

(a) In the box below is a list of drugs which affect the nervous system, (i) to (v), and a jumbled list of drug actions, A to E. Select the correct drug activity for each drug by placing the appropriate letter in the relevant box.

Drug	Letter
Atropine (i)	
Curare (ii)	
Caffeine (iii)	
Crack/cocaine (iv)	
Nicotine (v)	

- A. Reduces threshold of stimulation of neurones allowing facilitation (easier excitation).
- B. Blocks action of acetylcholine at parasympathetic postganglionic nerve endings.
- C. Blocks acetylcholine action at neuromuscular junctions.
- D. Mimics action of acetylcholine on postsynaptic membranes.
- E. Interferes with normal functioning of brain transmitters serotonin and dopamine.

[5]

(b) The frequency of the heart beat is regulated by the autonomic nervous system and thus can be increased or decreased by the action of certain chemicals and drugs.

(i) What effect does stimulation by the sympathetic nervous system and parasympathetic nervous system have on the frequency of the heart beat?

sympathetic:

parasympathetic:

[2]

(ii) The following table shows the effect of certain substances on the rate of the heart beat. Complete the table by writing 'increased' or 'decreased' in the appropriate boxes.

Chemical	Effect on rate of heart beat
adrenaline	
acetylcholine	
atropine	
nicotine	
thyroxine	

[5]

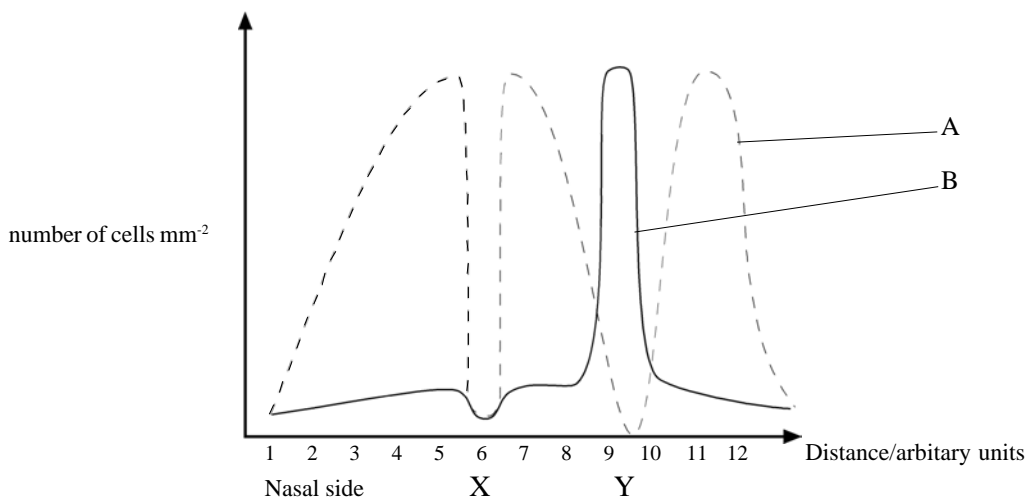
QUESTIONSHEET 2

(a) The table below relates to certain types of receptor found in the body. Complete the empty boxes by writing in one main function for each type of receptor and one main site in the body where each receptor can be found.

Receptor	Function	Site
Proprioceptor		
Thermoreceptor		
Baroreceptor		
Osmoreceptor		

[8]

(b) The graph below shows the number of receptor cells in the human retina along a one millimetre wide belt from the nasal side of the retina to the other side. Distances are in arbitrary units.



(i) Name the two types of receptor A and B and state their main function.

A: Function:

B: Function:

[4]

(ii) Suggest an explanation for the numbers of receptors found at X and Y.

