1. Which of the following shows the direction of a nerve impulse in a neurone?

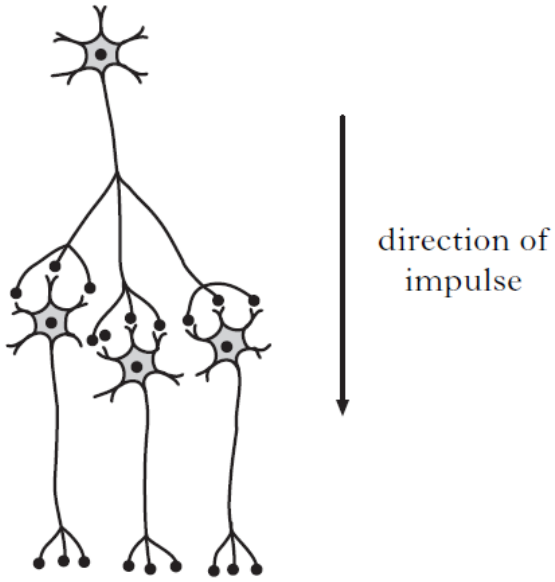
A Axon → cell body → dendrite

B Cell body → dendrite → axon

C Cell body → axon → dendrite

D Dendrite → cell body → axon

2. The following diagram represents four neurones in a neural pathway.



Which line in the table describes the pathway correctly?

	Type of pathway	
A	motor	divergent
B	motor	convergent
C	sensory	divergent
D	sensory	convergent

3. Which of the following statements describes a neurotransmitter and its method of removal?

A Adrenaline is removed by reabsorption.

B Adrenaline is removed by enzyme degradation.

C Noradrenaline is removed by enzyme degradation.

D Noradrenaline is removed by reabsorption.

4. Which of the following carries an impulse towards a nerve cell body?

A Dendrite

B Axon

C Myelin

D Myosin

5. Which of the following statements about diverging neural pathways is correct?

A They accelerate the transmission of sensory impulses.

B They suppress the transmission of sensory impulses.

C They decrease the degree of fine motor control.

D They increase the degree of fine motor control.

6. Vision in dim light is improved by the rods having

A peripheral neural pathways

B diverging neural pathways

C central neural pathways

D converging neural pathways.

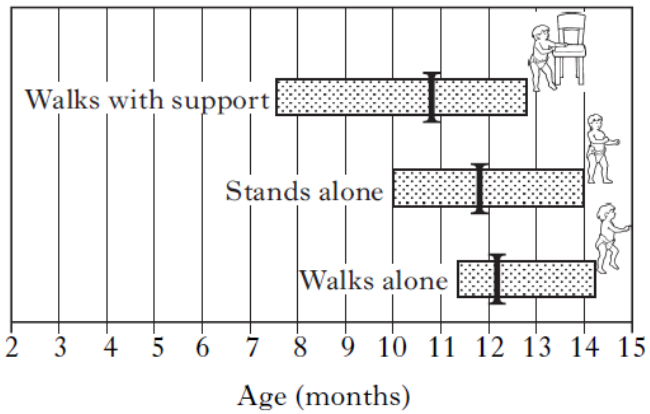
7.

The diagram below shows the ages (in months) at which children reach various stages in their development.

The left end of each bar indicates the age by which 25% of infants have reached the stated performance.

The right end of each bar indicates the age by which 90% of infants have reached the stated performance.

The vertical bar indicates the age by which 50% of infants have reached the stated performance.



An eight-month old infant can walk with support but cannot stand alone.

In what percentage of the population is this child found?

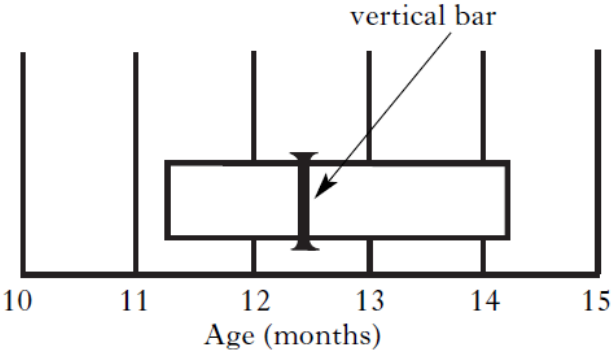
A Less than 25%

B Between 25% and 50%

C Around 50%

D Between 50% and 90%

8. The diagram below shows the ages in months at which children are able to walk unaided. The left end of the bar shows the age at which 25% of infants can walk unaided. The right end of the bar shows the age at which 90% of infants can walk unaided. The vertical bar shows the age at which 50% of infants can walk unaided.



