

- (e) Any one of: (1 mark each – max. 1) (1)
- Protein/amine
 - water soluble/hydrophilic/lipophobic/not fat soluble
 - Hormone receptor complex forms on the cell membrane/surface (vs inside cytoplasm)
 - Enzymes activated within the cytoplasm (vs in nucleus or other organelles)
 - Secondary messenger within cytoplasm is activated (vs genes activated)

15 2014:39 (13 marks)

- (d) (i) Thyroid releases: (2 marks)
- Calcitonin into blood
 - osteoclasts inhibited/osteoblasts stimulated increase uptake of calcium into the skeleton/
less Ca in the blood
- (ii) Parathyroid releases: (2 marks)
- parathormone/parathyroid hormone
 - osteoclasts stimulated to release calcium from skeleton/increases calcium absorption from gut (kidney)/increase activation of vitamin D/increase Ca in blood

16 2015:37 (5 marks)

- (b) (ii) Must NAME ONE hormone, state the target organ for that hormone and a main effect. (3)
- Any one of:
- Oestrogen (1)
 - Uterus/ovaries/breasts/anterior pituitary/hypothalamus (1)
 - Repairs uterine lining/endometrium/inhibits FSH/promotes/stimulates LH secretion/
maintains female secondary sexual characteristics (1)
- OR
- Progesterone (1)
 - Uterus/breasts/anterior pituitary/hypothalamus (1)
 - maintains uterine lining/endometrium/inhibits LH/prepares breasts/breast tissue for milk production (1)
- OR
- testosterone/androgens (1)
 - testes/brain/muscles/bones (1)
 - promotes/maintains male secondary sexual characteristics/stimulates sperm production/
growth of muscles and bones/musculoskeletal system (1)
- (d) MUST be a difference in response (2)
- Time = slower/longer (nerves are faster/take less time to respond)
 - Duration = longer lasting (nerve response last)

EXTENDED ANSWER QUESTIONS

17 2011:32 (18 marks)

- (a) (i) May use a fully annotated diagram. Any eight of: (8)
- low levels/concentration of thyroxin in the blood stimulates receptors/hypothalamus
 - Hypothalamus produces TSH RF/thyroid stimulating hormone releasing factor
 - TSH RF travels into the anterior pituitary
 - Blood vessels/portal system conducts/transmits TSHRF
 - TSH is released into the blood stream/general circulation
 - TSH stimulates the thyroid gland
 - TSH produces thyroid hormone/thyroxine
 - Thyroid hormone/thyroxin is released by the gland into the blood stream/general circulation
 - Thyroid hormone/thyroxin negatively feeds back to pituitary/hypothalamus controlling output of TSH

One mark each for any four points:

Steroid hormones:

- Receptor inside cytoplasm
- Moves through cell membrane
- Hormone receptor complex forms inside cytoplasm
- Enzymes activated inside nucleus/organelles
- Genes activated to form a particular protein
- Slower acting/effects in hours or days

Chapter 2: Nervous system

MULTIPLE-CHOICE QUESTIONS

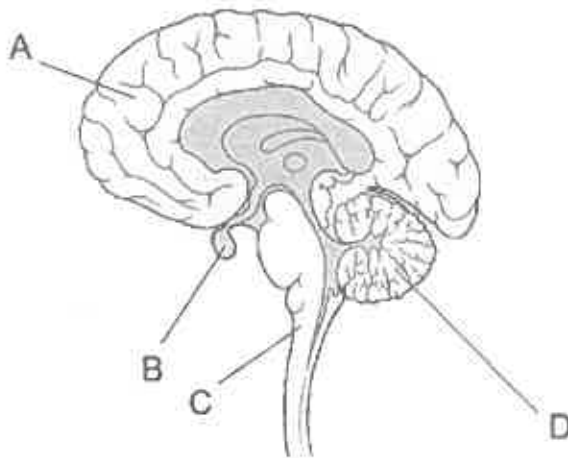
1 (2010:11)	(b)	2 (2010:18)	(d)	3 (2012:01)	(b)	4 (2012:02)	(a)
5 (2012:03)	(c)	6 (2012:14)	(a)	7 (2012:30)	(a)	8 (2013:01)	(b)
9 (2013:14)	(c)	10(2013:15)	(a)	11 (2013:18)	(a)	12(2013:19)	(c)
13 (2013:29)	(d)	14(2013:30)	(d)	15 (2014:02)	no solution available	16(2014:03)	no solution available
17 (2014:04)	(c)	18(2014:12)	(b)	19 (2014:18)	(b)	20(2015:14)	(c)
21 (2015:15)	(a)	22(2015:16)	(c)	23 (2015:25)	(c)	24(2015:26)	(a)

