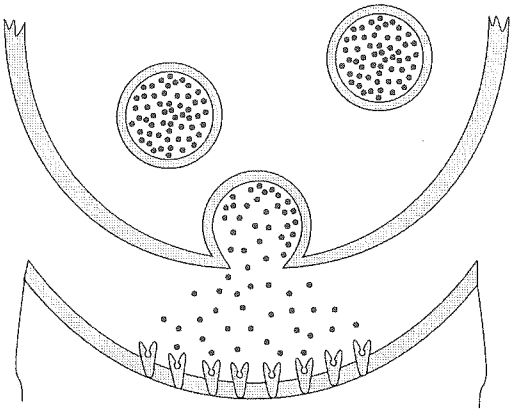
M, N - Nervous System

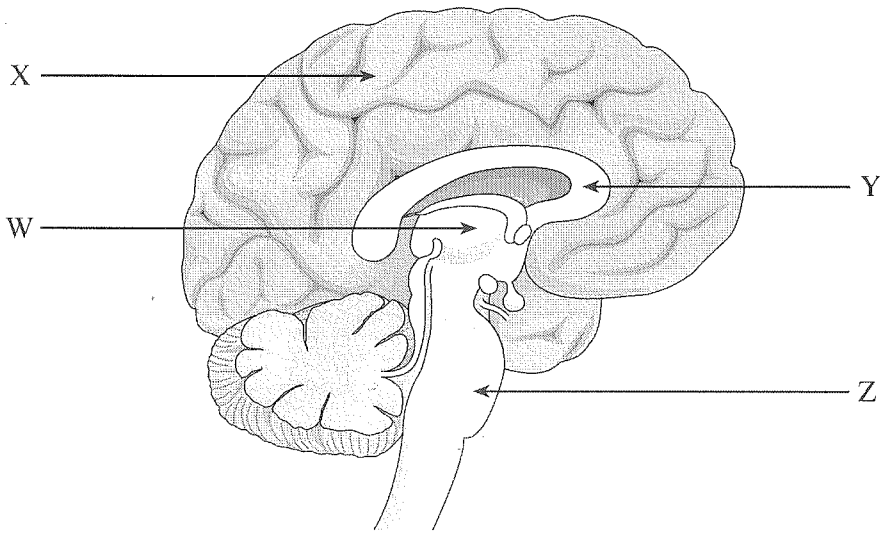
Use the following diagram to answer question 1.



1. The event that occurs next is the movement of

   A. sodium ions (Na^+) into the post-synaptic neuron.
   B. calcium ions (Ca^{2+}) into the pre-synaptic ending.
   C. potassium ions (K^+) out of the post-synaptic ending.
   D. bicarbonate ions (HCO_3^-) into the receptors of the pre-synaptic membrane.

Use the following diagram to answer question 2.



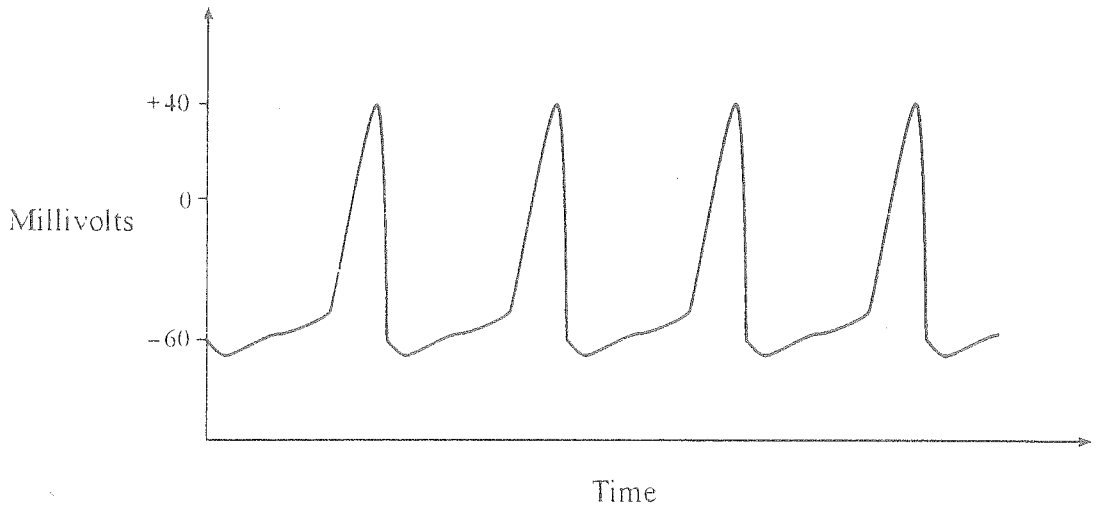
2. Which of the following structures sorts incoming sensory stimuli and channels them to the appropriate part of the brain?

   A. W
   B. X
   C. Y
   D. Z

3 The type of neuron that is found **only** in the central nervous system is the

A. interneuron.
B. motor neuron.
C. mixed neuron.
D. sensory neuron.

4 An axon was stimulated at one place and the voltage changes across the membrane were recorded as shown in the following graph.



What would be the effect if the intensity (amount) of stimulus was increased?

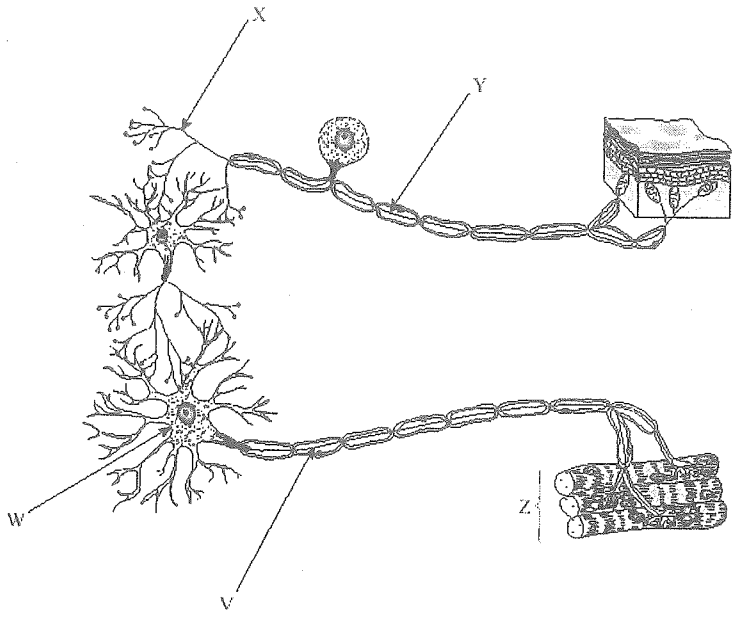
A. The frequency of impulses would increase.
B. The resting potential would increase from $-60\,mV$ to $-40\,mV$.
C. Each action potential would increase from $+40\,mV$ to $+60\,mV$.
D. Polarity changes would occur during the recovery (refractory) period.

---

5 Which of the following inhibits the digestive actions of the stomach and the small intestine?

A. cerebellum
B. anterior pituitary gland
C. sympathetic nervous system
D. parasympathetic nervous system

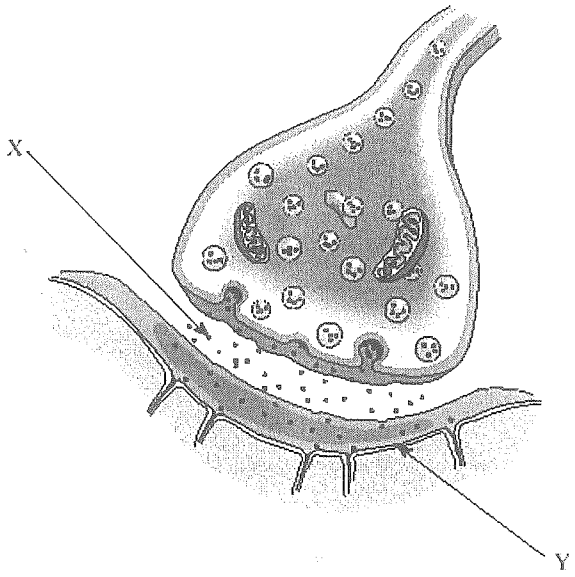
Use the following diagram to answer questions 6 and 7.



6. The structure labelled X is a(n)
A. node.
B. axon.
C. synapse.
D. dendrite.

7. If an impulse started at V, it would travel to
A. W and X.
B. W and Z.
C. X and Z.
D. Y and Z.

Use the following diagram to answer question 8.



8. If molecule X causes depolarization at Y, what could X be?
A. sodium ions
B. calcium ions
C. acetylcholine
D. acetylcholinesterase

---

9. Which of the following is characterized by a short axon and long dendrites?

A. interneuron
B. synaptic cleft
C. motor neuron
D. sensory neuron

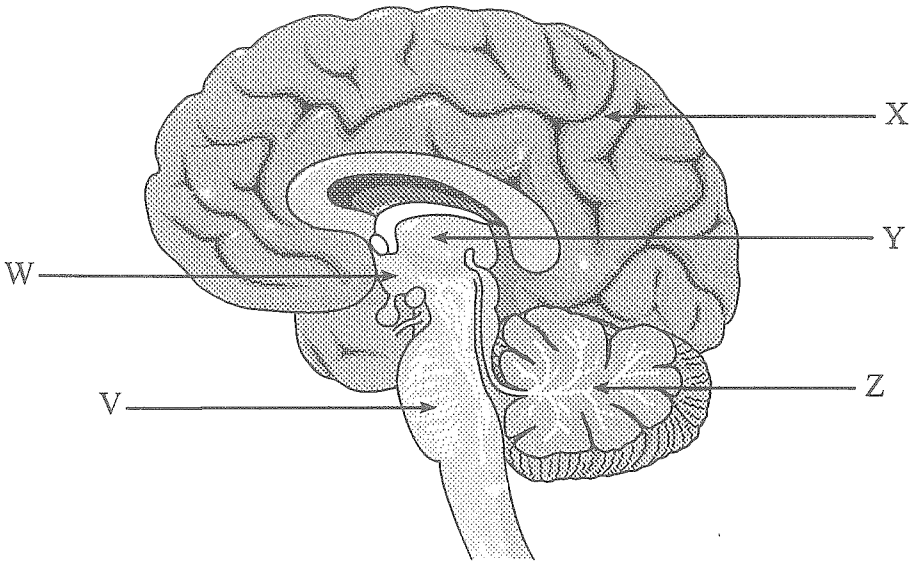
10. When a doctor taps below the kneecap and the lower leg jerks forward involuntarily, the pathway that the nerve impulse travels is

A. effector → sensory neuron → interneuron → motor neuron → receptor.
B. effector → motor neuron → interneuron → sensory neuron → receptor.
C. receptor → sensory neuron → interneuron → motor neuron → effector.
D. receptor → motor neuron → interneuron → sensory neuron → effector.

