WJEC (Eduqas) Biology GCSE Topic 4.1 Nervous Co-ordination and Control in Humans Questions by Topic

1. Gareth takes a penalty kick.

He **watches** the moving ball speed towards the goal.

The list below describes how the nervous system takes part in some of the above events, but not in the correct order.

1 The impulses pass along neurones.

2 The receptor cells respond to this stimulus.

3 Light from the moving ball strikes receptor cells in his eye.

4 The central nervous system processes the information.

5 Electrical impulses are produced.

(a) Place the five statements above in the correct order. [3]

..... → ..... → ..... → ..... → .....

(b) The eye is a sense organ.
State the name of **one** *other* sense organ and the stimulus it detects. [2]

Sense organ .....

Stimulus it detects .....

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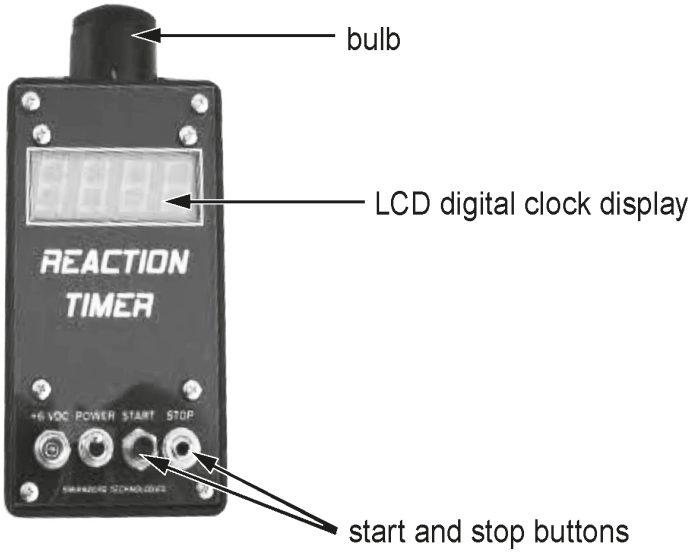
2. Megan wanted to know if playing music affected Bob's reaction time.

She used a reaction timer as shown in the photograph below.



Method

- The clock started timing as soon as the bulb lit up.
- When Bob saw the bulb light up, he pressed the stop button as fast as he could.
- Bob's reaction time with no music playing and then with music playing was recorded.

The results for five trials are shown below.

trial number	reaction time with no music playing (s)	reaction time with music playing (s)
1	0.20	0.53
2	0.20	0.44
3	0.20	0.40
4	0.20	0.38
5	0.20	0.25

(b) (i) State the name of the sense organ that detects light. [1]

.....

(ii) Describe how information gets from sense organs to the brain. [2]

.....

.....

3. Jon stands at a pedestrian crossing.

(a) When it is safe to cross, the crossing makes a high pitch sound and a light flashes green.

Name the **two** stimuli that Jon detects **and** the sense organs involved. [2]

stimulus	sense organ

(b) Information from sense organs travels along neurones.

