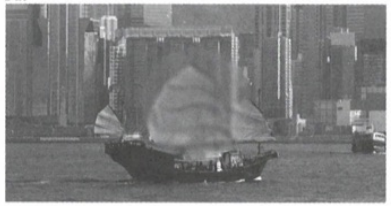
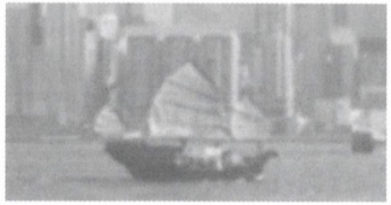
24. During aging, some people may suffer from an eye defect which is caused by the degeneration of light-sensitive cells in the yellow spot. Which of the following diagrams is the most likely vision perceived by a person suffering from this eye defect?

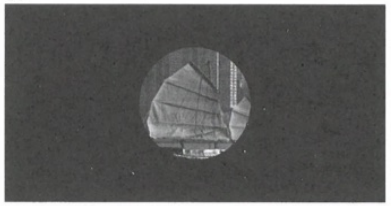
A.



B.

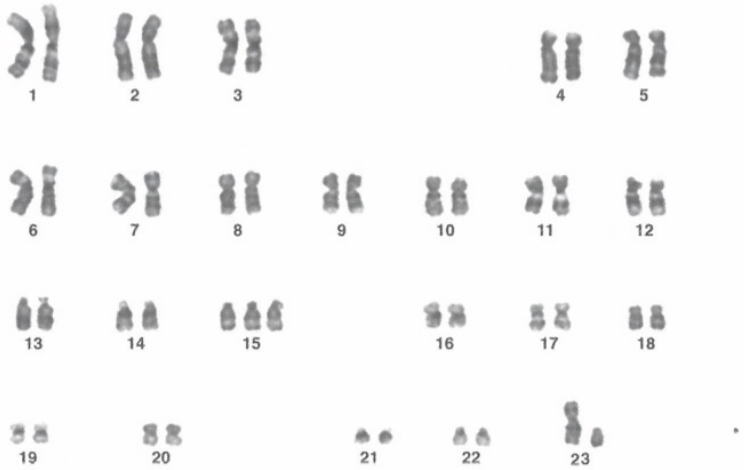


C.



D.

4. The photomicrograph below shows the karyotype of a patient who is suffering from a certain brain disease:



(a) What is the gender of this patient? Describe ***one*** observable feature from the karyotype to support your answer. (2 marks)

(b) (i) Describe the abnormality shown in the karyotype. (1 mark)

(ii) State the type of mutation involved in this abnormality. (1 mark)

(iii) How would this abnormality affect the mRNA level in the brain cells of this patient? (1 mark)

(c) The cerebellum is one of the regions affected by this disease. In relation to the function of the cerebellum, suggest ***one*** difficulty that would be experienced by this patient. (1 mark)

DSE M.C. Questions - Coordination in humans
(sort by difficulty)

Challenging

/

Average

2012 Q.4 (63%)

Which of the following gives the correct direction of impulse transmission in a neurone?

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

2012 Q.5 (61%)

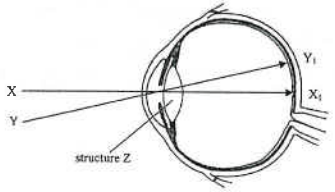
Chemicals released at the synapse are responsible for the impulse transmission from

(1) sensory neurone to interneurone
(2) interneurone to motor neurone
(3) motor neurone to muscle

A. (1) and (2) only B. (1) and (3) only C. (2) and (3) only D. (1), (2) and (3) only

Direction:

Question 27 and 28 refer to the diagram below, which shows a section of the human eye and the positions X_1 and Y_1 where the images of two coloured objects X and Y are formed respectively on the retina:



2013 Q.27 (64%)

Which of the following correctly describes a person's visual perception in day time?

A. X appears brighter because cone cells are found at position X_1.
B. X appears sharper because cone cells are found at position X_1.
C. Y appears black and white because rod cells are found at position Y_1.
D. Y appears blurred because rod cells are found at position Y_1.

Average

2013 Q.28 (55%)

When a person ages, structure Z becomes less elastic. When this happens, a person will probably have difficulty focusing on

A. a nearby object because structure Z cannot be thicken fully.
B. a nearby object because structure Z cannot be pulled thin fully.
C. a distant object because structure Z cannot be thicken fully.
D. a distant object because structure Z cannot be pulled thin fully.

2013 Q.29 (62%)

Which of the following combinations correctly matches the structure of the human ear and its function?

	Structure	*Function*
A.	ear flap	protecting the ear
B.	ear drum	amplifying sound waves
C.	ear bones	transmitting vibrations
D.	round window	setting the endolymph in motion

2015 Q.27 (72%)

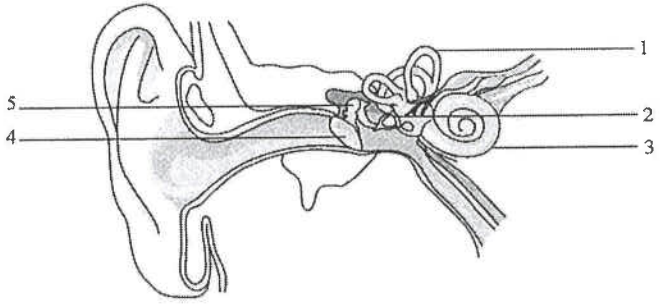
Which of the following combinations correctly shows the conditions of different parts of the eyes when a person is looking at an object moving towards him?