11. Which of the following is involved in the initiation of a "fight or flight" response?

A. Thyroid gland.
B. Prostate gland.
C. Adrenal cortex.
D. Adrenal medulla.

Use the following diagram to answer questions 12 and 13.



12. The function of the structure labelled Y is to

A. coordinate balance.
B. initiate a reflex arc.
C. regulate breathing rate.
D. sort incoming sensory impulses.

13. Which letter indicates the structure that integrates control of the endocrine glands by the nervous system?

A. V
B. W
C. X
D. Z

Which of the following neurons would be found in the autonomic nervous system?

A. Sensory neurons in the skin.
B. Sensory neurons in the spinal cord.
C. Motor neurons ending in the intestines.
D. Motor neurons ending in skeletal muscle.

Use the following table to answer question 14.

NEURON	TYPE OF NEURON	AMOUNT OF NEUROTRANSMITTER RELEASED
V	Inhibitory	100 units
W	Inhibitory	50 units
X	Excitatory	100 units
Y	Excitatory	75 units
Z	Excitatory	25 units

14. In order for a nerve impulse to be transmitted across the synapse, the amount of excitatory neurotransmitter must exceed that of inhibitory neurotransmitter by an amount called the "threshold." Which of the following combinations will result in the firing of a neuron whose threshold is 120 units?

A. Y and Z
B. V and W
C. V, X and Y
D. W, X and Y

---

15. A pesticide that destroys an enzyme found in the synaptic cleft may cause

A. denaturation of the presynaptic contractile proteins.
B. an increased rate of diffusion across the synaptic cleft.
C. continued depolarization of the postsynaptic membrane.
D. alteration of the receptors on the presynaptic membrane.

16. Which of the components of the nervous system has both autonomic and somatic divisions?

A. Central.
B. Peripheral.
C. Sympathetic.
D. Parasympathetic.

17. In an axon, the nerve impulses normally travel

A. in both directions.
B. toward the cell body.
C. away from the cell body.
D. faster as they are unmyelinated.

18. Which of the following substances would **not** be found in synaptic clefts?

A. Noradrenalin.
B. Acetylcholine.
C. Cholinesterase.
D. Carbonic anhydrase.

19. The hormone that initiates the "fight or flight" response is produced by the

A. adrenal gland.
B. hypothalamus.
C. pituitary gland.
D. medulla oblongata.

20. Sharing of information between the two cerebral hemispheres is possible because of the

A. cerebellum.
B. hypothalamus.
C. corpus callosum.
D. medulla oblongata.

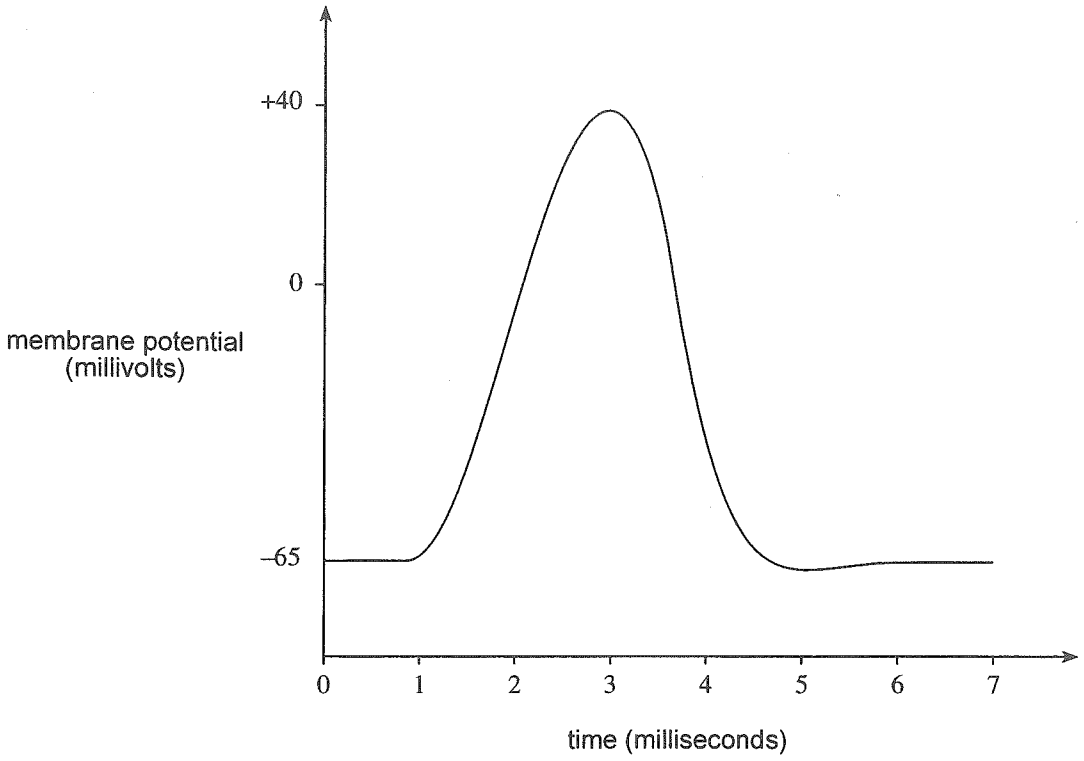
21. Which of the following interacts with the pituitary gland as the neuroendocrine control centre?

A. Thalamus.
B. Cerebellum.
C. Hypothalamus.
D. Medulla oblongata.

22. A semiconscious patient has lower than normal blood pH. The high concentration of which component of blood is used to indicate this condition?

A. albumin
B. hydrogen ions
C. potassium ions
D. oxyhemoglobin

Use the following graph to answer question 23.



23. During which of the following times is the membrane's permeability to sodium ions increasing?

A. 0 to 1 milliseconds
B. 1 to 3 milliseconds
C. 3 to 4 milliseconds
D. 4 to 5 milliseconds

---

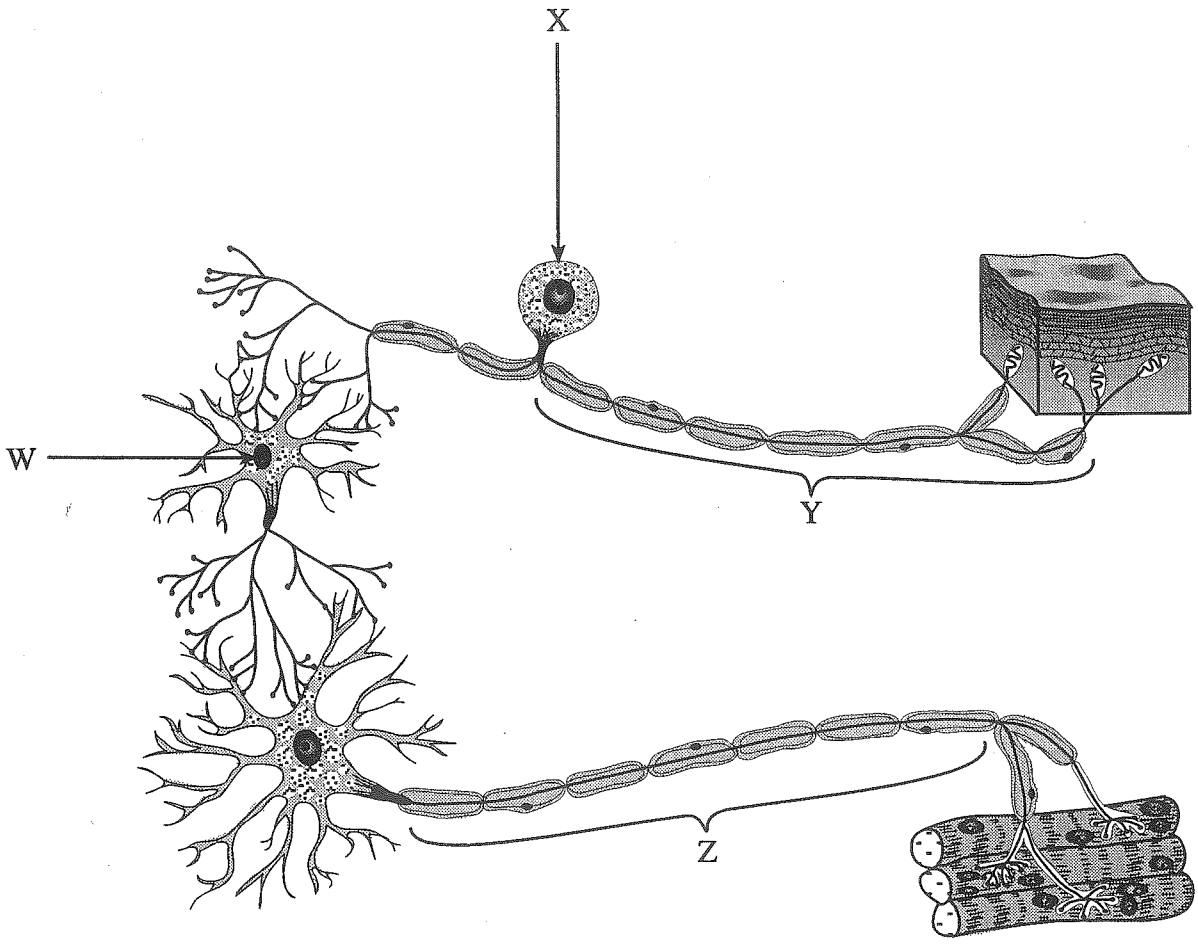
24. The space between **two** neurons in a reflex arc is the

A. synaptic cleft.
B. terminal knob.
C. node of Ranvier.
D. post-synaptic membrane.

25. Control of skeletal muscle is a function of the

A. somatic nervous system.
B. autonomic nervous system.
C. sympathetic nervous system.
D. parasympathetic nervous system.

Use the following diagram to answer question 26.