If sixteen infants, aged twelve months, were tested, how many would be expected to walk unaided?

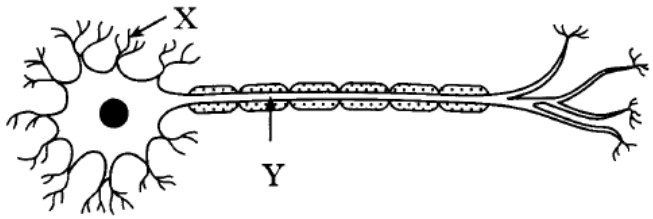
A 4

B 7

C 9

D 12

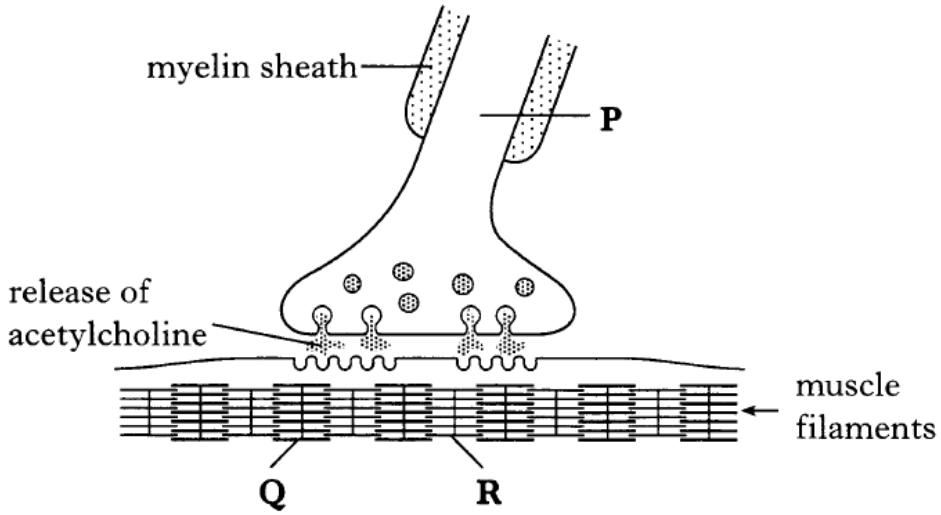
9. The diagram below shows a motor neurone.



Which line of the table identifies correctly the labelled parts and the direction of impulse?

	X	*Y*	*Direction*
A	dendrite	axon	X → Y
B	dendrite	axon	Y → X
C	axon	dendrite	X → Y
D	axon	dendrite	Y → X

10. The diagram shows a neuromuscular junction.



(*a*) Name the part of the nerve cell labelled **P**.

_____ **1**

(*b*) (i) What kind of substance is acetylcholine?

_____ **1**

(ii) What triggers the release of acetylcholine?

_____

_____ **1**

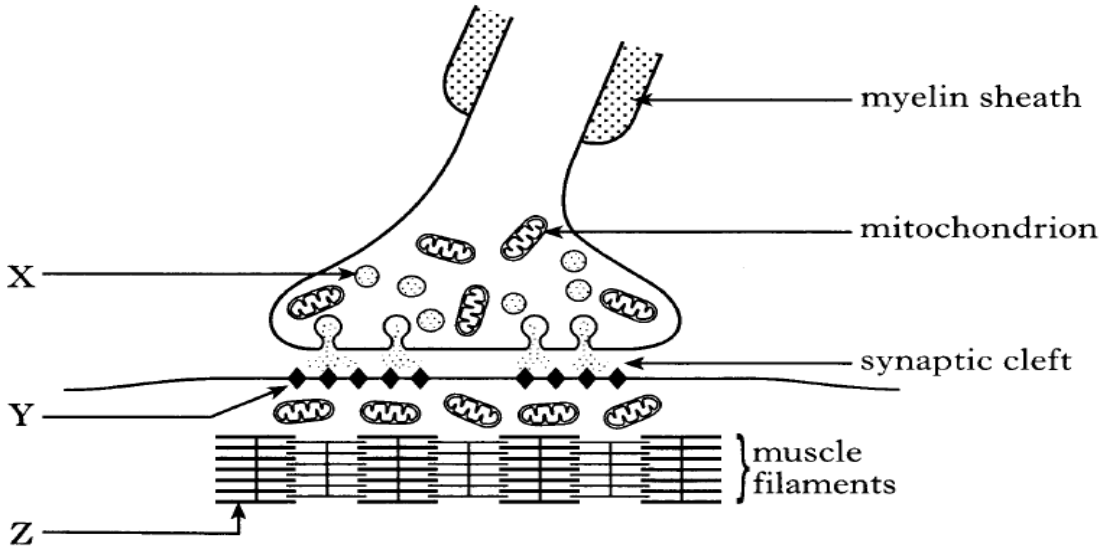
(iii) State what happens to acetylcholine after it has acted on the muscle.