	Lens	*Suspensory ligament*
A.	becoming thinner	slackening
B.	becoming thinner	tightening
C.	becoming thicker	slackening
D.	becoming thicker	tightening

Average

2017 Q.26 (73%)

Directions: Questions 25 and 26 refer to the diagram below, which shows the structures of a human ear:



Which of the following structures will vibrate when there are sound waves?

A. 1 and 3 only B. 2 and 3 only C. 2, 3 and 4 only D. 2, 4 and 5 only

2017 Q.27 (71%)

Which of the following combinations correctly matches the problem of short sightedness and its correction?

	Problem	*Correction*
A.	image focused behind the retina	wear concave lens
B.	image focused behind the retina	wear convex lens
C.	image focused in front of the retina	wear concave lens
D.	image focused in front of the retina	wear convex lens

2017 Q.28 (66%)

Which of the following correctly explains why our eyes feel tired if we have been reading a book for a long time?

A. The ciliary body has contracted for a long time.
B. The photosensitive cells have been over-stimulated.
C. The lens has maintained a curved state for a long time.
D. The suspensory ligament has been under tension for a long time.

Average

2017 Q.29 (53%)

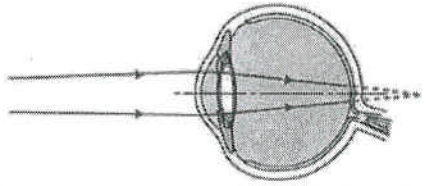
The diagram below shows a motor neurone:

Which of the following statements correctly describes the motor neurone?

A. X is connected to a muscle fibre.
B. Electrical impulses are transmitted from Y to X.
C. Synapses can be found at the end of both X and Y.
D. Electrical impulses are sent out at Y to the next neurone.

2018 Q.7 (74%)

Below is a ray diagram of a common eye defect:



Which of the following combinations correctly identifies the eye defect and type of lens to be worn to remedy it?

	Eye defect	*Type of lens*
A.	Long-sightedness	convex lens
B.	Long-sightedness	concave lens
C.	Short-sightedness	convex lens
D.	Short-sightedness	concave lens

Average

2019 Q.16 (56%)

Peter wanted to throw a crumpled paper into the rubbish bin in the dim room. He found that he could see a bin more clearly if he tried to focus on objects right next to the bin. Which of the following statements about the image formation of the bin is correct?

A. Image of the bin is formed on the yellow spot where there are cone cells only.
B. Image of the bin is formed on the yellow spot where there are more cone cells than rod cells.
C. Image of the bin is formed on the periphery of the retina where there are rod cells only.
D. Image of the bin is formed on the periphery of the retina where there are more rod cells than cone cells.

2019 Q.17 (59%)

Wearing contact lenses for too long will have an adverse effect on the eyes because this decreases the amount of oxygen reaching the eyes. Which of the following eye structure is most affected in this case?

A. iris B. lens C. cornea D. sclera

2019 Q.21 (54%)

Daisy is very hungry. When the waiter puts her favourite dish on the table, her saliva secretion increases. Which of the following body parts controls this response?

A. cerebrum
B. cerebellum
C. salivary gland
D. medulla oblongata

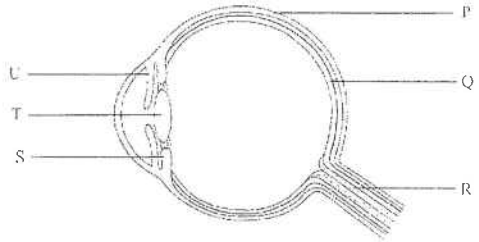
Easy

2012 Q.6 (79%)

Which of the following activities is coordinated by the cerebellum?

A. muscular movements during dancing
B. breathing movements during sleeping
C. secretion of digestive juices when one is hungry
D. withdrawal of hand when one touches a hot object

Directions: Question 8 and 9 refer to the diagram below, which shows a section of the human eye:



2012 Q.8 (81%)

Which part of the eye is tough and white in colour?

A. P B. Q C. R D. S

2012 Q.9 (87%)

Which of the following parts are made of muscle?

A. P and S B. Q and R C. R and T D. S and U

2015 Q.22 (86%)

Toys are often used to develop children's fine motor skills. Which of the following parts is trained when children play with toys?

A. cerebellum
B. spinal cord
C. pituitary
D. medulla oblongata

Easy

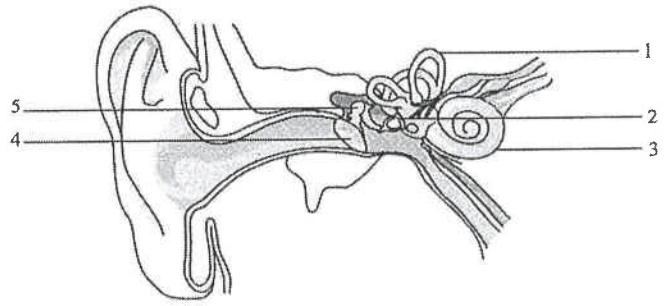
2015 Q.23 (84%)

Which of the following correctly compares reflex actions and voluntary actions?