26. Which of the following indicates an axon?

A. W
B. X
C. Y
D. Z

---

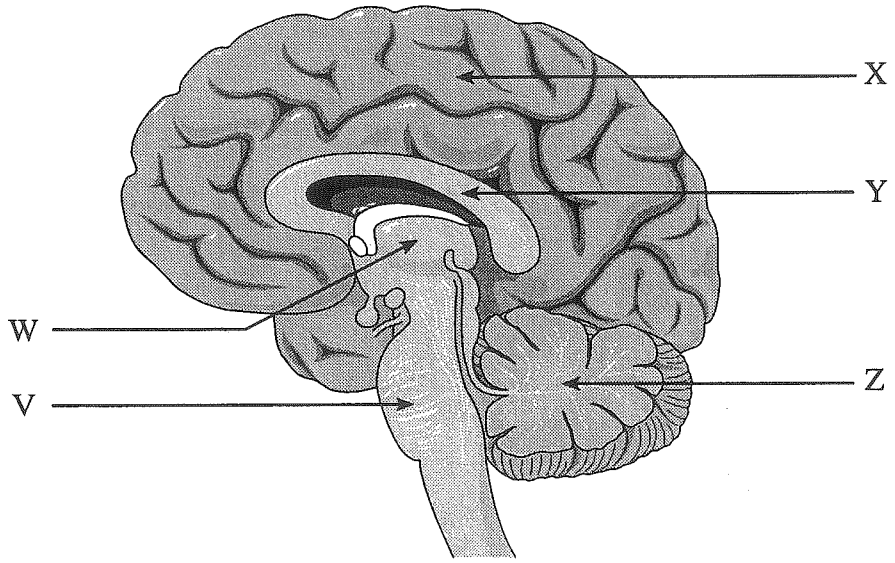
27. In which of the following is ATP required?

A. initiation of the nerve impulse
B. establishment of the resting potential
C. repolarization of the neural membrane
D. depolarization of the neural membrane

28 When a stimulus reaches the threshold level in a dendrite of a sensory neuron,

A. the sodium gates open.
B. a neurotransmitter is released.
C. the neuron becomes repolarized.
D. the sodium-potassium pump restores the resting potential.

Use the following diagram to answer questions and .



29. The structure labelled Y is the

A. thalamus.
B. cerebrum.
C. hypothalamus.
D. corpus callosum.

30. Balance and muscle coordination are functions of which of the following structures?

A. V
B. W
C. X
D. Z

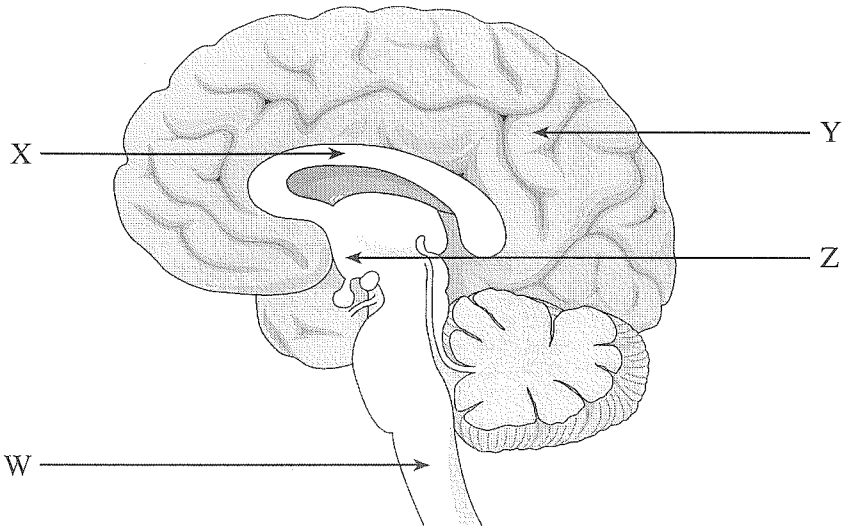
31. How does the hypothalamus increase the metabolic rate of cells in the body?

A. It produces and releases thyroxin.
B. It secretes a specific releasing hormone.
C. It increases autonomic nerve stimulation.
D. It causes cells to become permeable to blood glucose.

32. After a "fight or flight" response, parasympathetic nervous system stimulation will cause

A. pupils to dilate.
B. peristalsis to decrease.
C. the bronchioles to dilate.
D. the heart rate to decrease.

Use the following diagram to answer questions 33 and 34.



33. Elevated body temperature due to a prolonged infection is due to a stimulation of which of the following structures?

A. W
B. X
C. Y
D. Z

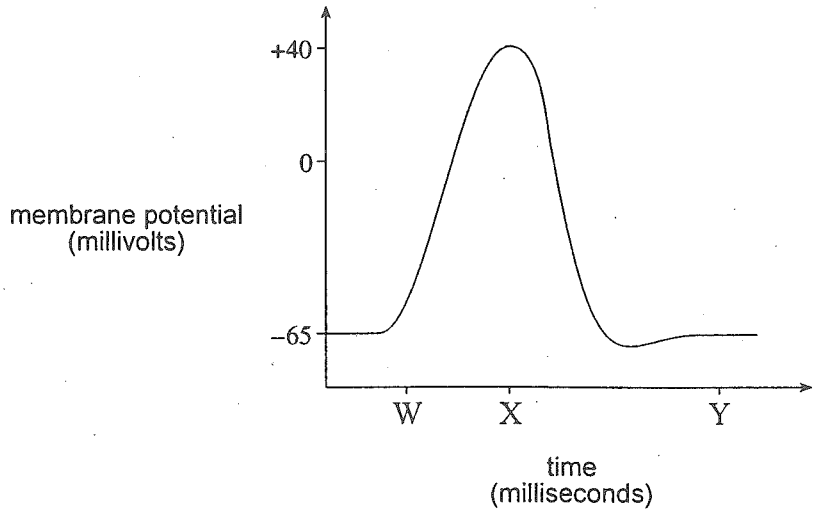
34. When the hormone estrogen was administered to patients with Alzheimer's disease, the memory of these patients improved. On which structure in the diagram could estrogen have had an affect?

A. W
B. X
C. Y
D. Z

35. Which of the following is responsible for transmitting impulses to the central nervous system (CNS)?

A. Effectors.
B. Interneurons.
C. Motor neurons.
D. Sensory neurons.

Use the following graph to answer questions 36 and 37.



36. The time period between **W** and **X** is called

A. repolarization.
B. depolarization.
C. the recovery period.
D. the resting potential.

37. Which of the following are characteristics of the neuron at time **Y**?

A. positively charged axoplasm and diffusion of sodium ions into the axoplasm
B. positively charged axoplasm and diffusion of potassium ions into the axoplasm
C. negatively charged axoplasm and diffusion of sodium ions out of the axoplasm
D. negatively charged axoplasm and diffusion of potassium ions out of the axoplasm

---

38. If a person's ability to integrate information from both hemispheres of the brain is impaired, the portion of the brain most likely affected is the

A. pituitary.
B. thalamus.
C. cerebellum.
D. corpus callosum.

39. What part of a neuron carries impulses toward the cell body?

A. axon
B. dendrite
C. synaptic cleft
D. terminal knob

40 Synaptic vesicles of the sympathetic nervous system contain

A. sodium ions.
B. acetylcholine.
C. noradrenaline.
D. potassium ions.

41 The bacterial toxin that causes botulism prevents the release of acetylcholine from pre-synaptic membranes. Which event in the transmission of a nerve impulse would be affected first by this poison?

A. the depolarization of an effector
B. the opening of sodium gates in dendrites
C. the production of an action potential at the nodes of Ranvier
D. the operation of the sodium-potassium pump in the neuron membrane

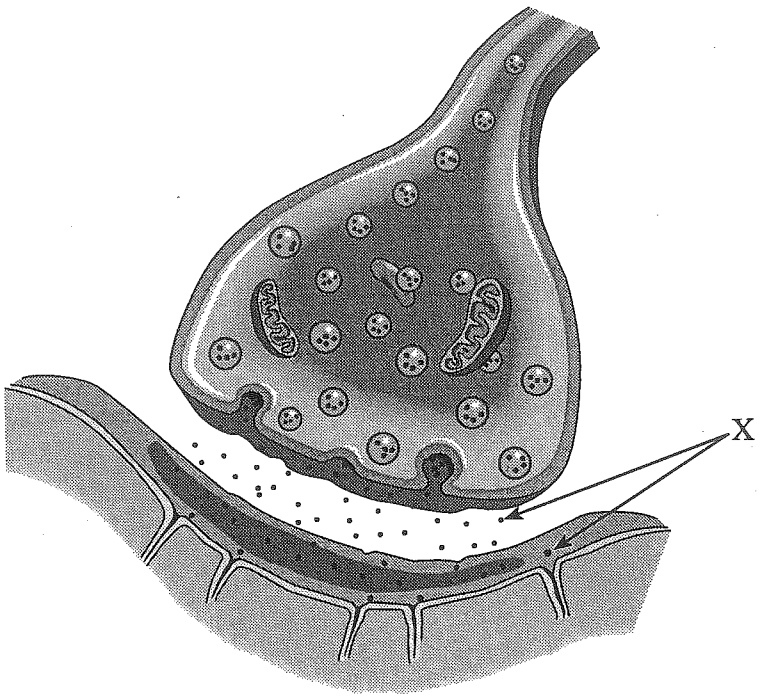
42 The parasympathetic nervous system

A. controls the central nervous system.
B. lowers blood pressure and promotes digestion.
C. uses noradrenalin as the neurotransmitter at synapses.
D. initiates the "fight or flight" response in times of stress.

43 The part of a sensory neuron that transmits nerve impulses from a receptor to the cell body is the

A. axon.
B. synapse.
C. dendrite.
D. neurotransmitter.

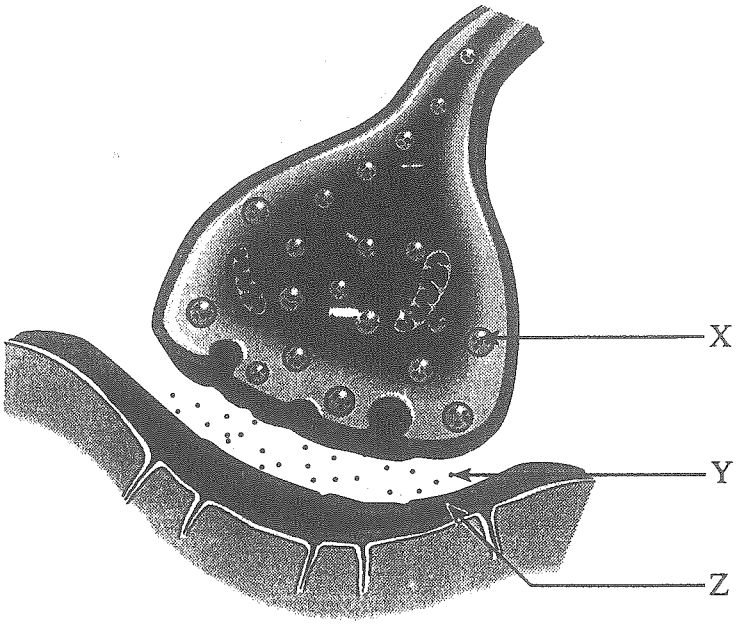
Use the following diagram to answer question 44.



44. The molecules labelled **X** function to

A. open sodium ion gates.
B. speed up the transmission of impulses.
C. provide an energy source for the resting potential.
D. tell the brain the kind of stimulus that is being received.