X:

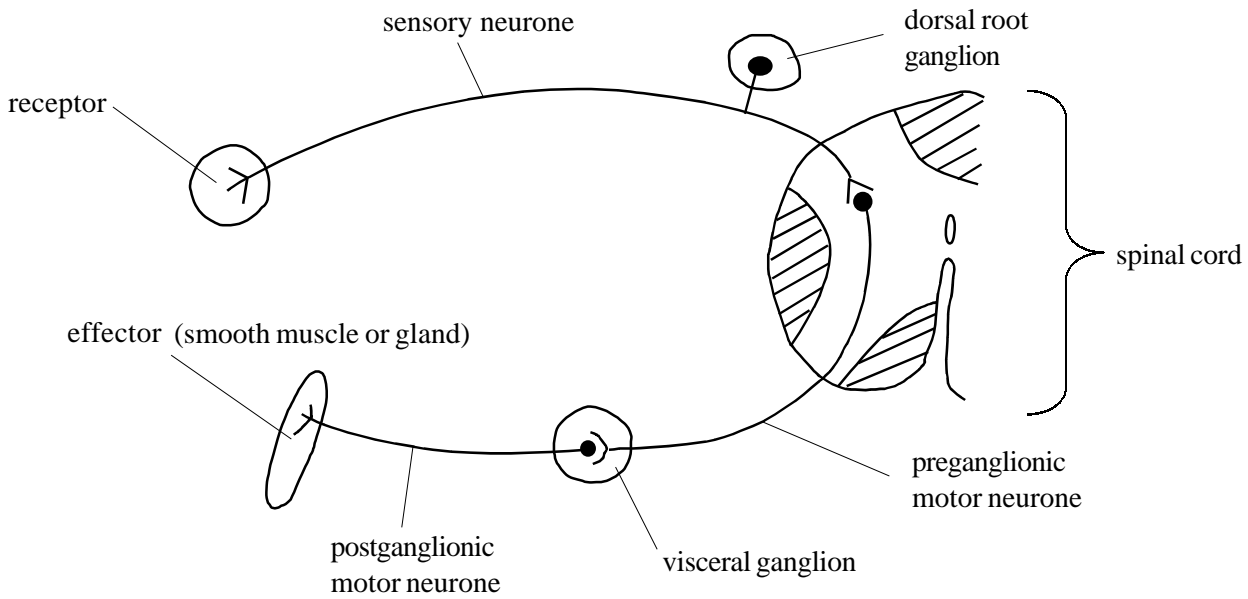
..... [2]

Y:

..... [2]

QUESTIONSHEET 3

The diagram shows the spinal cord and neurones involved in a simple autonomic reflex arc.



(a) State three ways in which this reflex arc differs from an arc in the voluntary nervous system (such as the knee jerk reaction).

- 1
- 2
- 3

[3]

(b) The table below indicates some effects of sympathetic and parasympathetic stimulation. If an effect is correct put a tick (✓) in the appropriate box and if it is incorrect place a cross (✗) in the appropriate box.

Effect	Sympathetic stimulation	Parasympathetic stimulation
Increases cardiac output		
Constricts pupils		
Increases peristalsis in gut		
Increases sweat secretion		
Stimulates bronchoconstriction		
Stimulates salivation		
Causes vasoconstriction of skin arterioles		

[7]

(a) What is a 'conditioned reflex' and how may it become established?

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[4]

(b) How do industries sometimes use conditioning when advertising their products?

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[2]

(c) Distinguish 'short term memory' from 'long term memory'.

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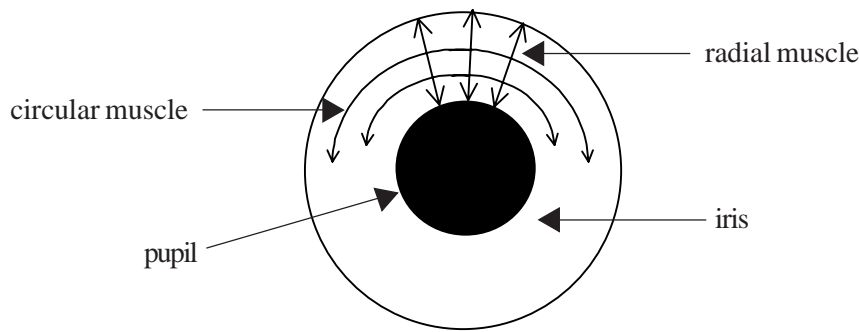
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[3]

The diagram of the pupil and iris shows the directions in which the radial and circular muscles of the iris act.