	Reflex actions	*Voluntary actions*
A.	responses may vary	responses are always the same
B.	stimulus is optional	stimulus is required
C.	initiated by receptors	initiated in the brain
D.	effectors must be muscles	effectors can be muscles or glands

2017 Q.25 (79%)

Directions: Questions 25 and 26 refer to the diagram below, which shows the structures of a human ear:



Which of the following structures is ***not*** involved in hearing?

A. 1 B. 2 C. 3 D. 4

Easy

2017 Q.30 (87%)

Which of the following ***does not*** belong to the central nervous system?

A. medulla oblongata
B. spinal cord
C. cerebellum
D. eye

2018 Q.22 (76%)

Which of the following combinations correctly identifies the distribution of grey matter and white matter in the cerebrum and spinal cord?

	Inner part of the cerebrum	*Inner part of the spinal cord*
A.	White matter	grey matter
B.	White matter	white matter
C.	Grey matter	grey matter
D.	Grey matter	white matter

Answers

Challenging

Average

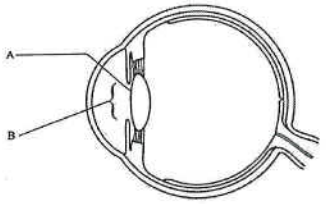
2012	2013	2015	2017	2018	2019
4 [B]	27 [B]	27 [C]	26 [D]	7 [A]	16 [D]
5 [D]	28 [A]		27 [C]		17 [C]
	29 [C]		28 [A]		21 [D]
			29 [C]		

Easy

2012	2015	2017	2018
6 [A]	22 [A]	25 [A]	22 [A]
8 [A]	23 [C]	30 [D]	
9 [D]			

CE - 2003

3. (a) The diagram below shows a section the human eye:



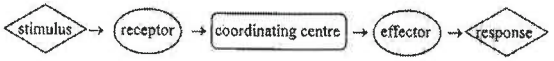
(i) Structure A has no blood capillaries.
(1) Why is this feature important to the formation of a clear image? (1)
(2) From where does structure A obtain nutrients? (1)

(ii) When a person steps out from a dark room into broad daylight, B becomes constricted.
(1) Explain the importance of this response. (2)
(2) State the type of response illustrated by the constriction of B. (1)
(3) The person also puts on his sunglasses. With regard to the nature of the response, state two ways in which this action is different from the constriction of B. (2)

(iii) In recent years, dark-coloured sunglasses are in fashion, but some of these sunglasses cannot cut off ultra-violet light. Suggest why wearing such sunglasses under bright sunlight would be more damaging to the eye than not wearing any sunglasses. (3)

CE - 2004

2. (c) Irritability is the ability of an organism to respond to an external stimulus. Most cases of irritability work in the following pattern :



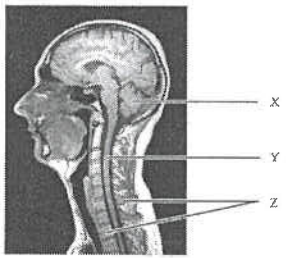
Below are three examples of irritability in humans:

(I) Secretion of saliva when food is ingested
(II) Constriction of pupil under bright light
(III) Running out of the classroom upon hearing of fire alarm

(i) For case I, state the receptor and the effector involved. (2)
(ii) Based on the above pattern, use a flowchart to show the nervous pathway for case II, including the types of neurons involved. (3)
(iii) (1) Name the region of the brain where the coordinating centre for case III islocated. (1)
(2) State two features of the responses controlled by this region. (2)

CE - 2006

3. The figure below shows a magnetic resonance image of the lateral side of the upper body of a person.



(a) Name structure X and state its function. (2)

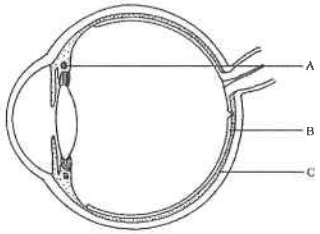
(b) What is the importance of structure Z to structure Y? (1)

(c) The diagram below shows the transverse section of structure Y and an outline of the arm:

On the above diagram, draw the reflex arc for the withdrawal reflex of the arm and label the different components of the reflex arc. (4)

CE - 2007

7. (a) The diagram below shows a section of a human eye:



(i) (1) Name structureA. (1)

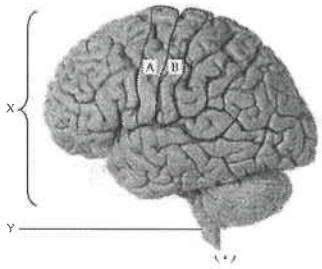
(2) Structure A becomes weak in an old man. Explain how this will affect his eye sight when he looks at a nearby object. (4)

(ii) Suggest one possible change of the lens which will also weaken the eyesight. (1)

(iii) With reference to the function of layer C, explain why the falling off of layer B from layer C may cause blindness. (4)

CE - 2008

2. The photograph below shows the lateral view of a human brain.



(a) The surface of structure X is highly folded. What is the significance of this feature? (1)

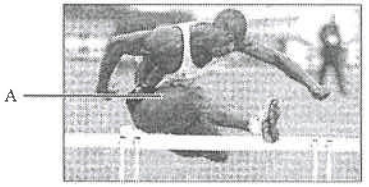
(b) Name structure Y and state ***one*** of its functions. (2)

(c) A patient who suffered from a stoke was diagnosed to have part of area A damaged. After the stroke, it was found that he had difficulty in moving his arm. What is area A? (1)

(d) Area B is located behind area A. What is area B?