Use the following diagram to answer question 45.



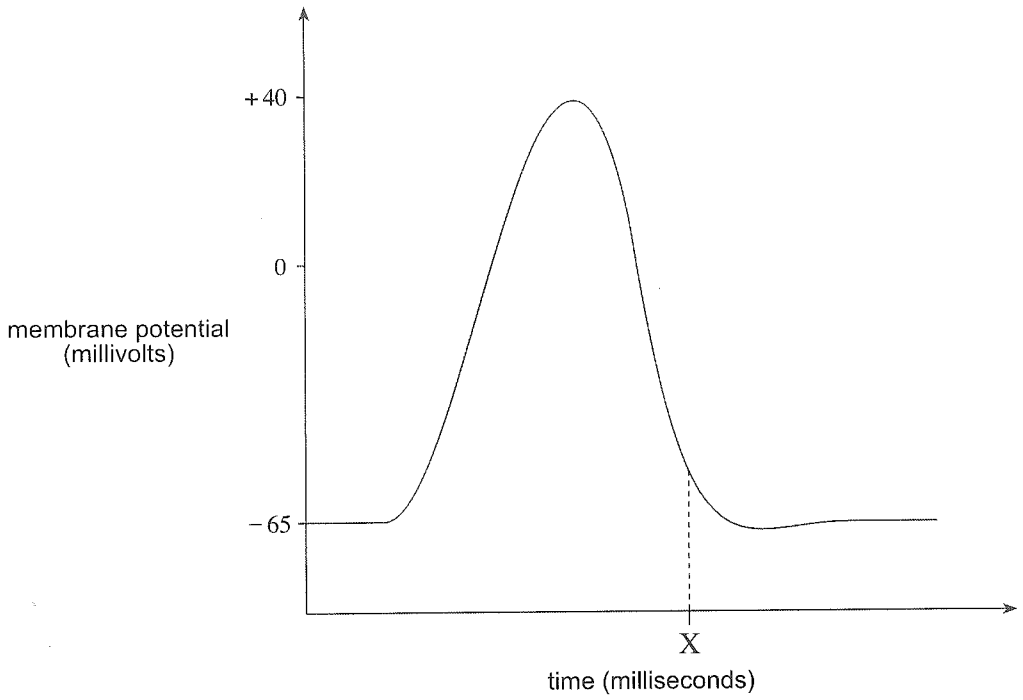
45. Which processes are involved in the movement of molecule **Y** from **point X** to **point Z**?

A. exocytosis and diffusion
B. endocytosis and diffusion
C. exocytosis and facilitated transport
D. endocytosis and facilitated transport

46. In a neuron, the correct order of structures that a nerve impulse passes through is

A. axon → cell body → dendrite.
B. dendrite → axon → cell body.
C. cell body → dendrite → axon.
D. dendrite → cell body → axon.

Use the following graph to answer question 47.



47. Which of the following is a characteristic of the neuron at time **X**?

A. Sodium ions are transported into the axon.
B. The axon membrane is impermeable to potassium ions.
C. There is a lower concentration of potassium ions inside than outside of the axon.
D. There is a net positive charge on the inside of the axon and a net negative charge on the outside.

48. Which part of the brain functions to maintain a blood pressure of 120/80 and a body temperature of 37°C?

A. thalamus
B. hypothalamus
C. cerebral cortex
D. corpus callosum

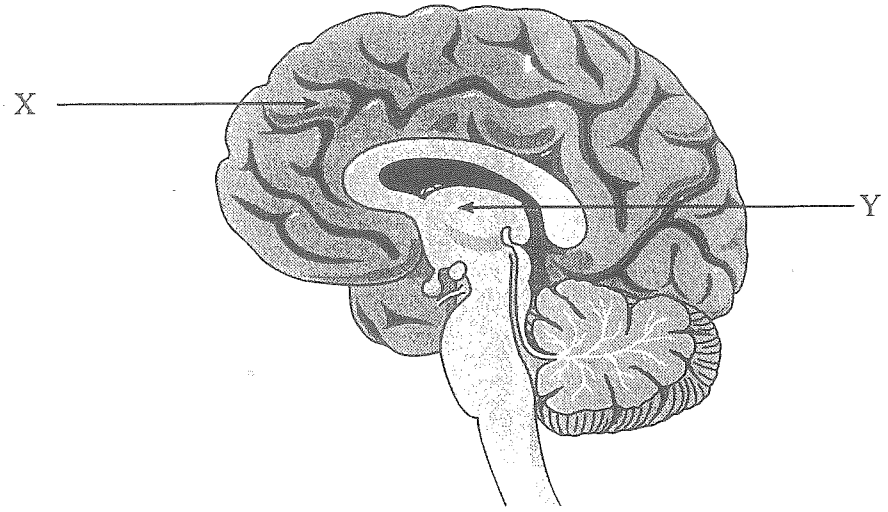
49 Which of the following is correctly paired?

A. sympathetic nervous system stimulation and acetylcholine
B. sympathetic nervous system stimulation and a relaxed state
C. parasympathetic nervous system stimulation and noradrenalin
D. parasympathetic nervous system stimulation and a relaxed state

50 The source gland for adrenalin is the

A. pancreas.
B. adrenal cortex.
C. adrenal medulla.
D. posterior pituitary.

Use the following diagram to answer questions 51 and 52.



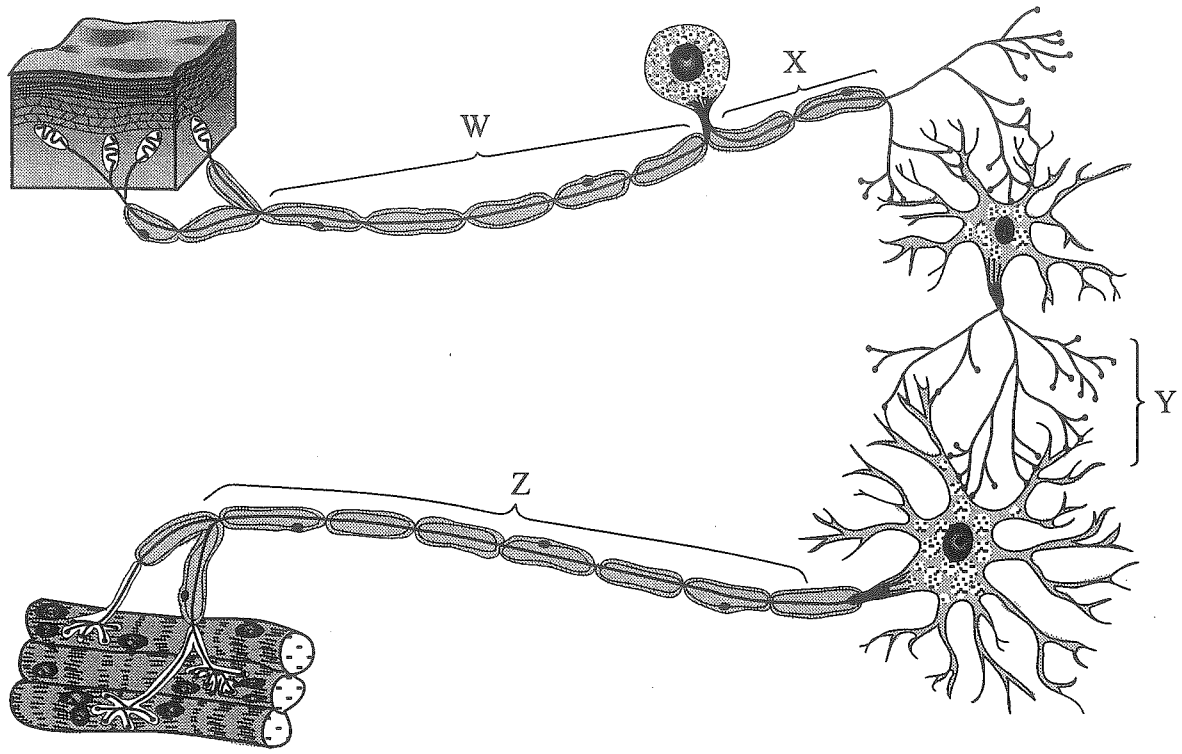
51. The structure labelled **X** is the

A. cerebrum.
B. cerebellum.
C. hypothalamus.
D. corpus callosum

52. A function of the structure labelled **Y** is to

A. sort and relay sensory stimuli.
B. initiate the "fight or flight" response.
C. integrate muscle position and balance.
D. channel information between the two hemispheres.

Use the following diagram to answer question 53.



53. Which of the following represents the axon of the motor neuron in the reflex arc?

A. W
B. X
C. Y
D. Z

---

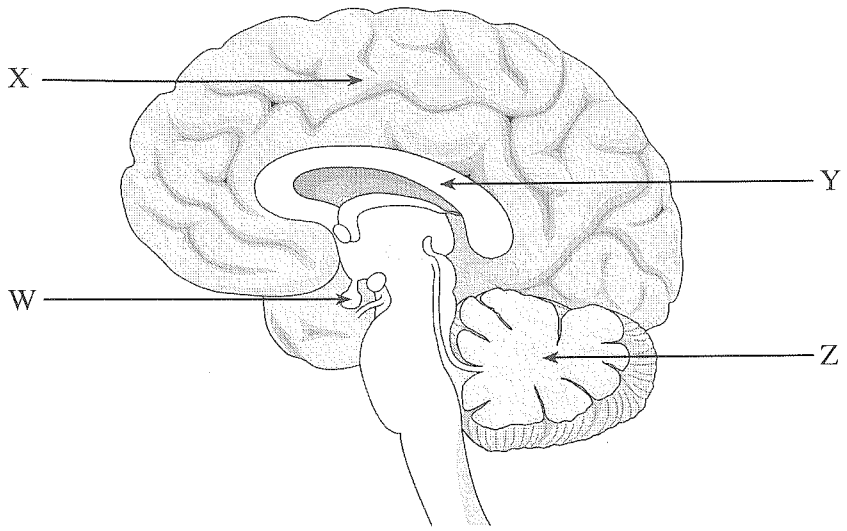
54. Relative to the outside of a neuron, the cytoplasm inside a resting neuron is

A. positively charged and the sodium ion concentration is lower inside than outside.
B. negatively charged and the sodium ion concentration is lower inside than outside.
C. positively charged and the sodium ion concentration is greater inside than outside.
D. negatively charged and the sodium ion concentration is greater inside than outside.

55. Neurotransmitters are released into the

A. axon.
B. dendrite.
C. synaptic cleft.
D. myelin sheath.

Use the following diagram to answer question 56.