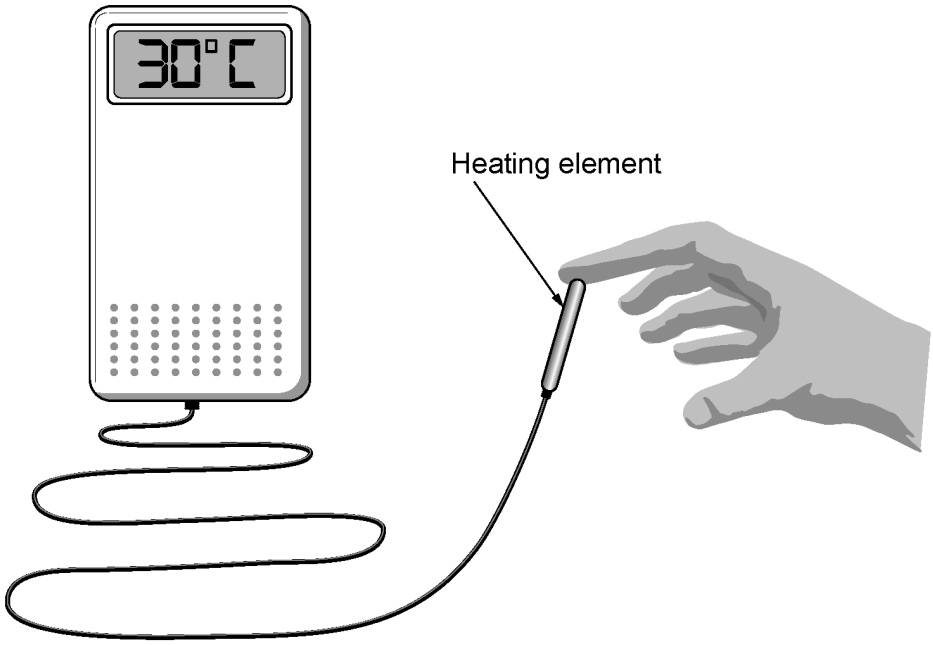
(i) In what form does information travel along neurones? [1]

.....

(ii) Which part of the nervous system processes information from neurones? [1]

.....

4. Harri used the apparatus shown below to investigate the sensitivity of the skin to changes in temperature.



This is Harri's method.

- He placed the heating element, set at 30°C, to a fingertip of one student.
- He increased the temperature of the heating element in 0.1°C steps.
- He noted the temperature at which the student said she could feel the increase in temperature.
- He called this temperature the **end temperature**.

He repeated this method on the lips, cheek and elbow.

(a) Harri then tested three other students in his class.
The results are shown in the table below.

student	end temperature (°C)			
	finger tip	lips	cheek	elbow
1	30.5	30.4	30.5	30.8
2	30.4	30.2	30.6	31.0
3	30.4	30.3	30.6	30.9
4	30.6	30.3	30.7	31.4
mean	30.5	30.3	30.6	31.0

Use the data from the table opposite to answer the following:

(i) Which skin part is the most sensitive to temperature change? [1]

.....

(ii) Which skin part has the widest range of readings? ..... [1]

(b) Harri then tested five of his teachers. The mean results are shown below.

mean end temperature (°C)			
finger tip	lips	cheek	elbow
30.6	30.3	31.3	32.0

Using only the results in the two tables, describe the effect of ageing on skin sensitivity. [2]

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.....

.....

(c) Complete the table below. [4]

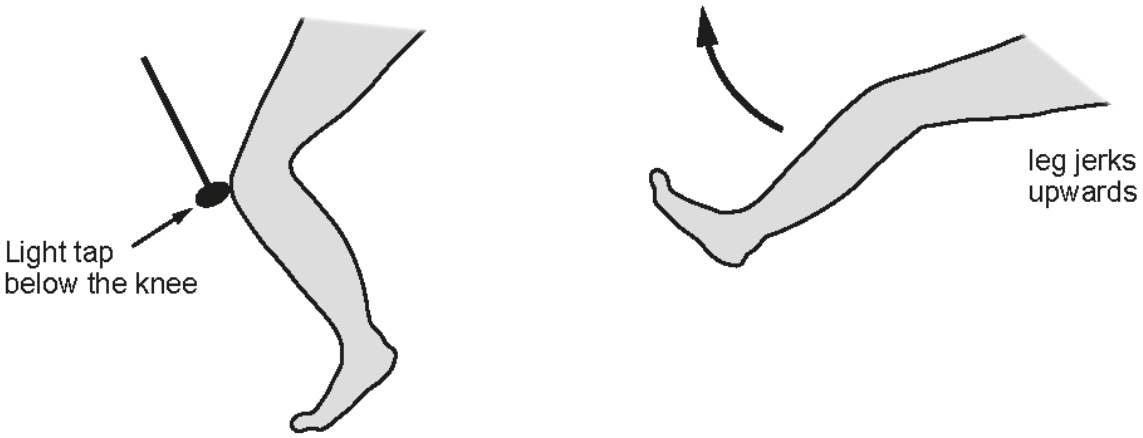
sense organ	stimuli detected
skin	temperature and .....
eye	.....
.....	sound
tongue	.....