CE - 2009

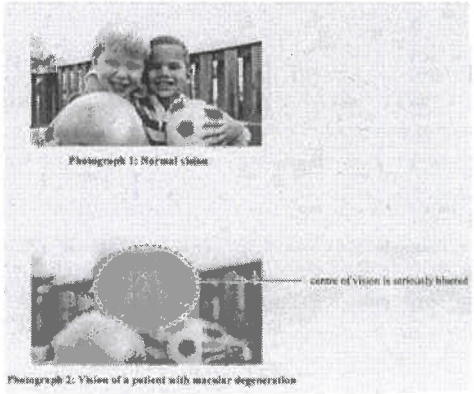
7. The photograph below shows an athlete leaping a hurdle.



(b) Describe the roles of different parts of the brain in bringing about the action of leaping the hurdle. (4)

CE - 2010

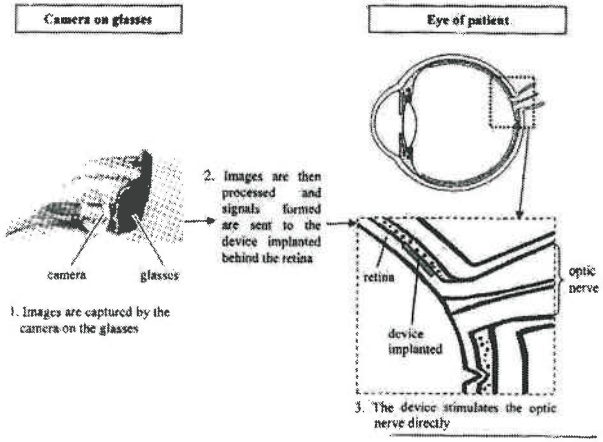
5. (a) Macular degeneration(視網膜黃斑變性) is a disease resulting in the loss of light-sensitive cells in the yellow spot of patients, The following photographs show normal vision and the vision of a patient with macular degeneration.



(i) State the type of light-sensitive cell that is lost in this disease. (1)

(ii) Explain why the vision of the patient with macular degeneration is seriously blurred in the centre. (2)

(b) The vision of patients with macular degeneration may be helped by bionic eyes. A bionic eye consists of a camera mounted on a pair of glasses worn by the patient. Signal from the camera are sent to a device implanted behind the retina of the eye of the patient. The diagram below show how the bionic eye works.



(i) Why can the bionic eyes also help the patients to see even when the lenses in their eyes become cloudy? (1)

(ii) Can the bionic eyes used to help other patients without any light-sensitive cells in their retina? Give one reason for your answer. (2)

(iii) In another type of bionic eye, a device is implanted in the brain. After receiving signals, the device will directly stimulate the brain to generate vision.

(1) Name the part of the brain where the device should be implanted. (1)

(2) Give one advantage of this type of bionic eye over the type illustrated in the diagrams in part (b). (1)

AL - 2002 2B

5. (a) What are the roles played by the different parts of the nervous system in the reception of various stimuli, signal integration and response initiation in the following incident?

'While riding a bicycle on the street, a boy saw a red traffic light in front and stopped his bicycle.' (9)

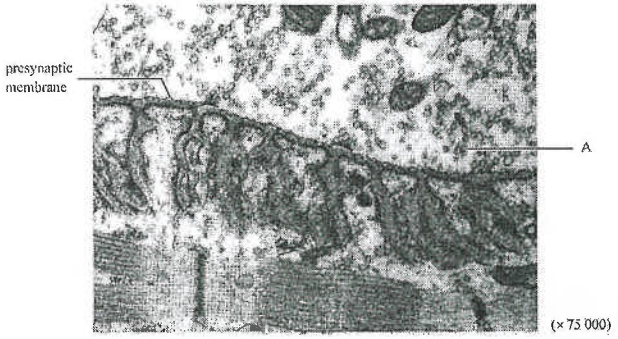
(b) Based on the differences between hormonal and nervous co-ordination, explain how their modes of action enable mammals to cope with different situations in life. (N.B. Reference to specific hormones is NOT necessary.) (7)

AL - 2004 2B

4. (a) When a boy entered a cinema from broad daylight, he could not see in the dark surroundings immediately. However, his vision resumed after a short while. After being seated, he could **clearly see** the actresses on the screen wearing colourful dresses but he could not see the people around him clearly. Explain the visual experiences of the boy in the cinema based on your knowledge and understanding of the rods and cones in the eye. Present your answer in paragraphs. (8)

AL - 2007 1A

6. The following electron micrograph shows a neuromuscular junction:



(a) Name the chemical substance inside A. (1)

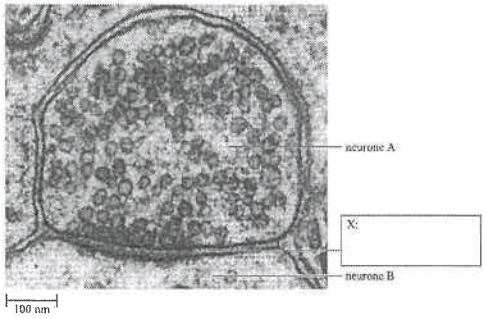
(b) A certain type of food pisoning - botulism - is caused by the ingestion of a bacterial toxin. This toxin acts by blocking the presynaptic membrane, resulting in muscle paralysis. Based on this information and features in the micrograph above, explain how this toxin brings about the paralytic effect. (3)