(a) (i) What is the main function of the iris?

..... [1]

(ii) What type of muscle tissue is found in the iris?

..... [1]

(iii) What kind of nervous control regulates the iris muscles?

..... [1]

(iv) Complete the following table by writing the most appropriate word or words in the boxes.

Feature	Effect of sympathetic stimulation	Effect of parasympathetic stimulation
radial iris muscles		
circular iris muscles		
pupil size		

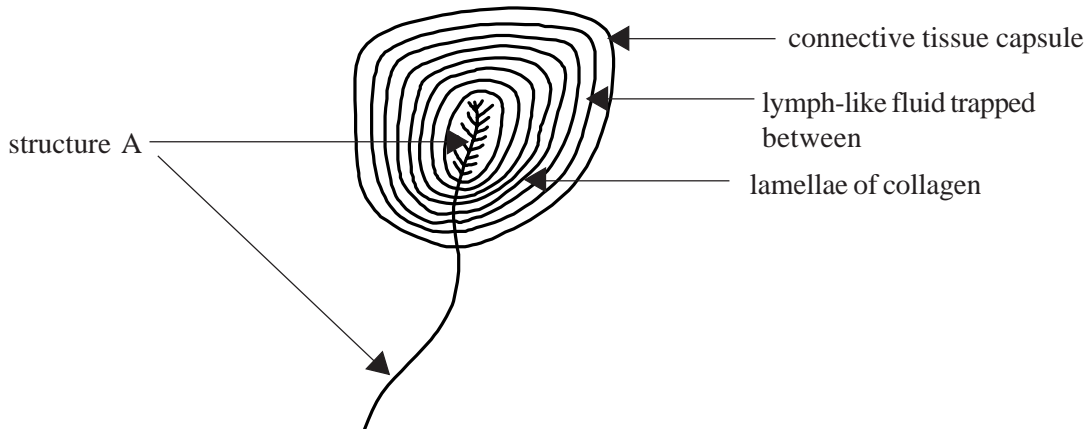
[3]

(b) Read through the following passage about tears. Some of the words in italics are incorrect and others are correct. Ring around the correct words.

Tears are a watery secretion released by *sebaceous/sudorific/lachrimal* glands. They contain salts, mucus and a *lipase/protease* enzyme called *lysozyme/papain*. Tears clean, lubricate and *sterilise/disinfect* the surface of the eyeball. The flow of tears is caused by stimulation of the *sympathetic/parasympathetic* nervous system. Excessive tears are produced when irritating substances come into contact with the *cornea/conjunctiva/sclerotic* causing watery eyes.

[6]

The drawing illustrates a Paccinian corpuscle from the connective tissue layer under the skin. The lamellae to the inside of the connective tissue capsule are spherical sheets of collagen and form vesicles which seal in a lymph-like fluid.



(a)(i) Identify structure A.

..... [1]

(ii) What is the function of a Paccinian corpuscle?

..... [2]

(iii) Suggest two sites in the body, other than under the skin, where Paccinian corpuscles occur.

1

2

[2]

(b)(i) Why can the Paccinian corpuscle be described as a transducer?

..... [1]

(ii) Suggest how the Paccinian corpuscle works.