5. *(a)* Complete the sentence about the human nervous system. [2]

The central nervous system consists of the ..... and

..... .

(b) The diagram below shows the knee jerk response, which is a reflex action.



(i) Apart from being very fast, state **one** *other* feature of **all** reflex actions. [1]

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(ii) Give **one** *other* reflex action which occurs in the human body and state its purpose. [2]

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6. *(a)* (i) Complete the following sentences about sense organs using some of the words from the list below. [2]

impulses **signs** **stimuli** **messages** **signals**

Sense organs respond to specific ..... by sending information in the form of ..... which are carried to the central nervous system.

(ii) State the name of:

I. the specialised nerve cells that carry the information to the central nervous system; [1]

.....

II. an organ that processes information received from sense organs. [1]

.....

(b) Jed investigated the hearing of some year 11 pupils and their teachers.

He asked 12 pupils and 12 teachers to say if they could hear a buzzer when he sounded it at each of five distances away from the two groups. The same buzzer was pressed for each person.

The results are shown in the table.

Distance from buzzer (m)	Number hearing buzzer	
	Year 11 pupils	Teachers
5	12	12
10	12	12
15	12	12
20	11	7
25	8	2

(i) Give **one** conclusion that Jed can make from this investigation. [1]

.....

.....

.....

.....

(ii) State **one** way in which Jed's investigation is a fair test. [1]

.....

(iii) What else should Jed have done to make sure the investigation was a fair test? [1]

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(iv) Jed thought that increasing the sample size would improve his confidence in his conclusion.

Describe how Jed would increase the sample size in this investigation. Explain why it would improve his confidence in his conclusion. [2]

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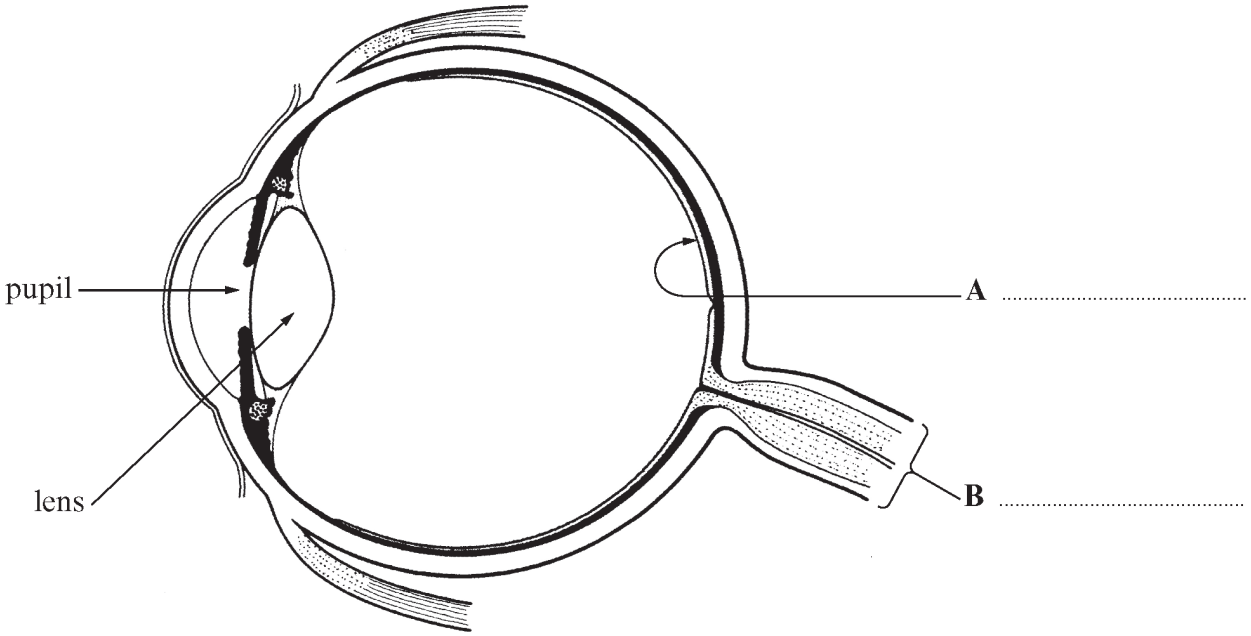
7. *(a)* The diagram below shows the structure of the eye.
Complete labels **A** and **B**. [2]