AL - 2008 2B

5. (a) Reflex and tropism are important responses of humans and flowering plants respectively. Contrast these two types of responses. Using suitable examples, discuss the significance of these responses to the organisms concerned. (11)

AL - 2009 1A

1. The following electron micrograph shows the junction between two neurones A and B



(a) Give a label for X in the box provided above. (1)

(b) With reference to ***one*** observable feature shown in the electron micrograph, deduce the direction of signal transmission between the two neurones. (3)

AL - 2010 1A

2. A visually normal person stared at a blue cross printed on a piece of white paper for 60 seconds. After that, he looked at a plain white screen and an image of a yellow cross was perceived. This can be explained by the mechanism of colour vision. Complete the following paragraphs with suitable word(s). (5)

Visual perception of the colour blue is due to the stimulation of the cone cells responsible for _(a)_____. After staring at the blue cross for some time, these cone cells became temporarily _(b)_____. On the retina where the image of the blue cross was previously formed, only the _(c)_____cone cells were stimulated when the person looked at the plain white screen. These cone cells sent signals via the _(d)_____to the visual centre at the _(e)_____of the brain. Thus, an image of a yellow cross was perceived.

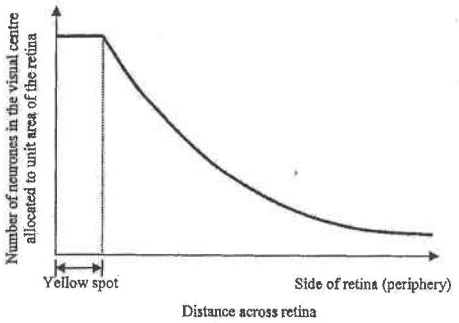
HKDSE - 2013 1B

1. For each of the brain parts listed in column 1, select from column 2 one phrase that matches it. Put the appropriate letter in the space provided.

Column 1		Column 2
Cerebellum	.....	A. Damage causes inability to make decisions
Medulla oblongata	.....	B. Damage causes loss of body balance
Cerebrum	.....	C. Damage causes loss of control of breathing rate
		D. Damage causes loss of withdrawal reflex

HKDSE - 2014 1B

10. The visual centre of the brain is responsible for processing nerve impulses from the retina. The number of neurons in the visual centre allocated to receiving impulses from a unit area of the retina is shown below (only half of the retina is shown):



(a) With reference to the types of photoreceptor cells and their distribution on the retina, explain why more neurons in the visual centre are allocated to unit area of the yellow spot.

(4 marks)

(b) After the perception of what we 'see', what it means to us depends on other parts of the brain. Explain how this works. (2 marks)

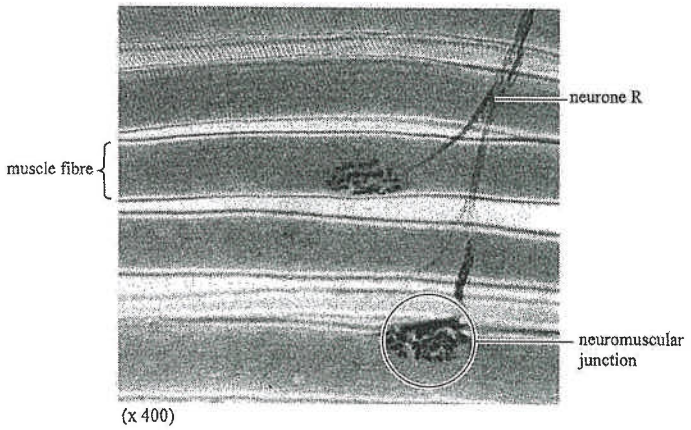
HKDSE – 2015 1B

1. For each of the ear parts listed in column 1, select from column 2 one phrase that matches it. Put the appropriate letter in the space provided. (3 marks)

Column 1		Column 2
Ear bones	_____	A. Transmitting vibrations
Eustachian tube	_____	B. Transmitting sound waves
Cochlea	_____	C. Converting sound waves to vibrations
		D. Converting vibrations to nerve impulses
		E. Equalizing the air pressure on either side of the ear drum

5. On the opposite page, Photograph P shows several muscle fibres associated with the terminal parts of neurone R and Photograph Q shows the detailed structure of a neuromuscular junction.

Photograph P



(x 400)

Photograph Q

(x 4500) part of muscle fibre

(a) Which type of neurones does R belong to? Give a reason for your answer. (2 marks)
(b) What is the functional relationship between S and T shown in Photograph Q?(2 marks)
(c) Describe how nerve impulses can be transmitted across the neuromuscular junction leading to muscle contraction. (3 marks)

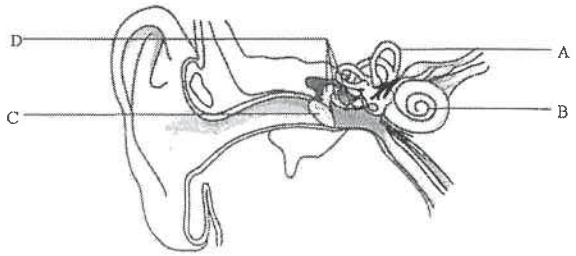
HKDSE – 2016 1B

1. The table below shows the condition which may result from damage to a certain part of the brain. Complete the table by filling in either the condition or the structural part of the brain affected. (3 marks)