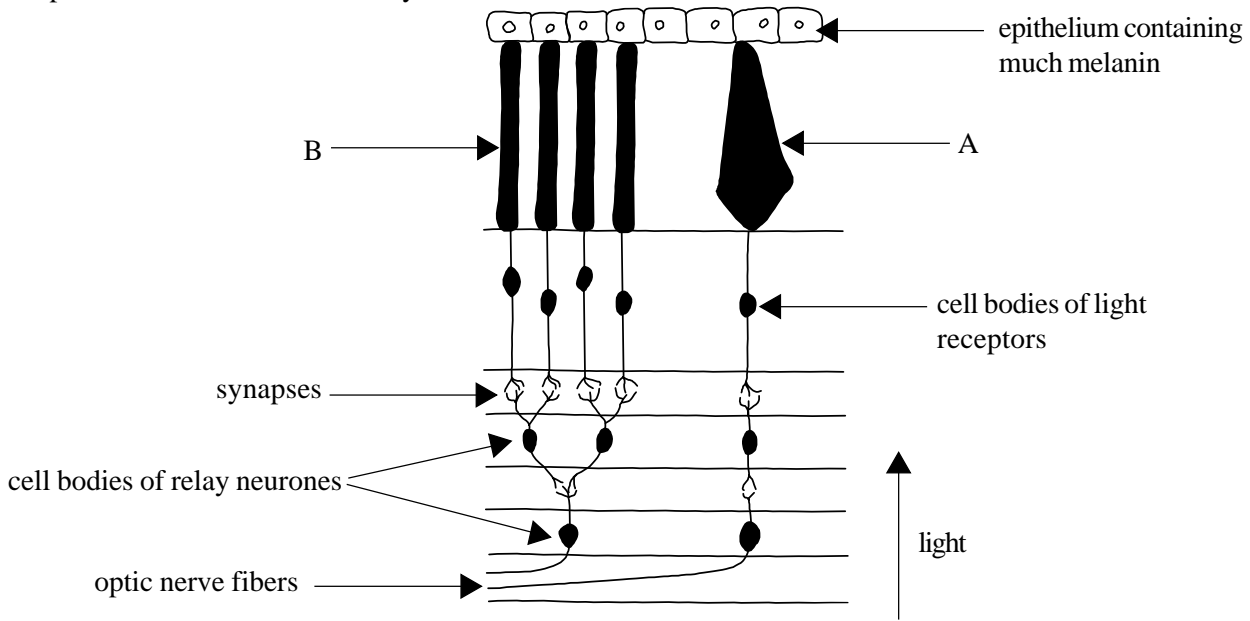
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[2]

The diagram shows the structure of the mammalian retina in vertical section to illustrate the position of the light receptors and their associated relay neurones.



(a) (i) Identify the photoreceptors A and B.

A B [1]

(ii) State two reasons for your identification.

1 [1]

2 [1]

(iii) Suggest a function for the melanin-containing epithelium.

..... [1]

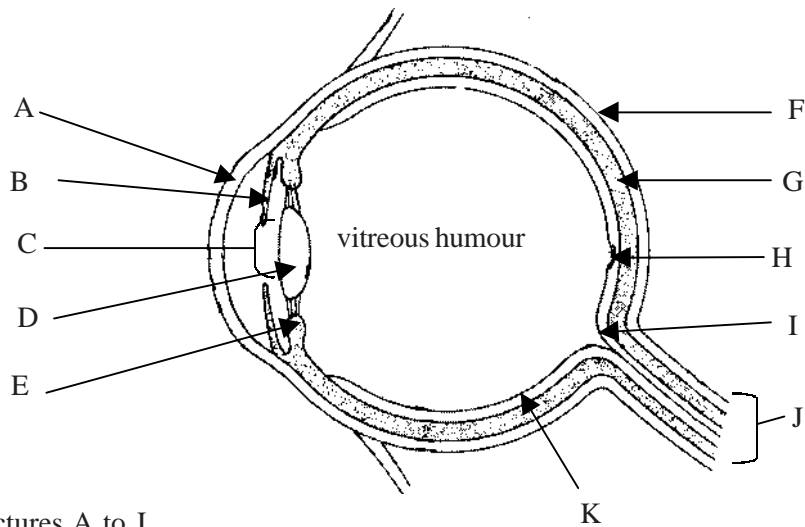
(b) (i) How do the sensitivities to light of the photoreceptors A and B differ?