SHORT ANSWER QUESTIONS

25 2010:24

(9 marks)

- (a) *Must name all three in order for 1 mark*
 Sensory/afferent (neuron) - interneuron/connector (neuron)/association (neuron) - motor/efferent (neuron) (1)
- (b) It would slow down the response time/takes too long for impulse to be transmitted to the brain (1)
 and as the rapid response is protective/damage could be caused (1)
(max. of 2 marks)
- (c) During the refractory/repolarisation period (1)
 The neuron is unable to be stimulated to begin another action potential during and for a few milliseconds/short time after another action potential (1)
OR
 Synapse only permits travel in one direction (1)
 Neurotransmitter only released from terminal end plate (1)
(max. of 2 marks)
- (d) Neurotransmitters/chemicals are released from vesicles/from end of axons (1)
 and diffuse/move across the synapse to receptors on the next neuron (1)
Annotated diagram OK
(max. of 2 marks)
- (e) (i) Sensory/afferent neuron (1)
 (ii) Dendrites and axons are continuous/the cell body lies to the side/lateral only has one long extension, the axon (1)



- (c) A/cerebrum/cerebral cortex/frontal lobe (1)
- (d) D/cerebellum (1)
- (e) **Any 3 points for 1 mark each** (1)
- A/Cerebrum (1)
- Saccule & Utricle (1)
- Semicircular canals (1)
- Inner ear - *if haven't mentioned semicircular canal or saccule & utricle* (1)
- Stretch receptors/proprioceptors/joint receptors in muscles/joints (1)
- Eyes/retina/optic nerve (1)
- Pressure receptors of feet (1)

(max. of 3 marks)

27 2011:21

(8 marks)

(a)

(4)

Function	Nervous	Endocrine	1 mark per box
Speed (reaction time)	Fast/milliseconds for an impulse	Slower/depends on distance to target organ/depends on rate of blood circulation/minutes to hours or weeks	
Transmission	Electrochemical/along nerve fibres/neuron	Chemical transmission/through the bloodstream/hormone	

- (b) A/top diagram (1)
- (c) (A group of) nerve cell bodies (1)
- (d) One mark for characteristics, one mark for description (2)
 - A is a myelinated nerve fibre - B is myelinated before the ganglion but not after
 - A has the neurotransmitter acetylcholine - B has the neurotransmitter acetylcholine or noradrenaline
 - A has one set of nerve fibres - B has two sets/parasympathetic and sympathetic fibres
 One mark for each pathway, if only one mentioned can only get one mark, second point must match the first for two

28 2011:28

(8 marks)

(a)

(2)

- Any example (1 mark for name and 1 mark for function)
 - Primary motor area/primary motor cortex/cerebrum - communication between nervous and muscular system/send signals to the lower brain centres/spinal cord/motor neurons to initiate muscle movement
 - Speech association area - speech formation
 - Memory association area - memory/intelligence

- (b) Any example (1 mark for function and 1 mark for describing it). (2)
- Motor/muscle function – left side/voluntary control/left side motor functions/left leg paralysis/left arm paralysis/paralysis of voluntary muscles
 - Speech – altered/loss of words/inability to form words
 - Memory – impairment/loss of

- (c) 1 mark per box (4)

	White matter	Grey matter
Structure	Axons/(nerve fibres) covered with myelin	Axons/(nerve fibres) without myelin/nerve cell bodies
Location in the brain	Internal/deep inside	Exterior (mostly)/basal ganglia

29 2012:38 (12 marks)

- (a) Y (1)
- Any (1) of the following: (1)

- Protects the axon/fibre
- Acts as an insulator
- Speeds up transmission of nerve impulses

