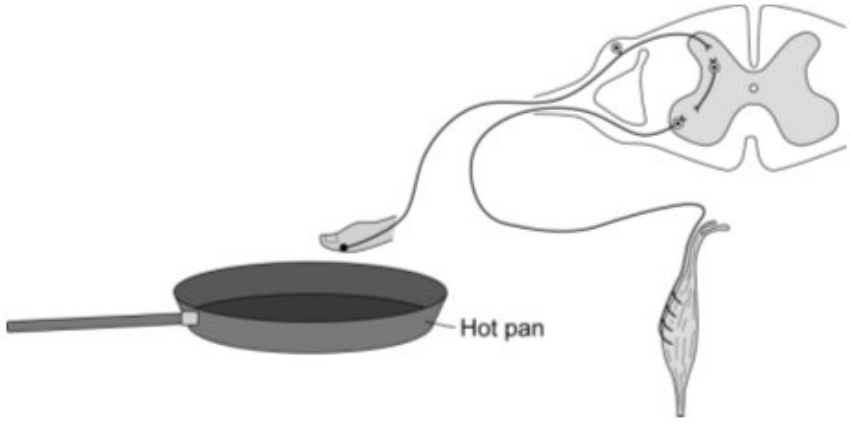
Q1. A person accidentally touches a hot pan.

Her hand automatically moves away from the pan.

The diagram shows the structures involved in this action.



(a) Describe fully how the structures shown in the diagram bring about this reflex action.

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.....

.....

(6)

(b) (i) The nerve pathway in this reflex action is about 1.5 metres in length. A nerve impulse travels at 75 m s^{-1}.

Use this information to calculate the time taken for this reflex action to occur.

Show clearly how you work out your answer.

.....

.....

Time intervals ..... s

(2)

(ii) The actual time interval is longer than the interval you have calculated in part (i).

Suggest an explanation for the difference.

.....

.....

(1)

(Total 9 marks)

Q2. The photograph shows a girl waiting to cross a road.

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(a) Name **two** different sense organs she would use to detect when it is safe to cross the road.

1 .....

2 .....

(2)

(b) Which sense organ contains receptors that help the girl to keep her balance?

.....

(1)

(c) (i) Complete the sentence.

A car driver automatically brakes if a child dashes out into the road.

This is called a ..... action.

(1)

(ii) Draw a ring around the correct answer to complete the sentence.

In the nervous system, information passes along cells called

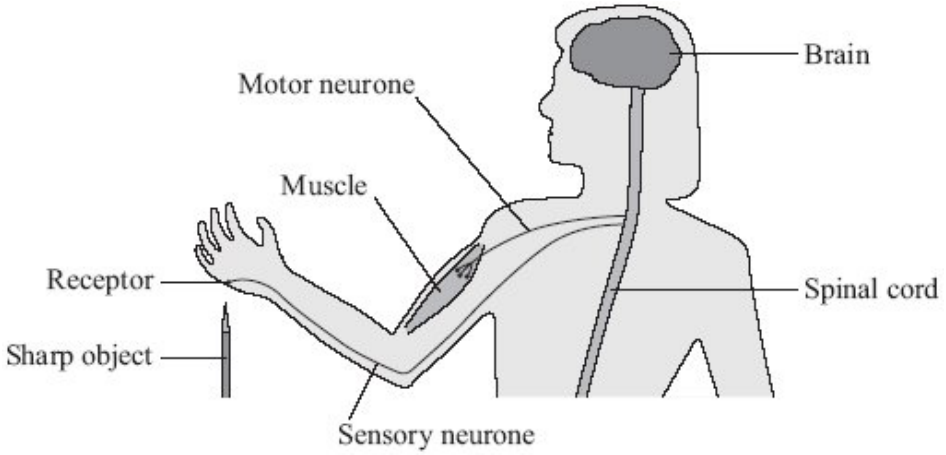
effectors
neurones
synapses

.

(1)

(Total 5 marks)

Q3. A student accidentally touches a sharp object.
Her hand is immediately pulled away from the object.
The diagram shows the structures involved in this response.



(a) Use the correct word or phrase **from the diagram** to complete each sentence.

(i) The stimulus is detected by the .....

(1)

(ii) Impulses travel to the central nervous system along a

cell called a .....

(1)

(iii) Impulses travel from the central nervous system to the effector

along a cell called a .....

(1)

(iv) The hand is pulled away from the sharp object by the

.....

(1)

(b) Where in the body are there cells sensitive to:

(i) light .....

(1)

(ii) sound .....