56. Which letter indicates the cerebellum?

A. W
B. X
C. Y
D. Z

---

57. The portion of the brain involved in speech, vision, learning and memory is the

A. cerebrum.
B. cerebellum.
C. hypothalamus.
D. medulla oblongata.

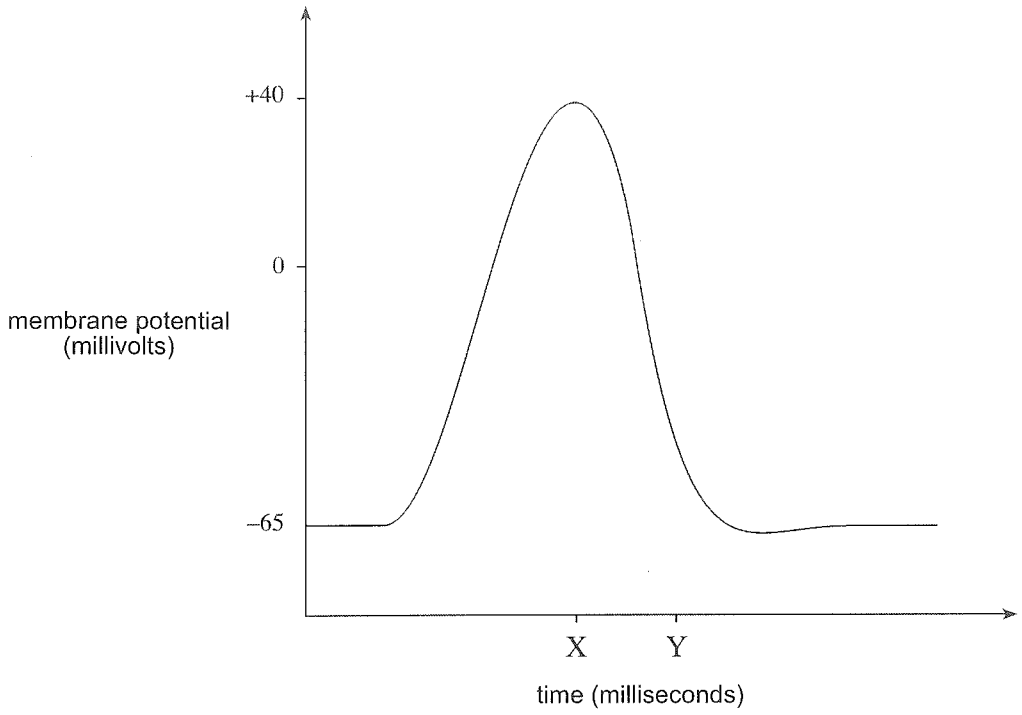
58. Some neurotransmitters in the peripheral nervous system stop or reduce muscle-cell contractions. These neurotransmitters must work by

A. destroying cholinesterase in the synaptic cleft.
B. decreasing the amount of stimulus required for depolarization.
C. preventing the sodium gates from opening in the postsynaptic membranes.
D. preventing the reabsorption of acetylcholine in the presynaptic membranes.

59. The hypothalamus causes the anterior pituitary to secrete hormones by

A. negative feedback.
B. releasing adrenalin.
C. releasing hormones.
D. nervous stimulation.

Use the following graph to answer question 60.



60. What occurs within the neuron between time **X** and time **Y**?

A. Sodium ions move into the cell.
B. Calcium ions move out of the cell.
C. Potassium ions move out of the cell.
D. Large, negatively-charged ions move into the cell.

---

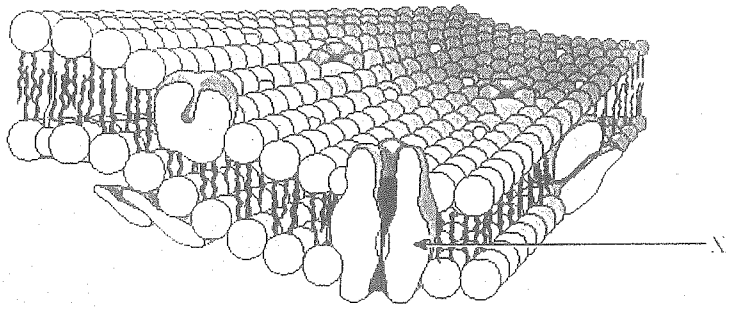
61. Resting potential is characterized by

A. the opening of the sodium gates.
B. more potassium ions outside the membrane than inside.
C. an equal number of sodium ions on both sides of the membrane.
D. more sodium ions on the outside than on the inside of the membrane.

62. Voluntary movement of the limbs is initiated by the

A. cerebrum.
B. cerebellum.
C. hypothalamus.
D. medulla oblongata.

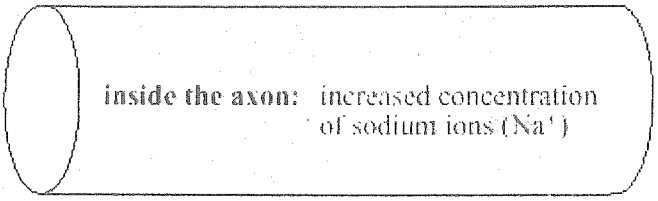
Use the following diagram to answer question 63.



63. . The diagram shows part of a dendrite. A role of structure X is to
A. secrete the myelin sheath.
B. identify the cell to phagocytes.
C. move sodium across the membrane.
D. release calcium at the synaptic ending.

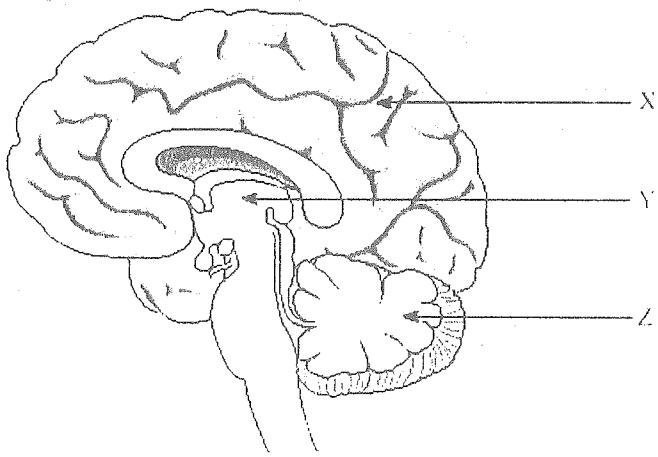
64. The diagram below represents a section of an axon.

outside the axon: increased concentration of potassium ions (K^+)



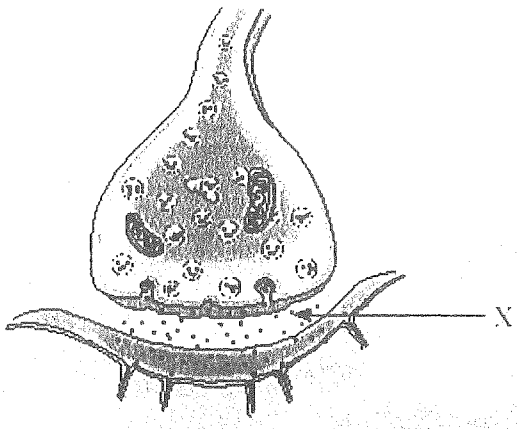
Given the conditions above, what will occur next?
A. Repolarization.
B. Depolarization.
C. Recovery period.
D. Synaptic transmission.

65. . Identify each part of the brain indicated in the diagram below and give **one** function of each. **(6 marks: 1 mark each for name and 1 mark each for function)**



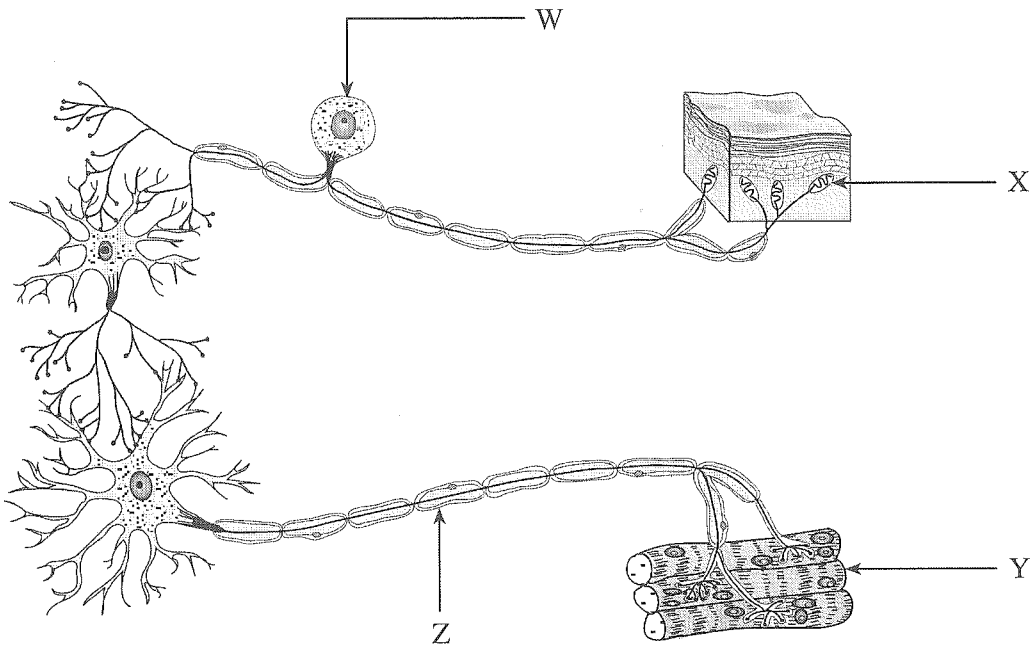
Part X:_____
Function:_____
_____
Part Y: _____
Function:_____
_____
Part Z: _____
Function:
_____
_____

Use the following diagram to answer question 66.



66. How does the molecule indicated by X move across the space above?
A. Osmosis.
B. Diffusion.
C. Active transport.
D. Facilitated transport.

Use the following diagram to answer question 67.