(b) Scientists investigated how the diameter of the pupil of the eye changed in different light intensities. The results are shown below.

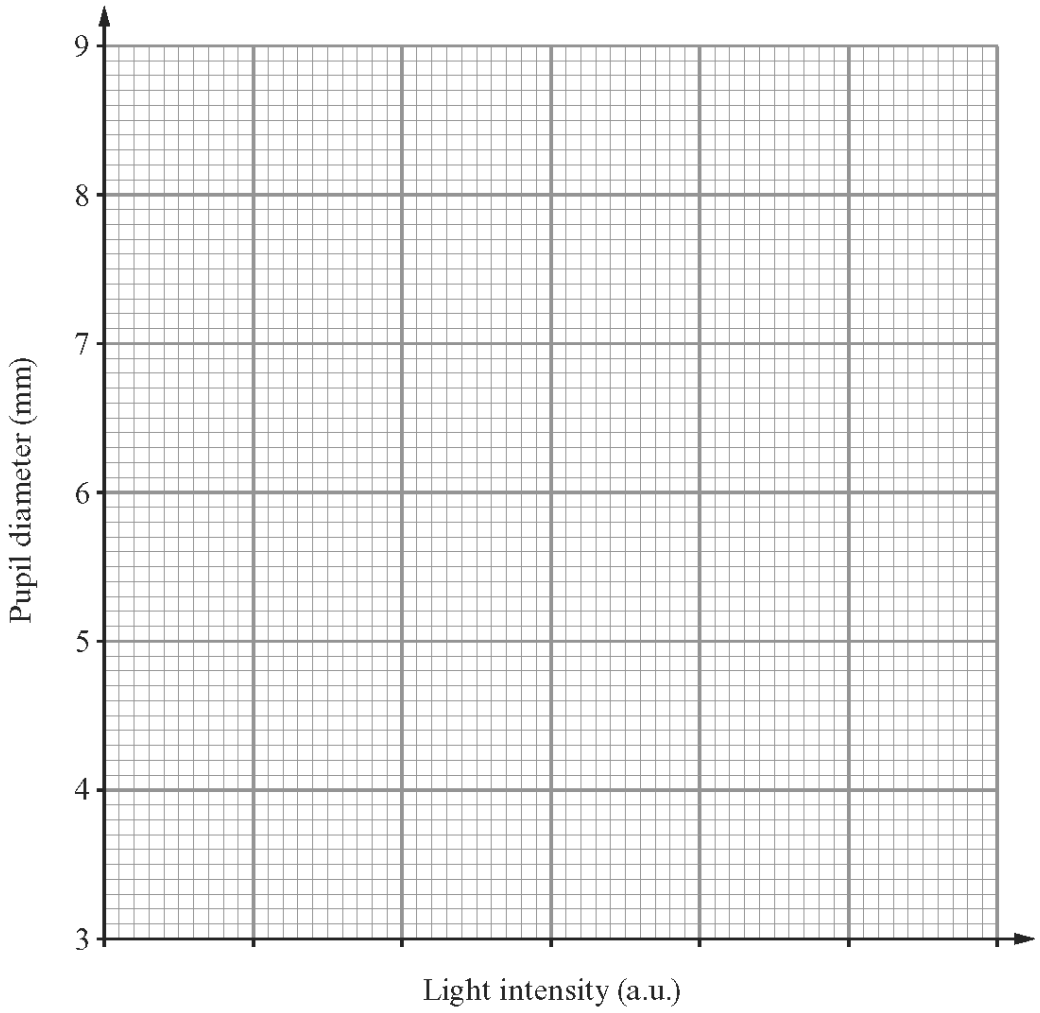
light intensity (a.u.)	pupil diameter (mm)
0	8.0
5	8.0
10	7.1
15	6.3
20	5.4
25	4.5