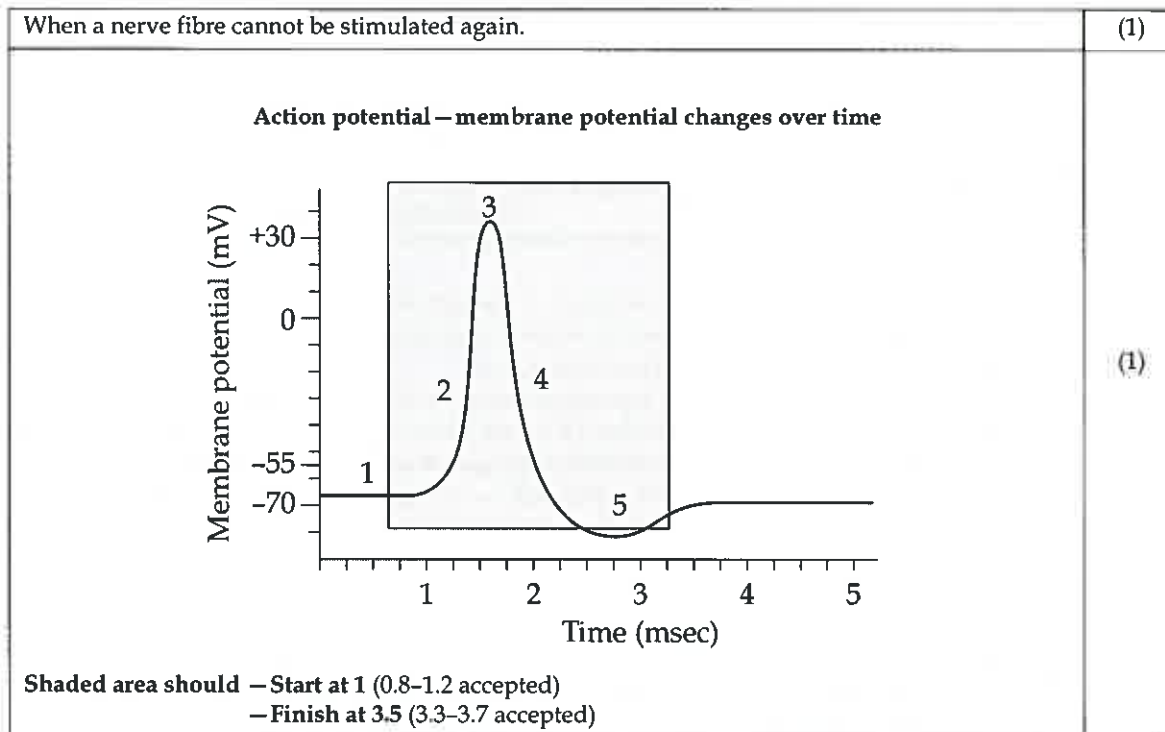
- (b) Any 2 of the following: (max. 2)

- Unmyelinated is continuous/flows along membrane/steady depolarisation along the fibre from one point to another
- Myelinated action potential jumps from one node to another/saltatory conduction
- Myelinated is faster than unmyelinated

(c)

Event	Point indicated on graph	
Sodium channels close and membrane is repolarising	4 only	(1)
Membrane is at resting state	1 only	(1)
Sodium channels open and membrane is depolarising	2 only	(1)

(d)



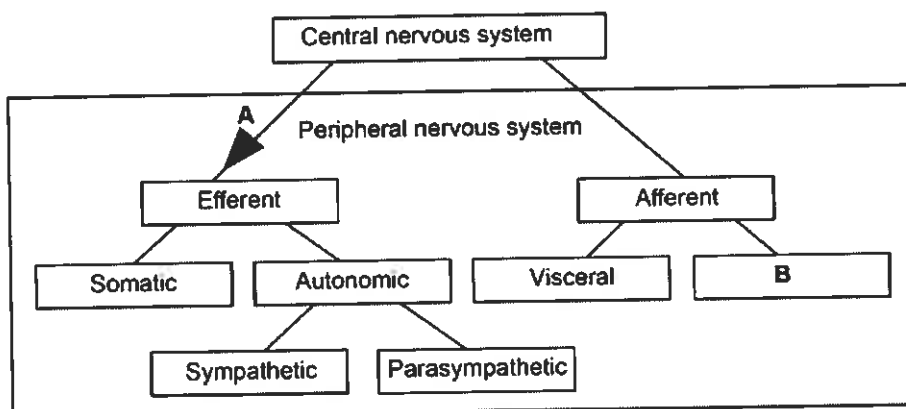
- (e) Any 3 of the following:
- Action potential remains the same/nerve impulse is not more intense or weaker
- The brick being dropped on the foot results in:
- More action potentials are created in a time frame/increase frequency of action potentials
 - More neurons stimulated/more pain receptors stimulated
 - Cerebrum processes the increased number of action potentials
 - Become conscious of a greater degree of pain/more pain detected