Condition	*Structural part of the brain*
Difficulty in breathing	
	Cerebellum
Difficulty in speech and vision	

HKDSE - 2018 1B

1.The diagram below shows the human ear and its associated structures:



(a) The table below lists two types of hearing loss. Using the label(s) in the above diagram, indicate which structure(s) is/are most likely to be defective in each case. (2 marks)

	Type of hearing loss	Structure
X	Damage to sensory hair cells	
Y	Failure of sound conduction	

Ludwig van Beethoven, a famous 18th century composer, suffered from type Y hearing loss in his 20s and became deaf in his 40s. some records say that he could hear music through his jawbone and skull by biting on a metal rod attached to his piano. Based on the structures and functions of human ears, complete the following flow chart to show the major steps involved in his method of hearing music.

(i)_____ of the metal rod

↓

transmission through bones to reach (ii)_____

↓

detection of (iii)_____ movement by sensory hair cells

↓

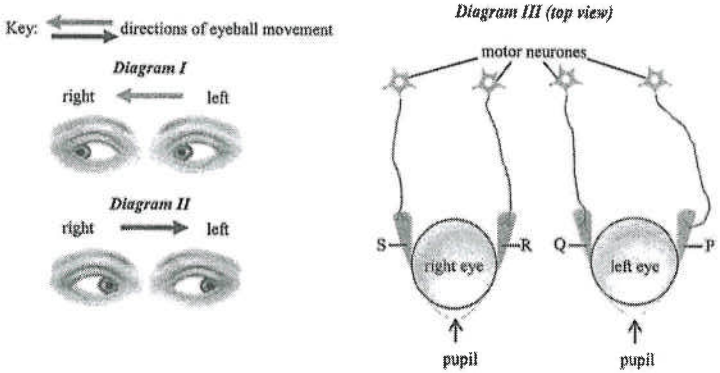
generation and transmission of nerve impulses through (iv)_____

↓

interpretation at the sensory area of the cerebrum

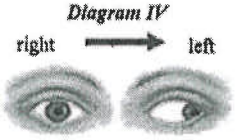
HKDSE - 2019 1B

4. Diagrams I and II below show a person with both eyes moving right and then left. This eyeball movement is brought about by the coordination of different eye muscle pairs. Diagram III shows four of the muscles (P, Q, R, and S), all connected to motor neurons controlling eyeball movement.



(a) To bring about the eyeball movement shown in Diagram I, which muscle(s) (P, Q, R, or S) contract(s)? (1 mark)

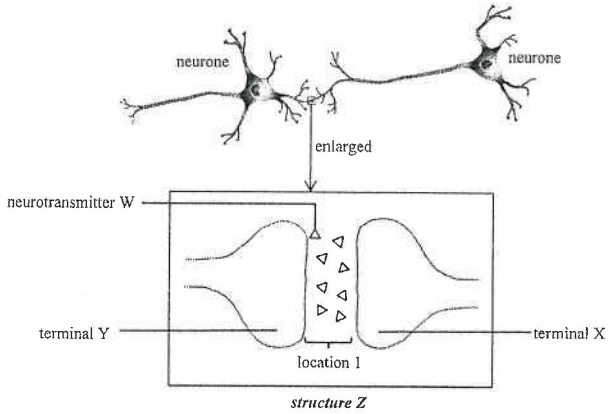
(b) A person suffers from impaired eyeball movement when turning his eyes from right to left, as shown in Diagram IV.



It is found that one of his eye muscles cannot fully contract. Based on your knowledge of neurotransmission at the neuromuscular junction, suggest two possible defects that would lead to the impaired eyeball movement shown in Diagram IV. (2 marks)

HKDSE - 2021 1B

2. The diagram below shows two adjacent neurones. When a nerve impulse arrives at structure Z, the amount of neurotransmitter W at location 1 increases.



(a) Name structure Z. (1 mark)

(b) (i) Neurotransmitter W at location 1 is released from one of the terminals of structure Z. Which terminal (X or Y) releases neurotransmitter W? (1 mark)

(ii) Describe how the neurotransmitter W at location 1 can bring about the transmission of nerve impulses at structure Z. (2 marks)

(c) What is the significance of the process in (b) to the transmission of nerve impulses? (1 mark)

Past papers Marking Scheme – Coordination in humans

CE - 2003 Q.3 (a)

(i) (1) To allow the transmission of light to the retina without obstruction 1
(2) aqueous humour / choroids 1

(ii) (1) It helps to reduce the amount of light entering the eyes 1
so as to prevent over-stimulation / damage of the light-sensitive cells 1
(2) reflex action 1
(3)

Constriction of B	Putting on sunglasses
Does not involve the cerebrum	Involves the cerebrum
Inborn	Learned action
Faster in action	Slower in action
Stereotyped response i.e. same stimulus always evokes the same response	Variable responses to the same stimulus

any 2 1,1

(iii) Dark-coloured sunglasses reduce the light intensity entering the eye 1
so the pupil will not constrict / constrict to a smaller extent in bright sunlight 1
As a result, more UV light can enter the eye and cause damage 1

CE- 2004 Q.2 (c)