(i) Complete the line graph opposite for these results by:

I. choosing the scale on the axis for light intensity; [1]

II. plotting the points; [2]

III. drawing a line, with a ruler, to join the plots. [1]



(ii) From this graph

I. Describe what happens to the diameter of the pupil as the intensity of light increases. [1]

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II. State the pupil diameter at a light intensity of 17 units. [1]

..... mm

(c) The pupil changes in diameter because of a nervous response which happens very quickly and automatically.

(i) Name this type of response. [1]

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(ii) What is the purpose of this type of response? [1]

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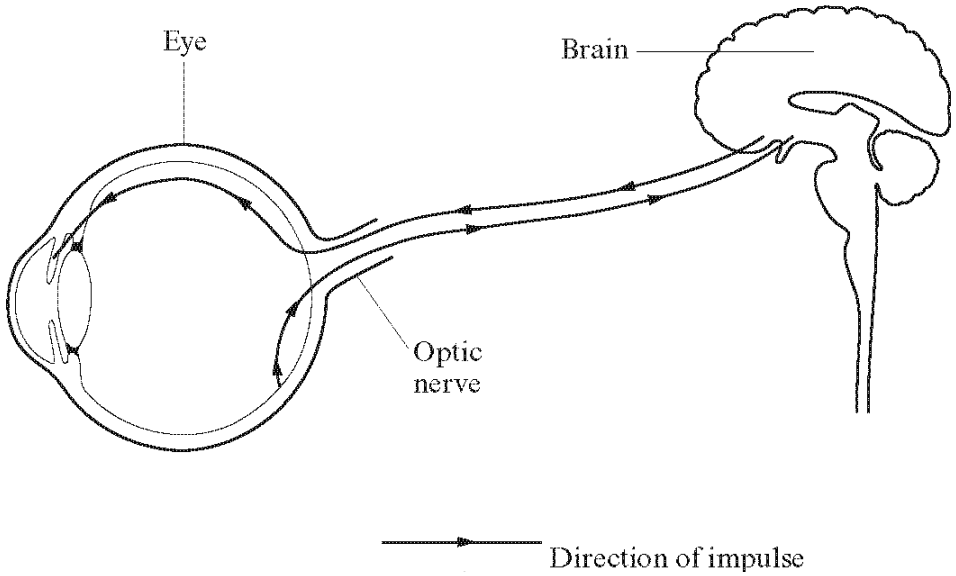
8.

The diagram shows the pathway taken by nerve impulses which help to bring about changes in the diameter of the pupil.



(a) On the diagram above, use an arrow to label the motor neurone. [1]

(b) Name [3]

(i) the stimulus which causes a change in the diameter of the pupil,

.....

(ii) the receptor which receives the stimulus,

.....

(iii) the effector which causes the decrease in the diameter of the pupil.

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(c) Describe how the decrease in diameter of the pupil demonstrates the three most important features of a reflex action. [3]

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9. Define a reflex action. Describe the reflex arc involved in the blinking response to a flashing light. (Diagrams will not be credited.) [6 QWC]

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10. *(a)* In the list below, which **two** letters represent pathways taken by nerve impulses in reflex actions? [2]

A motor neurone ⟶ brain ⟶ sensory neurone

B sensory neurone ⟶ spinal cord ⟶ motor neurone

C sensory neurone ⟶ spinal cord ⟶ receptor

D retina ⟶ brain ⟶ eyelid

Letters ..... and .....