67. Which of the following indicates the structure that initiates a nerve impulse during a reflex?

A. W
B. X
C. Y
D. Z

---

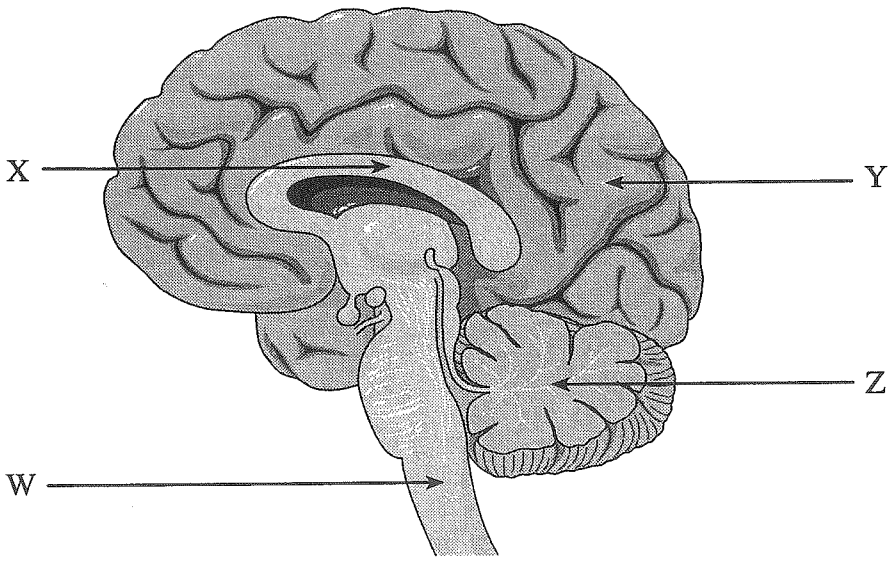
68. In a synaptic cleft, neurotransmitters move to the receptor sites by

A. osmosis.
B. diffusion.
C. active transport.
D. facilitated transport.

69. After surgery to remove a brain tumour, a person suffers from poor appetite, alternating chills and fever, and difficulty in maintaining water balance and blood pressure. Memory and muscle control are normal. Which part of the brain is **most** likely affected?

A. thalamus
B. cerebrum
C. cerebellum
D. hypothalamus

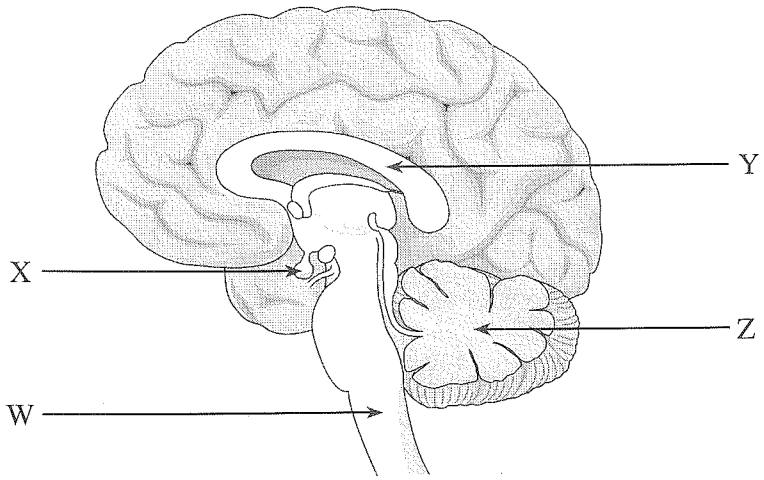
Use the following diagram to answer question 70.



70. Which of the following indicates the part of the brain containing reflex centres for swallowing and vomiting?

A. W
B. X
C. Y
D. Z

Use the following diagram to answer questions 71 and 72.



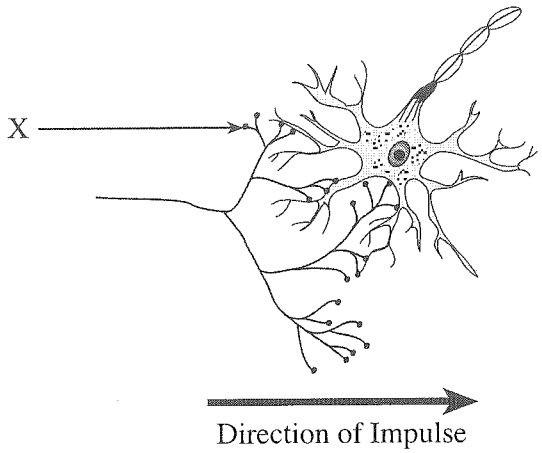
71. Which of the following indicates the medulla oblongata?

A. W
B. X
C. Y
D. Z

72. Which of the following activities accompanies high activity in structure Z?

A. sleeping
B. swallowing food
C. studying for an exam
D. performing a gymnastics routine

Use the following diagram to answer question 73.



73. Considering the direction of the nerve impulse, what is structure **X**?

A. cell body
B. myelin sheath
C. synaptic ending
D. post-synaptic membrane

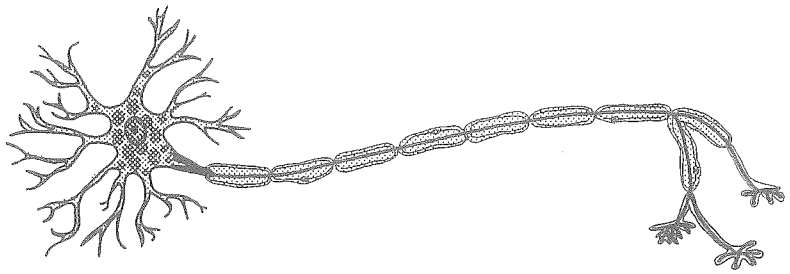
---

74. Two areas of the brain that regulate the responses of the autonomic nervous system are the

A. cerebrum and cerebellum.
B. corpus callosum and thalamus.
C. hypothalamus and medulla oblongata.
D. anterior pituitary and posterior pituitary.

75. Name each of the following neurons and for each give its role in a reflex arc. **(6 marks)**

a)

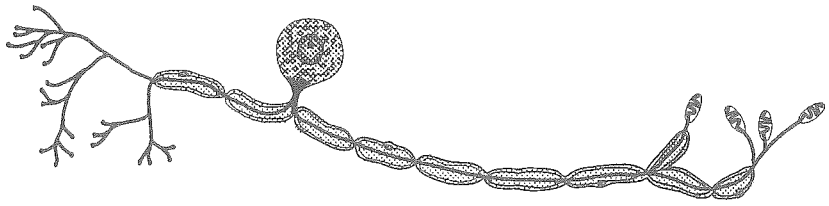


Name: _____

Role: _____

_____

b)

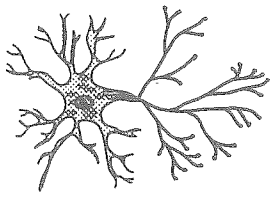


Name: _____

Role: _____

_____

c)

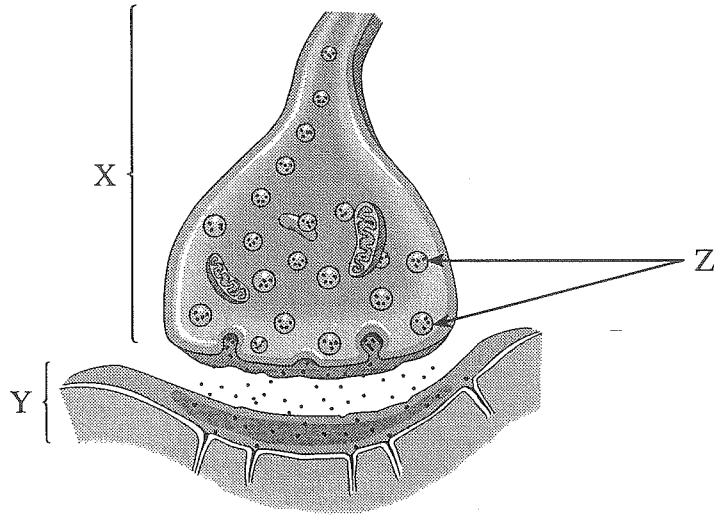


Name: _____

Role: _____

_____

Use the following diagram to answer question 76.



76. a) Identify each of the following structures. **(2 marks: 1 mark each)**

Structure **X**:

_____

Structure **Y**:

_____

b) Identify the substance stored and released by structure **Z** and describe its function.
(2 marks: 1 mark for substance; 1 mark for function)

Substance: _____

Function: _____

_____

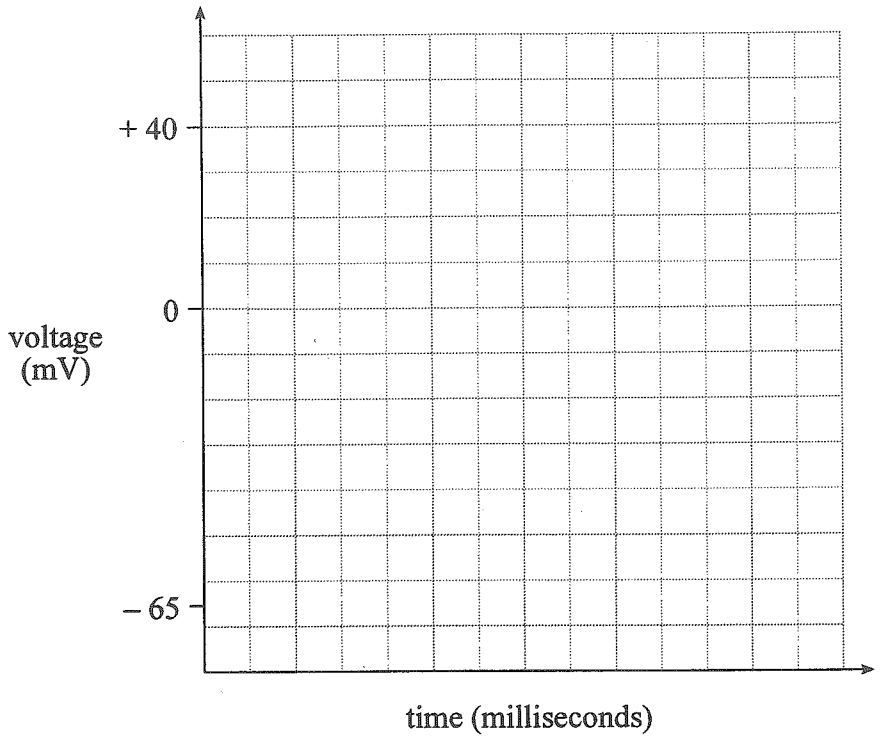
_____

_____

_____

c) Draw an arrow on the diagram above to indicate the direction of the nerve impulse.
(1 mark)