(max. 3)

30 2013:39

(13 marks)

- (a) (i) Motor/efferent/myelinated/effector (1)
 (ii) White matter/ascending tracts/descending tracts (1)
- (b) (i) Arrow must travel from the skin to the Muscle fibre. (1)
 (ii) Any three of: (1 mark each – max. 3) (3)
 • Rapid/involves only a small number of neurons
 • Automatic/Involuntary/without conscious thought
 • Requires a stimulus/not spontaneous
 • Stereotyped/happens the same way every time
- (iii) Protective/prevents (further) damage/allows removal of danger before being aware. (1)
- (c) Skin (1)
 Receptors for pain are at the ends of/in the sensory neuron (1)
- (d) (i) Arrow head going away from CNS (1)



- (ii) 1 mark both points (1)
 • From: Skin/muscles/exteroceptors/proprioceptors/bones/joints
 • To: the CNS/brain
- (iii) Each point - 1 mark each (max. 2) (2)
 • Sympathetic
 • Excessive sweating

31 2014:36

(10 marks)

- (a) A - hypothalamus (3)
 B - Cerebrum/cerebral cortex/parietal lobe/sulci
 C - cerebellum
- (b) (i) Cerebellum/C (1)
 (ii) Any two of: (2)
 • Lack of balance
 • Lack of muscle tone/reaction speed increases/floppiness
 • Reduced speed of movements
 • Inability to estimate how much time has passed
 • Inability to compare actual and intended movement
 CANNOT say anything about fine motor control/shaking/shaky movement/
 tremor as this is already implied in the question
- (iii) • Conscious/motor control of movement is in the cerebrum (so not affected) (1)
 • Cerebrum doesn't need to receive sensory information from outside the brain/
 the cerebellum needs to receive sensory information from outside the
 brain/cerebrum can bypass cerebellum (1) (2)

- (c) One mark for name and ONE mark for explanation: (2)
 Cranium/skull
 Hardness of cranium/bone protects/shape of skull is rounded to reflect blows/encases brain
 OR
 Meninges
 Outer layer/dura mater is tough/inflexible preventing brain movement/inner layer/
 pia mater seals against infection
 OR
 Cerebrospinal fluid/CSF
 Cushions brains/acts as shock absorber

32 2014:39 (6 marks)

- (a) Node of Ranvier (1)
 (b) Any ONE of the following: (1)
 • Insulate axon/fibre
 • Protect axon/fibre from damage
 • Faster nervous transmission
 • Saltatory conduction/propagation of impulse
 • Produce myelin
 (c) • (Depolarisation) occurs at Nodes of Ranvier along fibre/occurs at X/ (4)
 jumps from node to node (1)
 • (Sodium channels open for) sodium ions to diffuse in across membrane/into/
 inside axon cytoplasm
 • (following depolarisation sodium channels close and potassium channels open for) potassium
 ions to diffuse out across membrane/outside membrane
 • Inside membrane becomes negative in relation to outside
 • A sodium-potassium pump transports sodium ions out of the cell and potassium ions in to
 return to a polarised/resting state

33 2015:32 (15 marks)

- (a) One of the following: (1)
 • Mostly occurs in elderly/old age (1)
 • Caused by deficiency of neurotransmitters (dopamine in Parkinsons and ACh in Alzheimers) (1)
 • Some memory loss (only in elderly)
 (b) (i) 3 (1) (1)
 (ii) Any two of the following points (2)
 • Nerve/contains neuron fibres
 • Both sensory and motor fibres/mixed nerve/afferent and efferent fibres
 • Nerve surrounded by connective tissue/epineurium
 (iii) One mark for each part of the pathway (in order): (4)
 • Sensory/afferent neuron carries impulse (stimulus from receptor) to spinal cord
 • Passes impulse to connector/association neuron
 • Motor/efferent neuron carries impulse out of spinal cord
 • Impulse received by effector (for response)
 (c) One mark for each part of the process (in order): (3)
 • Calcium released in pre-synaptic knob/axonal ending/exocytosis of neurotransmitter/s
 from vesicles
 • Diffusion of neurotransmitter across synapse/synaptic gap
 • Neurotransmitter binds to specific receptors on post-synaptic membrane/
 on dendrite of next neuron
 (d) Must provide TWO related differences (1 mark for each statement for **autonomic** = 2 marks (4)
 AND 1 mark for each statement for **somatic** = 2 marks)