_____

_____ **1**

11.

The diagram shows a neuromuscular synapse.



(*a*) (i) Name cell structure **X**.

_____ **1**

(ii) Describe the role of structure **X** in exocytosis.

_____

_____ **1**

(*b*) What is the function of molecule **Y**?

_____

_____ **1**

(*c*) The areas on both sides of the synaptic cleft are rich in mitochondria. Explain why mitochondria are needed in each area.

_____

_____

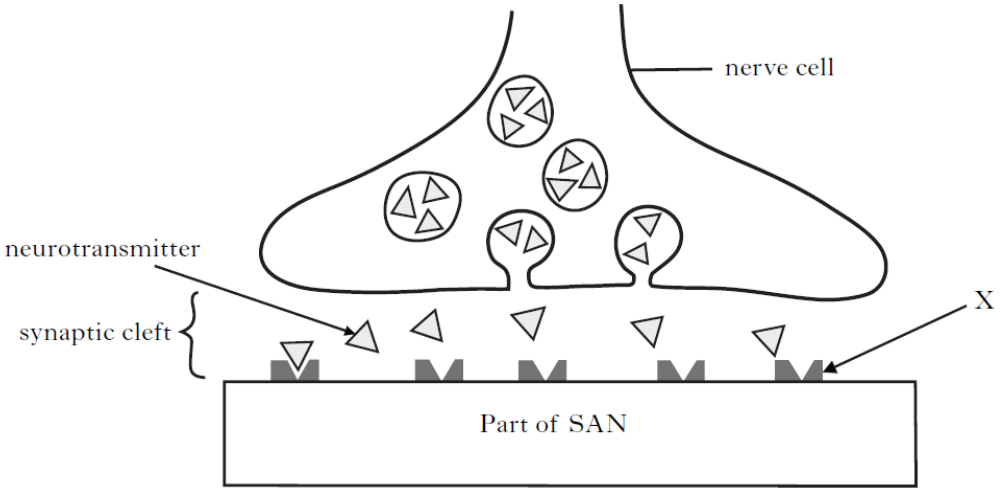
_____ **2**

12. What structural feature of motor and sensory neurones speeds up the transmission of nerve impulses?

_____

_____ **1**

13. (*a*) The diagram below shows a synapse which links a nerve cell with the sinoatrial node (SAN) in the heart.



(ii) Describe the function of molecule X.

_____ **1**

(*b*) One example of a neurotransmitter is acetylcholine.

How is acetylcholine removed from the synapse?

_____

_____ **1**

(*c*) (i) In which area of the brain does the sympathetic nervous system originate?

_____ **1**

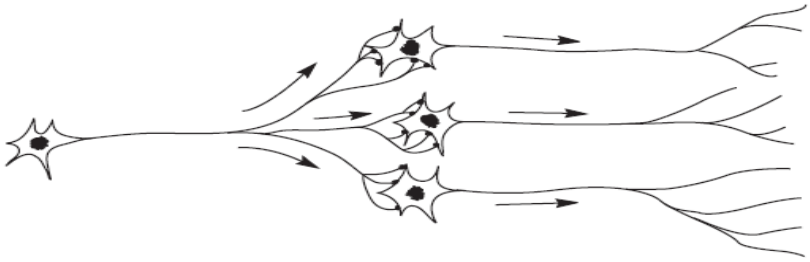
(ii) Describe a situation which would lead to stimulation of the sympathetic nervous system.

_____

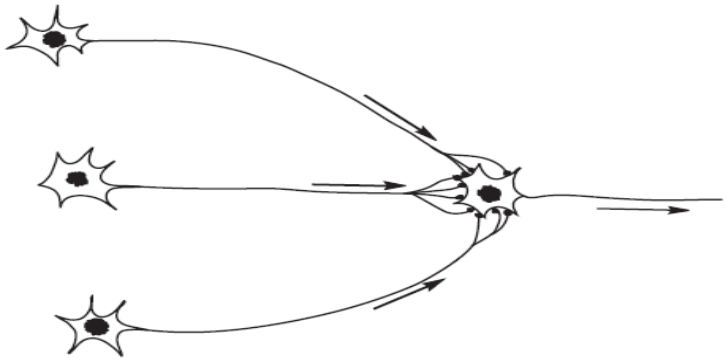
_____ **1**

14. The diagram below shows two different neural pathways.
Nerve impulses are travelling from left to right in both pathways.

