
29. Rhodopsin

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### **Solution 2:**

1. Ear pinna – The pinna or the external ear collects the sound waves from different directions and send them to the middle ear.
2. External auditory meatus It forms a passage from the pinna to the eardrum.
3. Cochlea – It converts vibrations into nerve impulses and thus helps in hearing.
4. Semicircular canals – It responds to change in position and maintains balance.
5. Lachrymal gland – It secretes a watery fluid which washes the surface of eyes.
6. Eyelids – It blinks to clean the dust and grit from the cornea.
7. Retina – It is a photosensitive layer to receive the image.
8. Eye lens – It focuses the image on the retina.

9. Pupil – It regulates the amount of light that enters the eye.
10. Olfactory lobe – These are concerned with the sense of smell.
11. Optic lobe – These are concerned with vision.
12. Medulla oblongata – It controls involuntary functions of the body like – coughing, swallowing, breathing, heartbeat, etc.

### Solution 3:

1. Nephron
2. Blind spot
3. Myelin
4. Olfactory lobe
5. Cranial nerve

### Solution 4:

(i) Lens	→ (a) Adjustment of light rays
(ii) Lachrymal gland	→ (c) Secretion of tear
(iii) Olfactory epithelium	→ (f) Smell
(iv) Cochlea	→ (e) Hearing
(v) Semicircular canal	→ (d) Balance of the body
(vi) Eyes	→ (b) Vision

### Solution 5:

1. Nerve impulse – It is an electrochemical change occurring in the membrane of a nerve fibre produced by a stimulus.
2. Axon – It is a fibre like process of the neuron which carries impulses away from the cell body.
3. Cyton – It is an oval, angular, polygonal or stellate body which contains a large central nucleus.
4. Action potential – A momentary change in electrical potential on the surface of a cell, or a nerve or muscle cell, that occurs when it is stimulated, resulting in the transmission of an electrical impulse.
5. Reflex action – It is an immediate and involuntary response to a stimulus.
6. Yellow spot – It is the region of best vision where more cone cells are present.
7. Blind spot – It is the region of no image formation because of lack of cone cells.
8. Power of accommodation – It is the ability of the lens to focus on far and distant objects.

**Solution 6:**

(i) Nerve cell and neuroglia cell -

<b>Nerve cell</b>	<b>Neuroglia cell</b>
These are the conducting cells in the nervous system which conduct impulses.	These are not the conducting cells but are helper cells to the nerve cells or neurons.

(ii) Nervous system and hormonal system -

<b>Nervous system</b>	<b>Hormonal system</b>
(i) It co-ordinates the body through electrical impulses.	(i) It secretes hormones.
(ii) The nervous system controls muscle movement, senses, heartbeat, breathing, digestion, memory and speech	(ii) The endocrine system controls levels of glucose in the blood, hydration levels, heat productivity, sexual maturity, sperm and egg production and growth of cells and tissues.

(iii) Cranial nerve and spinal nerve -

<b>Cranial nerve</b>	<b>Spinal nerve</b>
(i) They arise from brain.	(i) They arise from spinal cord.
(ii) There are 12 pairs of cranial nerves.	(ii) There are 31 pairs of spinal nerves.

(iv) Cerebrum and cerebellum -

<b>Cerebrum</b>	<b>Cerebellum</b>
It is concerned with intelligence, memory and voluntary activities.	It is concerned with body equilibrium.

(v) Adrenalin and acetylcholine -

<b>Adrenalin</b>	<b>Acetylcholine</b>
It is a neurotransmitter which increases the heart beat to meet any emergency.	It is a neurotransmitter which slows down the heart beat.

(vi) Motor and sensory nerve –

Motor nerve	Sensory nerve
A motor nerve contains motor fibres which bring impulses from the brain or spinal cord to the effector organs.	A sensory nerve contains sensory fibres which bring impulses from the sense organs to the brain or spinal cord.