77 a) On the following grid, draw a curve to represent an action potential. **(2 marks)**



b) Label the "depolarization" and the "recovery period" of your graph.
(1 mark: $\frac{1}{2}$ mark each)

c) Describe what happens to the axon during repolarization. **(3 marks)**

_____

_____

_____

_____

_____

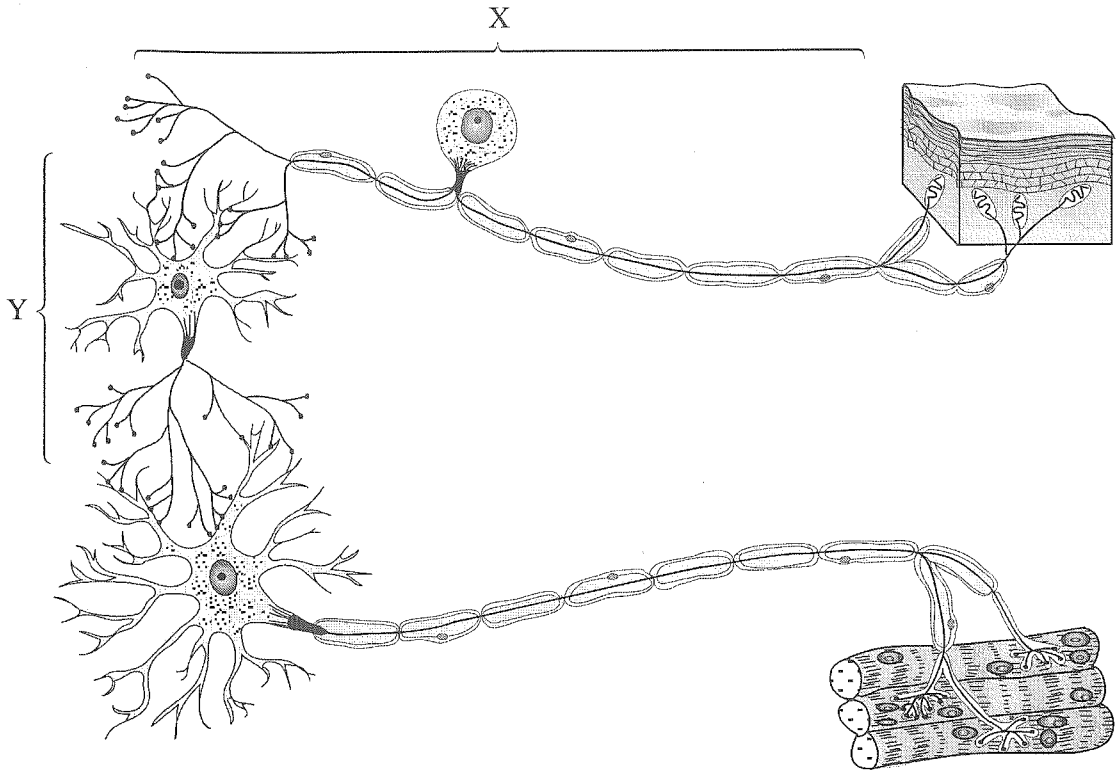
_____

d) Describe what happens to the axon during the recovery period. **(1 mark)**

_____

_____

Use the following diagram to answer question 78.



78 a) Identify each of the following structures and give **one** function of each.
(4 marks: 1 mark each for name; 1 mark each for function)

Structure **X**:

Name: _____

Function: _____

_____

Structure **Y**:

Name: _____

Function: _____

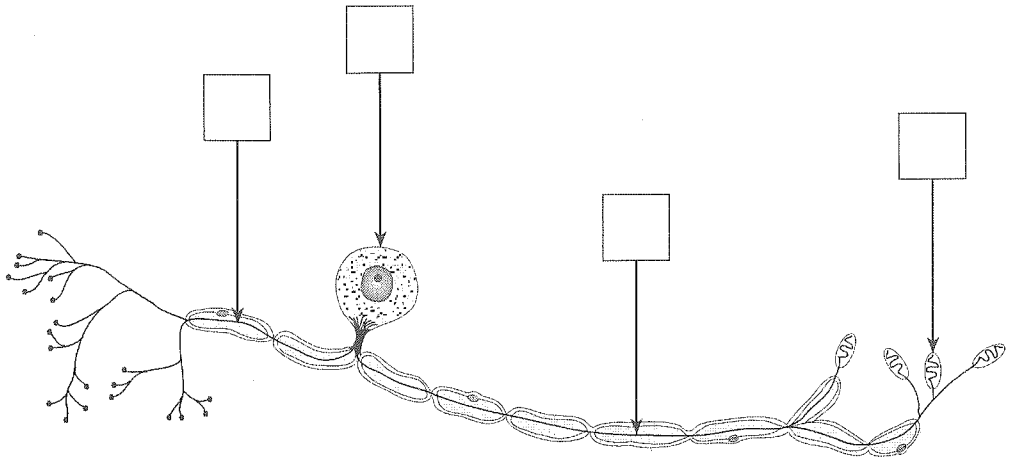
b) A substance disrupts communication between structures **X** and **Y**. Give an explanation of how a substance could do this. **(1 mark)**

_____

_____

_____

Use the following diagram to answer question 79.



79. a) Label the diagram above using the numbers of the terms listed below.
(Not all the terms will be used.) **(2 marks: $\frac{1}{2}$ mark each)**

1. axon
2. dendrite
3. synapse
4. node of Ranvier
5. cell body
6. receptor

b) Describe how a reflex arc functions. **(5 marks)**

80. Describe the transmission of a nerve impulse through a neuron. **(8 marks)**

8(a) Use the word list below to complete the paragraph describing characteristics of a nerve impulse. (Use each word only once. Not all of the words will be used.)

(2 marks: $\frac{1}{2}$ mark each)

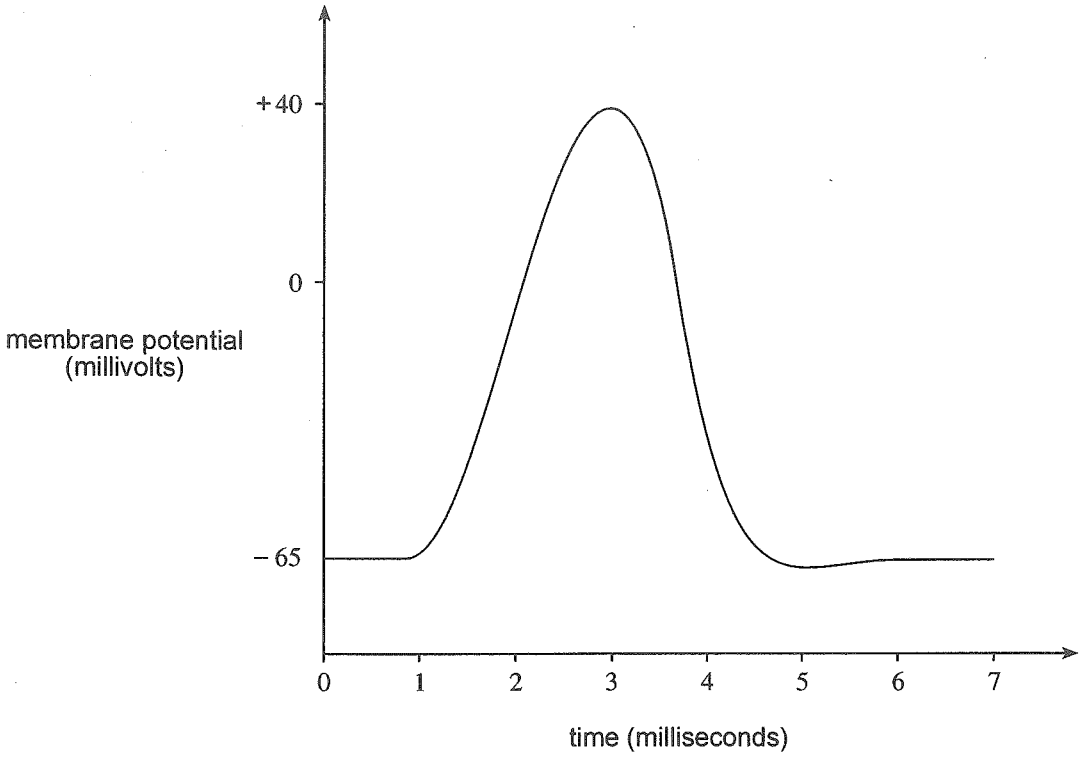
- resting potential
- threshold
- recovery phase
- all-or-none
- stimulus
- polarized membrane

Any change in the environment that can open sodium gates is called a(n) _____ . If the change in the environment does not open a sodium gate then the _____ has not been reached. When an action potential is produced, it is called the _____ response. During the _____ , no further action potentials can be generated.

b) Describe the changes that occur in the polarity of the membrane and the distribution of ions during an action potential. **(4 marks)**

c) Describe the structure of the myelin sheath and explain why it speeds up the transmission of nerve impulses. **(2 marks)**

Use the following graph to answer question 82.



82. The graph shows the change in an axon's polarity before, during and after an action potential.

a) Explain what occurs in the axon at the following times. **(3 marks: 1 mark each)**

From 1 to 3 milliseconds:

_____

_____

From 3 to 5 milliseconds:

_____

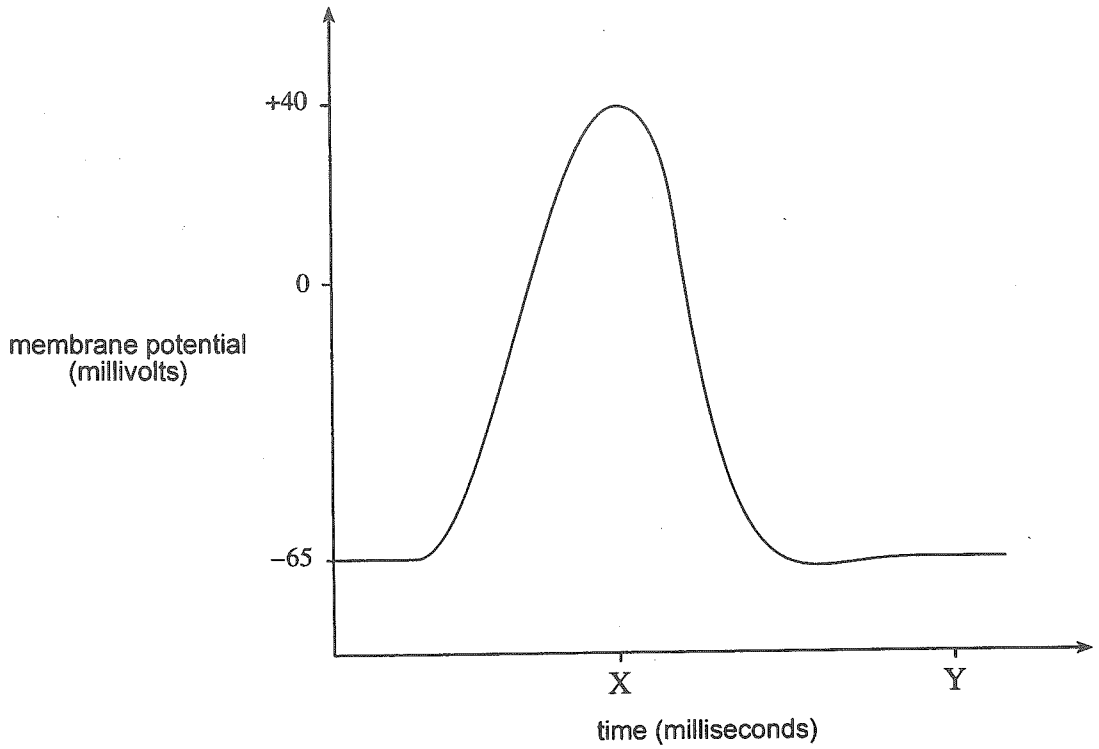
_____

From 5 to 7 milliseconds:

_____

_____

Use the following graph to answer question 83.