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..... [2]

(ii) Briefly outline the trichromatic theory of colour vision.

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..... [4]

The diagram below shows an eye cut in vertical section.



(a) Name structures A to J.

- A: B: C:
 D: E: F:
 G: H: I:
 J: K: [11]

(b) Describe how the eye focusses light onto the retina.

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 [5]

(c) Describe how the eye regulates the intensity of light reaching the retina.

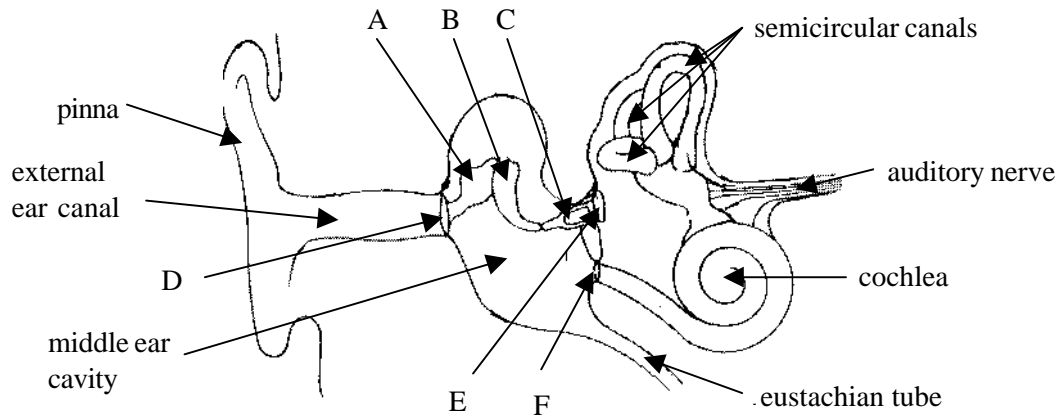
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 [4]

(d) Distinguish between structures H and I.

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 [2]

The diagram below shows the structure of the human ear.



(a) Name structures A to F.

A: B: C:

D: E: F:

[6]

(b) (i) The ear is an example of a transducer. Explain what is meant by this.

.....
 [2]

(ii) Describe how sound waves in the atmosphere become pressure waves in the fluid inside the cochlea.

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 [5]

(c) Explain the function of the Eustachian tube.

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 [2]

The parasympathetic nervous system is primarily concerned with activities that conserve and restore body energy during times of rest or recovery. Thus it is an **energy conservation –restorative system**.

The sympathetic nervous system is primarily concerned with processes involving the expenditure of energy, especially during stress due to physical or emotional activities. At these times it may set up the **fight or flight response**.

(a) List five ways in which the parasympathetic system is an energy conservation-restorative system.

- 1:
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- 2:
-
- 3:
-
- 4:
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- 5:
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[5]

(b) Describe the fight or flight response.

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[5]

(a) Name the parts of the human eye which:

(i) reflect light:

..... [2]

(ii) refract light:

..... [4]

(iii) absorb light:

..... [3]

(iv) transduce light:

..... [2]

(b) Name the parts of the human ear which:

(i) gather sound:

..... [2]

(ii) transmit sound:

..... [3]

(iii) amplify sound:

..... [2]

(iv) transduce sound:

..... [2]

The word 'autonomic' means 'self-ruling'. This term is used in recognition that the autonomic nervous system regulates all the visceral functions of the body without any conscious control.

(a) (i) Describe the regulation of the heart by the sympathetic nervous system.

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[4]

(ii) Describe the regulation of the heart by the parasympathetic nervous system.

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[4]

(b) The sympathetic and parasympathetic systems work in harmony to regulate the heart to meet the body's requirements. However, the heartbeat can be influenced by the activities of the voluntary nervous system. Explain how this is so.

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[2]