(vii) Grey matter and white matter –

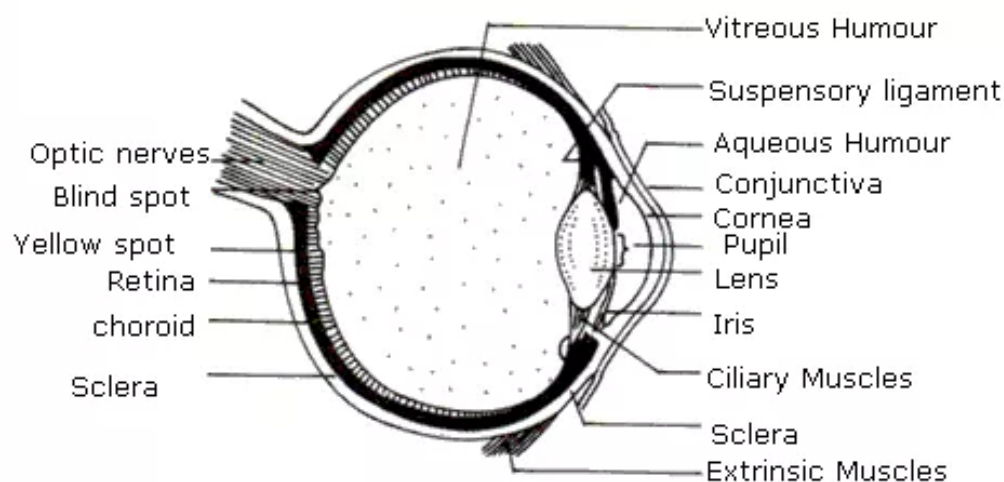
Grey matter	White matter
(i) It is composed of cell bodies of a nerve cell.	(i) It is composed of axons from the nerve cells.
(ii) It lies outside the brain but inside the spinal cord.	(ii) It lies inside the brain but outside the spinal cord.

(viii) Myopia and Hypermetropia –

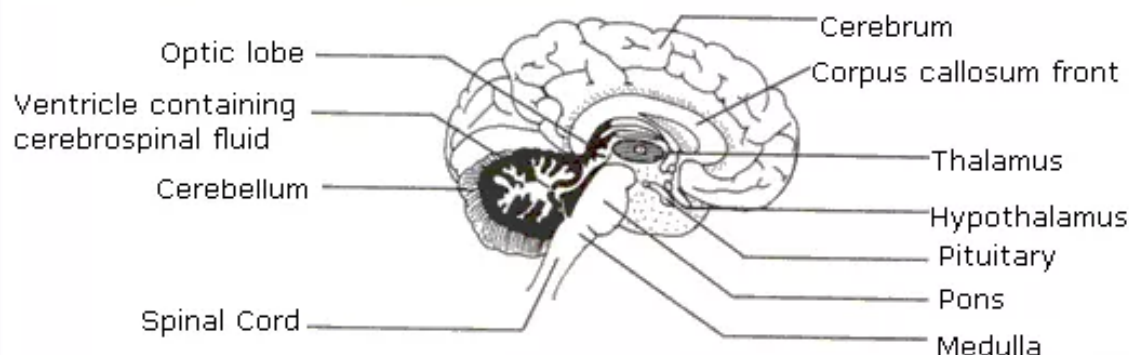
Myopia	Hypermetropia
(i) The image of distant object is produced in the front and not on the retina.	(i) The image is produced beyond the retina as the light rays are unable to converge on the retina.
(ii) It results from abnormally long eyeball.	(ii) It results from abnormally short eyeball.
(iii) The defect can be produced by high convexity of the lens.	(iii) The defect can be produced by low convexity of the lens.
(iv) It can be corrected by the use of spectacles having concave lens.	(iv) It can be corrected by the use of spectacles having convex lens.