83 a) Describe what is occurring at the neuron between time **X** and time **Y**. **(4 marks)**

b) What would occur if the membrane of the axon became impermeable to potassium ions (K^+) at time **X**? **(2 marks)**

84. Describe how each of the following is important to the passage of a nerve impulse.

sodium/potassium pump: **(2 marks)**

synaptic vesicles: **(2 marks)**

myelinated axon: **(2 marks)**

85. Give **one** function of each of the following parts of a reflex arc. **(4 marks: 1 mark each)**

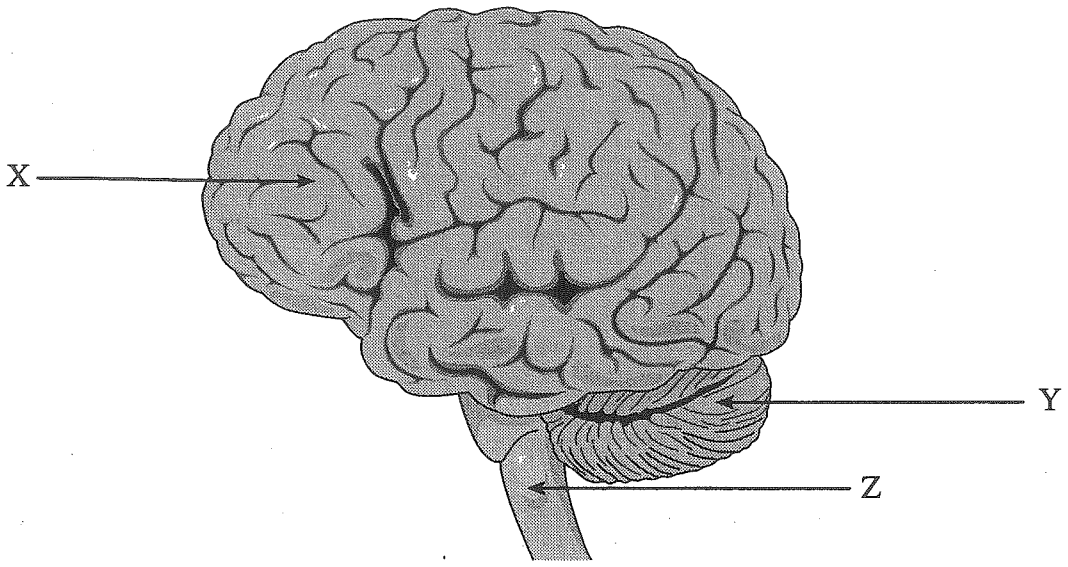
myelin sheath:

effector:

interneuron:

receptor:

Use the following diagram to answer question 86.



86. Identify structures **X, Y** and **Z** and give **one** function of each.
(6 marks: 1 mark each for name; 1 mark each for function)

Structure **X**:

Name: _____

Function: _____

_____

Structure **Y**:

Name: _____

Function: _____

_____

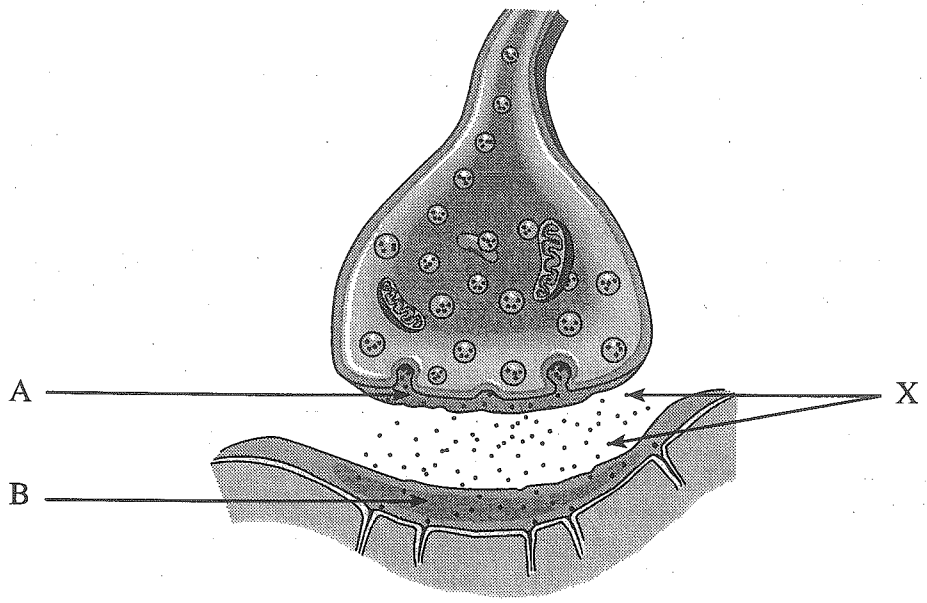
Structure **Z**:

Name: _____

Function: _____

_____

Use the following diagram to answer question 87.



87. a) Identify the process by which the molecules labelled **X** leave the cell. **(1 mark)**

_____

b) How do the molecules travel from membrane **A** to membrane **B**? **(1 mark)**

_____

_____

c) Describe the effect of these molecules on membrane **B**. **(1 mark)**

_____

_____

88. Which of the following is a true statement about the sympathetic and parasympathetic nervous systems?

A. Sympathetic system causes increased rates of digestion while the parasympathetic system causes decreased rates of digestion.

B. Sympathetic system causes decreased breathing rate while the parasympathetic system causes increased breathing rate.

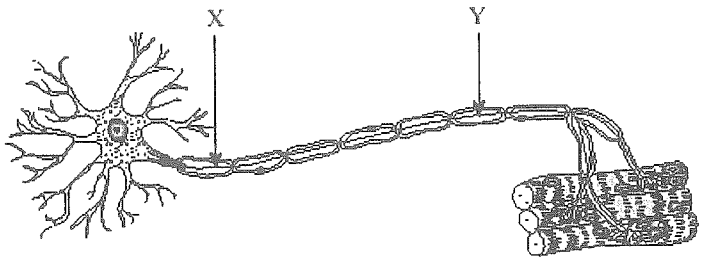
C. Sympathetic system causes constriction of the iris while the parasympathetic system causes dilation of the iris.

D. Sympathetic system causes increased heart rate while the parasympathetic system decreases heart rate.

84. Explain how an action potential is generated in a neuron. **(4 marks)**

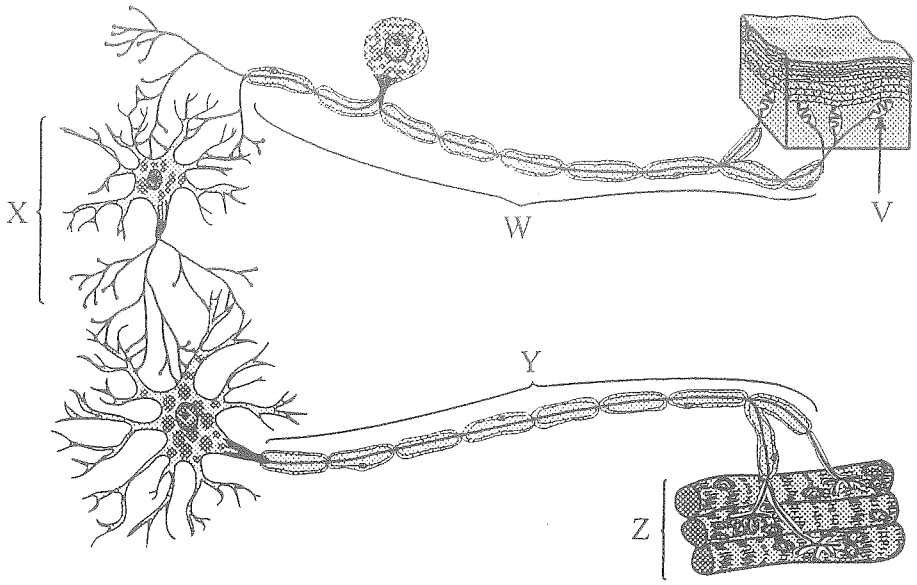
b) What would be the effect of increasing the stimulation of the neuron? Give reasons to support your answer. **(2 marks)**

Use the following diagram to answer question 86



86. Describe, in correct order, the events that occur during the transmission of a nerve impulse from point X to point Y. **(8 marks)**

Use the following diagram to answer question 91

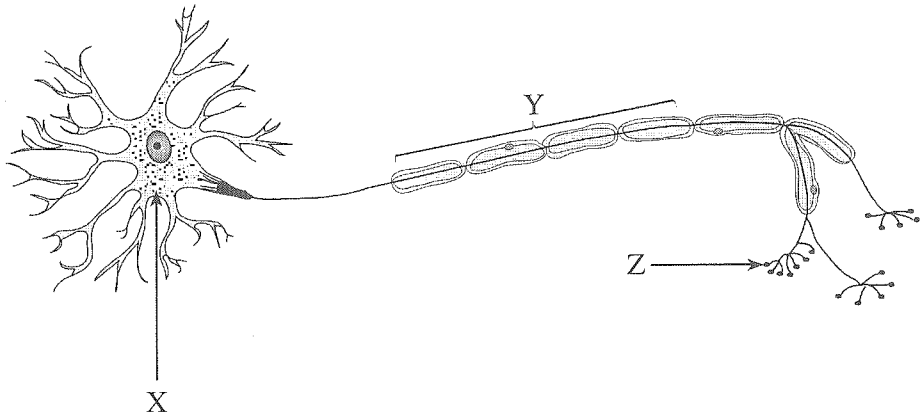


91 The diagram above represents a simple reflex arc. Identify structures **V**, **W**, **X**, **Y** and **Z** and give **one** function of each structure.

(5 marks: $\frac{1}{2}$ mark for each name, $\frac{1}{2}$ mark for each function)

STRUCTURE	NAME	FUNCTION
V		
W		
X		
Y		
Z		

Use the following diagram to answer question 92



92 a) Identify the following structures. **(2 marks: 1 mark each)**

Structure **X**:

_____

Structure **Z**:

_____

b) Describe the stages in the transmission of a nerve impulse. **(4 marks)**

_____

_____

_____

_____

_____

_____

_____

c) How would nerve impulse transmission be affected without the cells that form structure **Y**? **(1 mark)**

_____

_____