(i) Receptor: taste buds / smell receptor Effector: salivary glands 1,1

(ii) (light) → light sensitive cells —sensory neurone→ relay neurone in brain —motor neurone→ muscle of iris → (contraction of iris muscle / pupil constriction)
6 x ½

(iii) (1) *cerebrum 1
(2) The responses can be .controlled voluntarily
They are not stereotyped
They need to be learned any two 1,1

CE - 2006 Q.3

(a) *cerebellum 1
It is for coordinating the activities of muscles in maintaining body balance 1
(b) Z protects Y from mechanical damage 1
(c) Drawing of different neurones: correct position of cell bodies, presence of 2 synapses only, ½, ½
Label: receptor/nerve ending, sensory neurone, interneurone, motor neuron, effector/biceps/muscle (any four) 4 x ½
Correct pathway : Indicate the direction of nerve impulse transmission
Or direction can be identified from the label(s) of the component 1

CE - 2007 Q.7 (a)

(i) (1) ciliary muscles 1
(2) When the man is looking at near object, the weakened ciliary muscle contract with less force 1
and the tension of the suspensory ligament remains high 1
Hence, the lens is not thick enough 1
and fails to converge light to form a clear image on the retina 1
(ii) The lens becomes less elastic / cloudy 1
(iii) Layer B contains light sensitive cells 1
cannot obtain nutrients / oxygen from layer C 1 +
As a result, light sensitive cells die 1
Light falling on layer B cannot be detected / no nerve impulse can be produced 1
Therefore the vision is impaired

CE - 2008 Q.2

(a) To harbour more neurones / nerve cells
(✓ cell bodies / interneurone; × cells / brain cells) 1

(b) Y: * medulla oblongata / medulla 1
It acts as the reflex centre for some reflex actions
It controls involuntary actions } any one 1

Correct function with wrong example → 0
Correct function with example of reflex and involuntary action mixed up → 1
Give correct example instead of function → 1

(c) Motor area 1
(d) Sensory area 1

CE- 2009 Q.7 (b)

(b) Cerebellum coordinates muscular contraction of the whole body 1
to maintain body balance 1
Cerebrum sends nerves impulses to various muscles 1
for contraction to leap the hurdle / to initiate the voluntary action of leaping the hurdle 1

CE - 2010 Q.5

5. (a) (i) Cone (1)
(ii) Vision in the centre mainly relies on the detection of light falling on the yellow spot (1)
As the yellow spot contains cone cells only, light falling on this spot can hardly be detected by the patient with this disease (1)
The vision becomes blurred in the centre

(b) (i) The use of the bionic eyes replaces the normal light path through the lenses for image formation (1)
(ii) Yes (2 or 0)
Signals from the camera are sent to the device which stimulate the optic nerve directly/ light-sensitive cells are not required for the stimulation of optic nerve
(iii) (1) *Cerebrum/ *cerebral cortex/ *sensory area/ * visual area (1)
(2) This type of bionic eye can give visual sensation to a person with damage in optic nerve/ rupture of eyeball/ no eyeball (1)

AL - 2002 2B

5. (a) Stimuli reception
- cones on retina of eye stimulated by red light (1), $^{+}$produce sensory impulses (1) 2
- utriculus / sacculus perceive position of head (1), $^{+}$generate sensory impulse (1) 1
- semi-circular canals perceive rotational movement of the head (1) at deceleration / stopping 1

Signal integration
- association centre in the cerebral cortex (1) processes impulses from the visual cortex (1) and medulla (1) / cerebellum, and relay them to the motor centre in the cerebral cortex (1) 4

Response initiation
- motor centre in cerebral cortex sends impulses (1) 3
- to the muscles of the hands / legs to stop bicycling (1)
- sends impulses to other skeletal muscles to maintain balance (1)

(N.B. $^{+}$mark to be given once only, candidates must show that they have attempted in all 3 areas to earn full mark of 9) (max. 9)

(b)

Hormonal co-ordination	Nervous co-ordination	
Different situations in life		
• cope with stimuli which involves gradual change (1), deal with prolonged response (1) (Bonus (1): for sustaining long term survival / adaptations)	• cope with sudden stimuli (1) / emergency situations, and the need for short-duration response (1)	4 + bonus = 1
Mode of action of the hormonal and nervous systems		
• hormones are circulated in blood (1)	• electrical nature of nervous impulse conduction (1) allows quick co-ordination (1)	3 } max. 5
• diffuse / systematic response (1), synchronizes different parts of the body to contribute to overall response (1)	• localized response (1), enables specific parts of the body to cope with the situation (1)	4

(max. 7)

AL - 2004 2B

4. (a) Reasons for unable to see for a while upon entry into the cinema then vision resumed:
- $^{+}$rods responsible for dim light vision as the surrounding is dim (1)
- bright light bleaches / splits the pigment (1) in the rods (1)
- no response can be generated from the rods to produce vision (1) max. 4
- during pigment regeneration time, the boy cannot see in the dimly lit surrounding (1) / pigment takes time to regenerate
- vision resumes when pigment in the rods is reformed / regenerated (1)

Reasons for clearly seeing the colourful dresses of the actresses on the screen:
- screen is brightly lit and cones are responsible for colour vision in bright light (1) max. 3
- concept of one cone one neurone (1), ∴ visual acuity (1)
- high density of cones at fovea increases resolving power to see clearly (1)