### Solution 7:

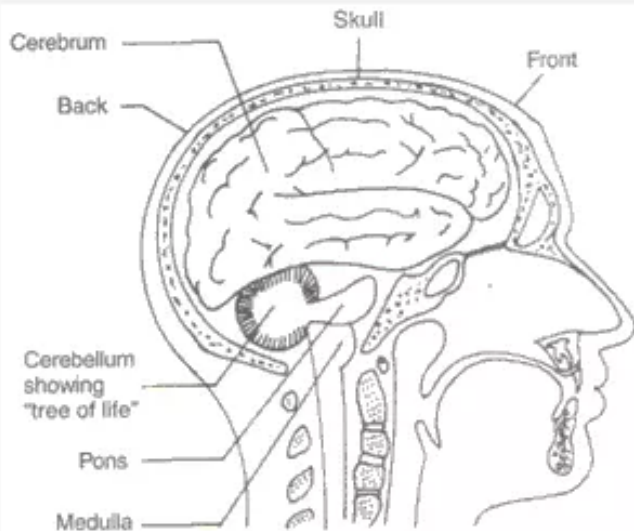
(a) Vertical section of Human eye:



(b) Longitudinal section of Human brain:



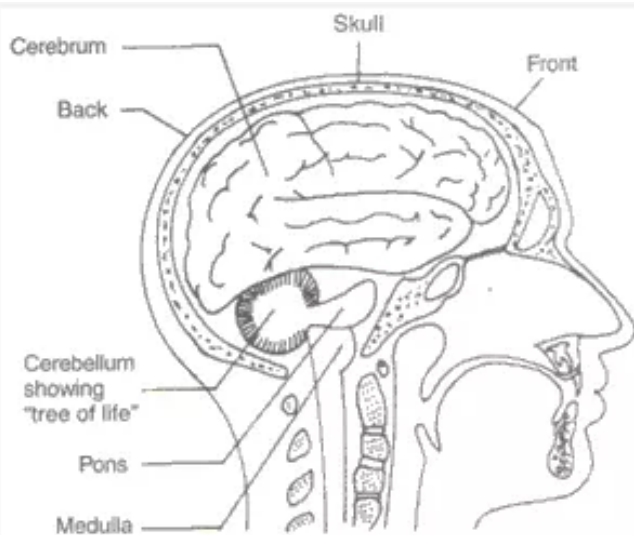
**Solution 8:**



*Parts of brain*

- (i) Cerebellum
- (ii) Cerebral peduncles
- (iii) Medulla oblongata
- (iv) Olfactory lobes
- (v) Cerebrum
- (vi) Diencephalon

**Solution 9:**



*Parts of brain*

- (i) Cerebellum
- (ii) Cerebral peduncles
- (iii) Medulla oblongata
- (iv) Olfactory lobes
- (v) Cerebrum
- (vi) Diencephalon



### Solution 10:

1. A – Cerebrum; B – Cerebellum; C – Medulla oblongata
2. (A) Cerebrum – It is concerned with intelligence, memory and voluntary activities.
3. Cerebellum – It is concerned with body equilibrium.
4. Medulla oblongata It controls all involuntary activities like heart beat, respiration, etc.  
The three protective membranes covering the brain are :

- Dura mater
- Arachnoid mater
- Pia mater.

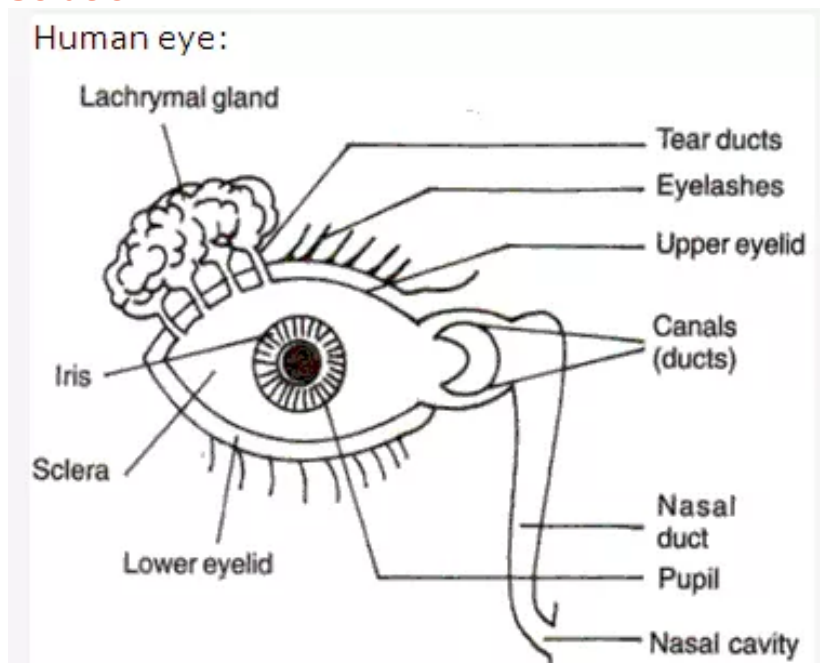
5. Neuron is the basic unit of the brain.