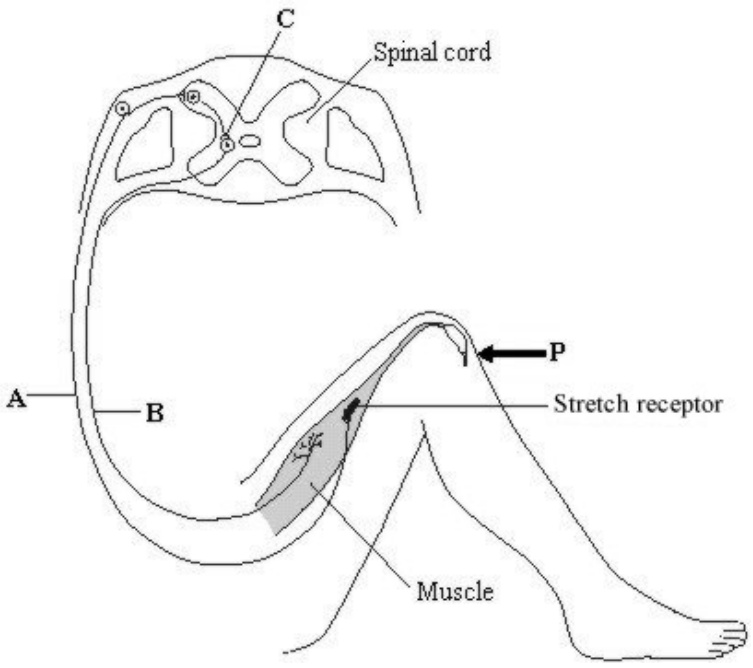
(1)

(iii) changes in position?.....

(1)

(Total 7 marks)

Q4. The diagram shows the nervous pathway which is used to coordinate the knee-jerk reflex. When the person is hit at point **P**, the lower leg is suddenly raised.



(a) (i) Name the type of neurone labelled **A**. .....

(1)

(ii) **On the diagram**, draw arrows next to the neurones labelled **A** and **B** to show the direction in which an impulse moves in each neurone.

(1)

(b) How is information passed across the synapse at **C**?

.....

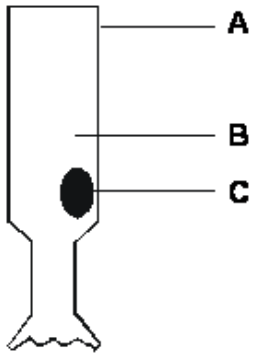
(1)

(c) **On the diagram**, label the effector with the letter **X**.

(1)

(Total 4 marks)

Q5. The drawing below shows a light-sensitive (receptor) cell from the eye. The structures labelled A, B and C, can be found in most animal cells.



(a) Name the structures labelled A, B and C.

A .....

B .....

C .....

(3)

(b) Describe, as fully as you can, what happens in the nervous system when this receptor cell is stimulated by light.

.....

.....

.....

.....

(3)

(Total 6 marks)

M1. (a) stimulus / heat detected by temperature receptors in skin

1

impulses travel along sensory neurone to spinal cord / CNS

1

chemical transmission across synapse

1

via relay neurone

1

impulses to muscle / effector via motor neurone

1

muscle / effector contracts, moving the hand away

1

(b) (i) 0.02 s

*correct answer gains **2** marks*

*if answer incorrect, evidence of 1.5 / 75 gains **1** mark*

2

(ii) impulse slowed down because of time taken for diffusion of the chemical across the synapse

1

[9]

M2. (a) eye / sight / eyesight

either order

1

ear / hearing

ignore light

1

(b) ear

1

(c) (i) reflex

1

(ii) neurons

1

[5]

M3. (a) (i) receptor

1

(ii) sensory neurone

1

(iii) motor neurone

1

(iv) muscle

1

(b) (i) eye(s)

allow retina

ignore sight

1

(ii) ear(s)

ignore hearing

*do **not** allow ear drum*

1

(iii) ear(s)

ignore balance

1

[7]

M4. (a) (i) sensory / afferent

1

(ii) <u>on diagram</u>:

arrow (next to neurone **A**) pointing towards spinal cord
and
arrow (next to neurone **B**) pointing towards muscle

1

(b) chemical (released) **or** neurotransmitter
or by diffusion

accept correct named example of a neurotransmitter

1

(c) <u>on diagram</u>:

X labelling muscle **or** motor end plate

*do **not** accept on stretch receptor*

1

[4]

M5. (a) A – cell membrane
B – cytoplasm
C – nucleus

each for 1 mark

3

(b) (nerve) impulse sent along nerve fibre to brain

each for 1 mark

3

[6]