Pathway A



Pathway B



(*a*) (i) Name the types of pathway represented by **A** and **B**.

A _____

B _____ **1**

(ii) Pathway **A** helps the hand to function.

Explain how it does this.

_____

_____

_____ **2**

(*b*) Blinking is a reflex action.

(i) What is a reflex action?

_____

_____ **1**

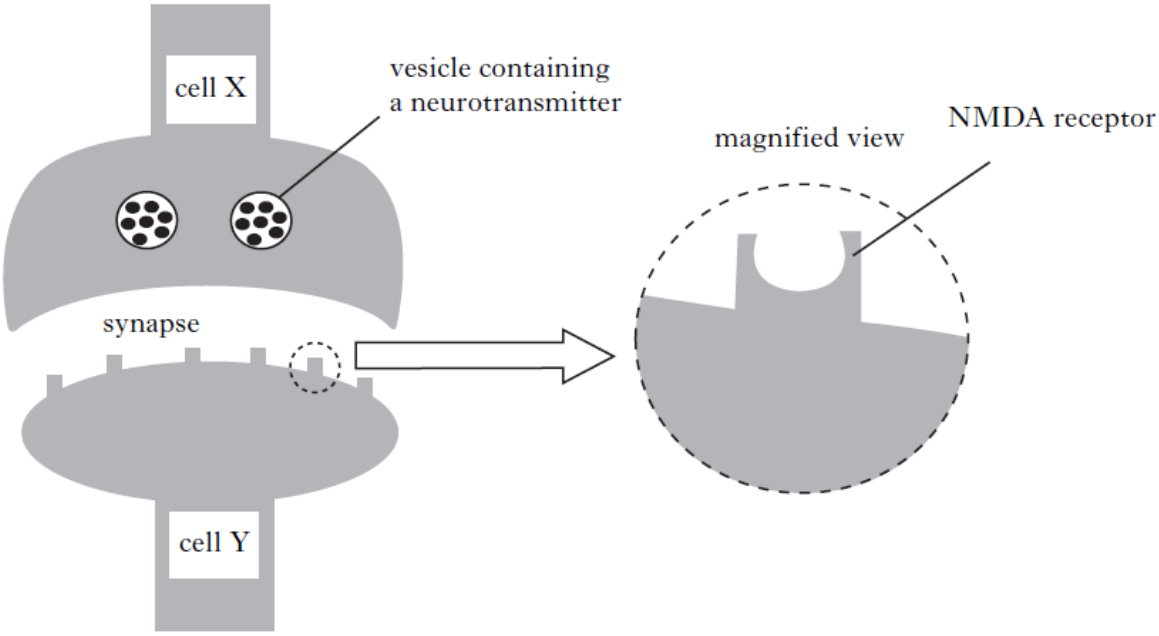
(ii) The blinking reflex can sometimes be suppressed.

What term refers to the ability of the nervous system to suppress reflexes?

_____ **1**

15.

The diagram below shows a synapse between two nerve cells in the brain and a magnified view of a receptor called NMDA.



(ii) The diagram above shows a single neural pathway.

Explain how a converging neural pathway would be more likely to generate an impulse in nerve cell Y.

_____

_____

_____ **2**

(*b*) Many factors can lead to memory loss.

(i) One of these factors is a reduction in the number of NMDA receptors.

Which part of the brain contains nerve cells rich in NMDA receptors?

_____ **1**

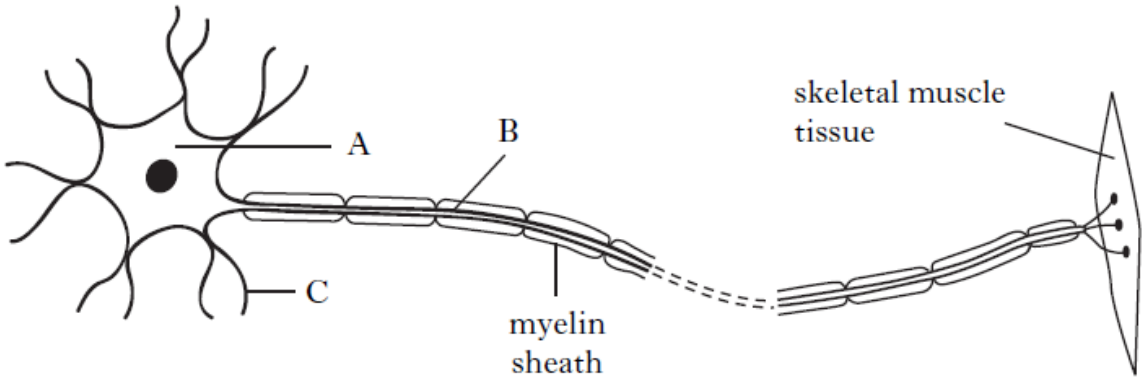
(ii) Another factor is the decreased production of acetylcholine.