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### Solution 11:

1. Meninges – It is located around the brain and spinal cord.
2. Ganglia – It is located outside the brain and spinal cord.
3. Cerebellum – It is located behind cerebrum and above medulla oblongata in the brain.
4. Nodes of Ranvier – It is located on the unmyelinated areas on the axon.
5. Effector organs – It is located in muscle , gland or any organ of the body.

### Solution 12:



### Solution 13:

Difference between nerve and neuron:

Nerve	Neuron
It is a collection of axons leading to or from the central nervous system.	A nerve cell with its processes is called a neuron.

**Solution 14:**

1. Iris: It is located in the eye. Its function is to protect the eyeball and controls the size of the pupil.
2. Semicircular canals: It is located in the inner ear. These are concerned with the body equilibrium.

**Solution 15:**

Following are the two examples of reflex actions in our daily life :

1. Removing hand suddenly when pricked by a thorn.
2. Blinking of eyelids on exposure to light.

**Solution 16:**

1. Reflex action – It is an immediate and involuntary response to a stimulus.
2. Example of a conditioned reflex: Tying one's shoe lace.

**Solution 17:**

1. (a) Bone of skull
2. (b) Inner ear
3. (c) Eardrum
4. (d) Bone of skull
5. (e) Bone of middle ear
6. (f) Middle ear
7. (g) Air filled
8. (ii) (b) Inner ear – It transmits the impulse to brain.
9. (d) Bone of skull – It helps in fixing the position of the ears to help the brain use auditory cues to judge direction and distance of sounds.
10. (g) Air filled – It keeps the pressure in the middle ear equalized with pressure in the outside.
11. (iii) The main division of the ear are: outer ear, middle ear and inner ear.
12. (iv) Stirrup
13. (v) The labyrinth is the inner ear which consists of utricle, saccule, cochlea and three semicircular canals.

**Solution 18:**

1. A – Semi-circular canal  
B – Utricle  
C – Saccule  
D – Cochlea  
(ii) Auditory nerve.  
(iii) 1. Utricle and saccule
2. Semi-circular canal
3. Cochlea
4. Sensory cells of organ of Corti
5. Perilymph

**Solution 19:**

1. Cochlea – It helps in hearing by transmitting impulses to the brain through auditory nerves.

2. Fovea centralis – It is a point at retina where more cone cells are concentrated and thus produces sharpest vision.
3. Three semicircular canals – It maintains the dynamic equilibrium.
4. Retina – It prevents the reflection of light.
5. Lachrymal glands – It produces tear to lubricate the eyeball.

#### **Solution 20:**

The arrangement of neurons in

Cerebrum: cytons are present outside and axons are inside

Spinal cord: cytons are present inside and axons are outside.

#### **Solution 211:**

Functions of medulla oblongata –

1. It controls the involuntary activities like – respiration, circulation, digestion, etc.
2. It controls the dilation and constriction of blood vessels.

#### **Solution 22:**

Reflex action – It is an immediate and involuntary response to a stimulus.

Example – 1. Blinking of eyelids on exposure to light .

2. Knee jerk.

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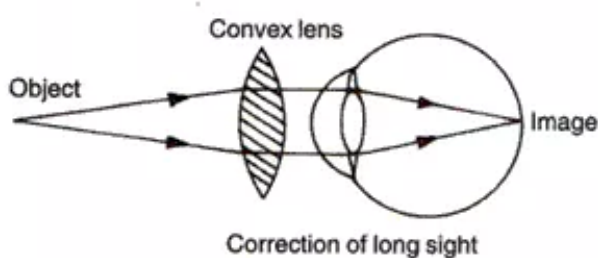
#### **Solution 23:**

(i) Hypermetropia.