Reasons for not seeing the people around the body clearly: 3
- $^{+}$rods responsible for dim light vision as the surrounding is dim (1)
- concept of many rods share 1 neurone (1), ∴ low acuity (1) / vagueness

(N.B. $^{+}$ = concept to be awarded mark once only) (max. 8)

AL - 2007 1A

6. (a) acetylcholine (1) / neurotransmitter (1)

(b)
- the toxin blocks the release of the neurotransmitter into the cleft (1) (max. 3)
- there will be no neurotransmitter to stimulate the post-synaptic membrane (1) / no depolarization of sarcolemma
- the post-synaptic membrane / sarcolemma will not develop action potential (1)
- in the absence of nervous stimulation, myofilaments will not slide over one another (1), thus muscles will fail to contract

AL - 2008 2B

5. (a)

Reflexes	Tropism	
• response is elicited by external or internal stimuli	• response is elicited by external stimuli	1
• Stimuli involved may or may not be unilateral	• stimuli involved are unilateral	1
• messages involved are electrochemical in nature (1)	• messages involved are chemical in nature (1)	1, 1
• most are non-directional responses	• directional responses, either towards or away from the stimulus	1
• quick responses	• slower responses	1
• non-growth responses	• growth responses	1

max. 6

Significance:	Significance:
• protection against danger (1) / damage > pupil reflex protects retina /photoreceptors from damage by strong light (1) > withdrawal from heat / sharp points protect the skin from being burnt / cut (1) > blinking reflex / tear production protects the eyes from mechanical damage (1)	• to position its body parts so as to obtain adequate supply of light, nutrients, water for better growth and survival (2) **or** • phototropism helps to bring leaves towards light for more food production (1) / photosynthesis, for proper growth and development of shoot (1) • geotropism helps to bring root into the soil for nutrient and water absorption (1) and for anchorage (1)

Significance:	Significance:
• adjustment to changes in internal environment for optimum body function (1) > breathing rate increases in response to increased carbon dioxide level in arterial blood so as to speed up the removal of carbon dioxide (1) • as reactions to perform body functions (1) > proprioceptors for keeping muscle tone in maintaining posture (1) > salivation in anticipation of food to prepare for digestion in mouth (1) > dilation of pupil under dim conditions allows more light to reach the retina (1) > when distended by food peristalsis of intestine increases to help movement of food inside (1) **max.4**	• hydrotropism helps to bringroots to areas of the soil with higher water content (1) **max .4**

max. 7

AL - 2009 1A

1. (a) *synaptic cleft / gap (1) ×synapse (1)

(b) • signal transmits from neurone A to neurone B (1) (1)
• presence of a large number of vessicles in the synaptic knob of neurone A (1) (1)
• shows that A is the presynaptic neurone (1)
• which releases neurotransmitter to depolarize the membrane of B / next neurone (1) } any one (1)

4 marks

AL - 2010 1A

2. (a) · detecting blue light (1) [not colour vision]
(b) · bleached/ overstimulated/ fatique/ unavailable for further stimulation (1) (5)
(c) · red and green
(d) · optic nerve (1)
(e) · cerebral cortex/ cerebrum (1)/ visual cortex (not accept sensory area)

5 marks

HKDSE - 2013 1B

1. B (1)
C (1)
A (1)

HKDSE - 20141B

10. (a) • yellow spot contain a high density of cones cells (1)
• and there are three types of cones for colour perception (1),
• as a result, there are more sensory nerve impulses coming from the yellow spot (1) (4)
• from the yellow spot (1), hence more neurones are allocated to analysis of the nerves impulses

(b) • impulses received from the visual cortex will be interpreted at the association area (1)
• where relevant information about the image will be retrieved from the previously stored information (1) (2)

6 marks

HKDSE – 2015 1B

1. A, E, D 1,1,1

5. (a) motor neurone(1)
it is connected to an effector (1), i.e. muscle fibre in this case 2

(b) S provide energy (1)
for the synthesis / secretion / resynthesis of the neurotransmitter / chemical messenger stored in T (1) 2

(c) arrival of nerves impulses at the motor nerve ending triggers the release of neurotransmitters into the neuromuscular junction (1)
these neurotransmitters diffuse across the synapse (1) and
to initiate electrical impulse in muscle fibres / bind to the receptor sites on the membrane of the muscle fibre (1) to trigger muscle contraction 3

HKDSE – 2016 1B

1.

HKDSE – 2018 1B

1. (a) • B (1)
• C and D (1) (2)

(b) (i) vibrations (1)

(ii) oval window / cochlea (1)

(iii) lymph / fluid (1) (4)

(iv) auditory nerve (1)

6 marks

HKDSE – 2019 1B

4. (a) • Q and S (1) (not acceptable: Q or S) (1)

(b) Any two of the following: (not acceptable : axon, neurone, neurotransmitter cannot diffuse across synaptic cleft) (2)

- insufficient amount of / abnormal or damaged vesicles at the synaptic knob or in sufficient amount of mitochondria to provide energy for vesicles to synthesize neurotransmitters (1)
- insufficient amount of neurotransmitters is released at the neuromuscular junction (to stimulate R) (1) (no mark: P or Q or S)
- neurotransmitter is degraded too rapidly (1)
- insufficient amount of / abnormal or damaged receptors to bind with neurotransmitters (1)

3 marks