Name the condition which results from the loss of acetylcholine-producing cells in the brain.

_____ **1**

16.

The diagram below shows a motor neurone and its junction with skeletal muscle tissue.



(*a*) Name the parts of the neurone labelled A, B and C on the diagram.

A _____

B _____

C _____ **2**

(*b*) Neurotransmitters bind to receptors on skeletal muscle tissue triggering contraction.

(i) Name **two** neurotransmitters.

1 _____

2 _____ **1**

(ii) Explain why the release of neurotransmitter into a synaptic cleft may sometimes fail to trigger muscle contraction.

_____

_____ **1**

(*c*) (i) State the importance of the myelin sheath in the transmission of impulses.

_____

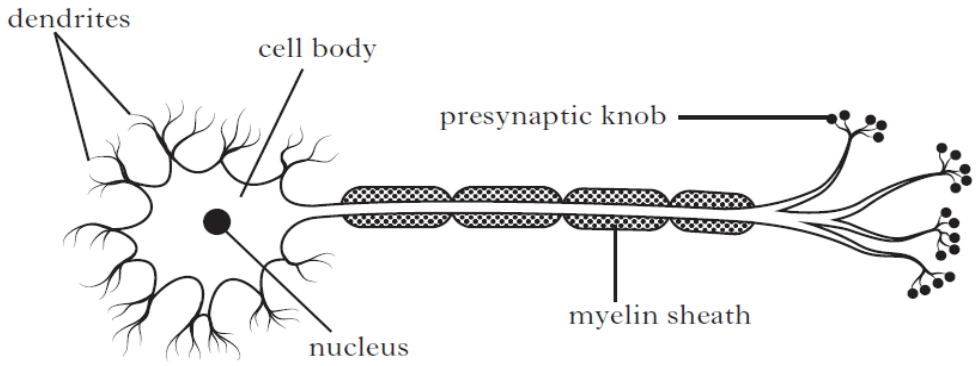
_____ **1**

(ii) Post-natal myelination is necessary for a child to go through the sequence of developmental stages leading to walking.

What term describes this sequence of developmental stages?

_____ **1**

17. The diagram below shows a neurone from an adult.



(*a*) Draw an arrow **on the diagram** to show the direction in which an impulse would travel. **1**

(*b*) Suggest a possible role of the nucleus in the transfer of information across a synapse.

_____

_____ **1**

(*c*) Complete the table below which contains information about organelles found in the presynaptic knob.

Organelle	*Function*
	Provides ATP for synthesis reactions
Vesicle	

1

(*d*) (i) How might a neurone in a newly-born child differ from the one in the diagram?

_____

1

(ii) In what way would this affect how the neurone functions?

_____

_____

1

18. Myelination of the nervous system leads to the development of walking.

(i) Name the cells that produce the myelin sheath.

_____

1

(ii) Explain why it is important that axons are surrounded by a myelin sheath.

_____

_____

1

19.

The information in the table below refers to the development of walking by infant boys.

Stage of development	*Description of behaviour*	*Age (weeks) at which behaviour develops*	
		Earliest	*Latest*
1	Rolls over	9	23
2	Sits up without support	16·5	32·5
3	Crawls	21	38
4	Pulls up and stands holding on to furniture	23	43
5	Walks holding on to furniture	28·5	49
6	Stands unsupported	35·5	54
7	Walks alone	44·5	57·5

(*a*) Assuming a normal pattern of distribution, predict by what age 50% of boys would be expected to walk alone.

Space for calculation

_____ **1**

(*b*) Identify all the stages in the development of walking that boys could be at when they are 36 weeks old.

Tick the correct boxes

1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐

1

Describe the change which occurs in the nervous system that allows children to go through the stages of development leading to walking.

_____ **1**

20. Give an account of the nervous system under the following headings:

(i) the role of neurotransmitters at the synapse; **6**

(ii) the structure and function of neural pathways. **4**

(10)

21. Describe the function and mechanism of neurotransmitter action at the synapse. **7**

22. Describe how recreational drugs can affect the brain. **(10)**