(ii) There are two main conditions in the eye which is responsible for this defect:

1. Shortening of the eyeball from front to back.
2. The lens is less concave.

(iii) Correction of Hypermetropia:



(iv) Both the eyes facing forward helps in judging the depth or relative distance. This is due to overlapping images formed in brain from both eyes which focus on an object together at one time.

#### **Solution 24:**

Cone cells.



### Solution 25:

(i) 1 – Retina

2 – Yellow spot

3 – Blind spot

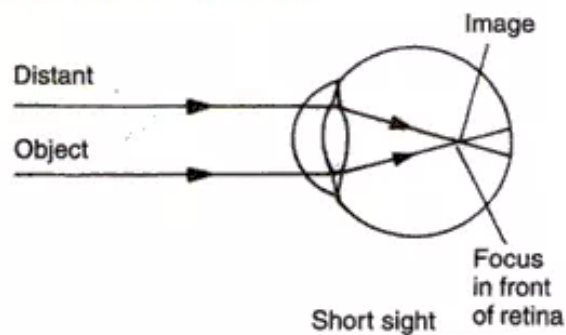
4 – Optic nerve

5 – Lens

(ii) Optic nerves – It transmits the impulses to the brain.

Lens - It focuses the image on the retina.

(iii) Short sightedness:



### Solution 26:

(i) Myopia.

(ii) 1. Vitreous humor

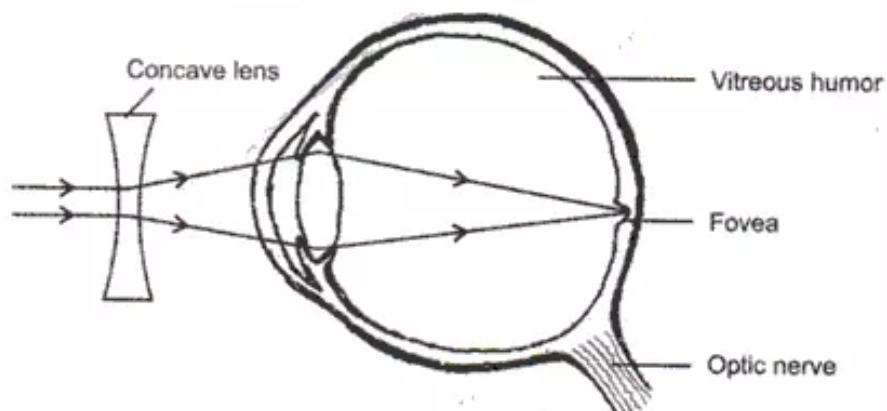
2. Fovea

3. Optic nerve

(iii) 1. Lengthening of the eyeball from front to back.

2. Lens is too curved.

(iv) Correction of Myopia:



**Solution 27:**

1. Cochlea: It helps in hearing by transmitting impulses to the brain through auditory nerves.
2. Meninges: It provides protection to brain and spinal cord.

**Solution 28:**

One feels blinded for a short while on coming out of a dark room. This is called light adaptation of the eye. It is due to the constriction of the pupil to prevent the entry of light into the eye and pigment rhodopsin is bleached to reduce the sensitivity of the rods.

**Solution 29:**

1. Iris
2. Cerebrospinal fluid

**Solution 30:**

1. True
2. True
3. True
4. True
5. False
6. True
7. False
8. False

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**Solution 31:**

1. (d) nerve cell
2. (b) cerebrum
3. (a) 31
4. (b) 12
5. (a) dura mater
6. (a) ear
7. (c) rhodopsin
8. (a) twilight vision
9. (d) macula
10. (d) two nerves
11. (c) hearing
12. (b) 31
13. (a) eustachian
14. (c) iris
15. (b) cones
16. (b) Ear
17. (d) corpus callosum
18. (d) eye
19. (d) filter light
20. (b) the two cerebral hemispheres