(b) Name an example of each of the two reflex actions given as your answer to *(a)*. [2]

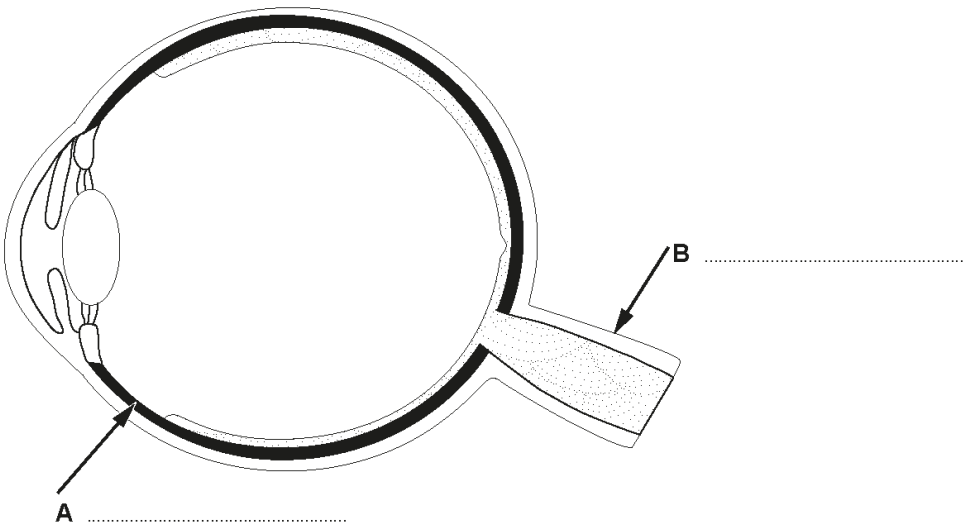
(i) Letter .....

Example .....

(ii) Letter .....

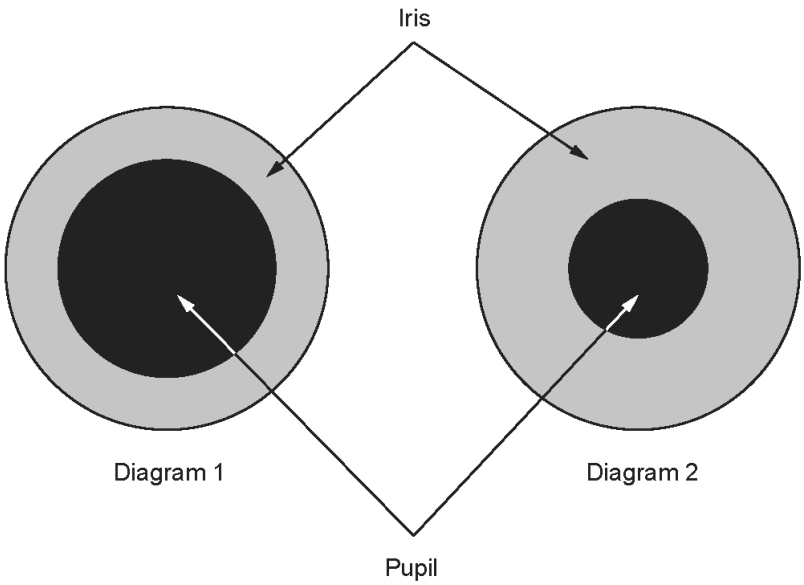
Example .....

11. The diagram below shows a section through the eye.



(a) Label parts **A** and **B** on the diagram. [2]

(b) The diagrams below show a front view of the iris in different light intensities.



Explain how the appearance of the iris and pupil change in different light intensities. [4]

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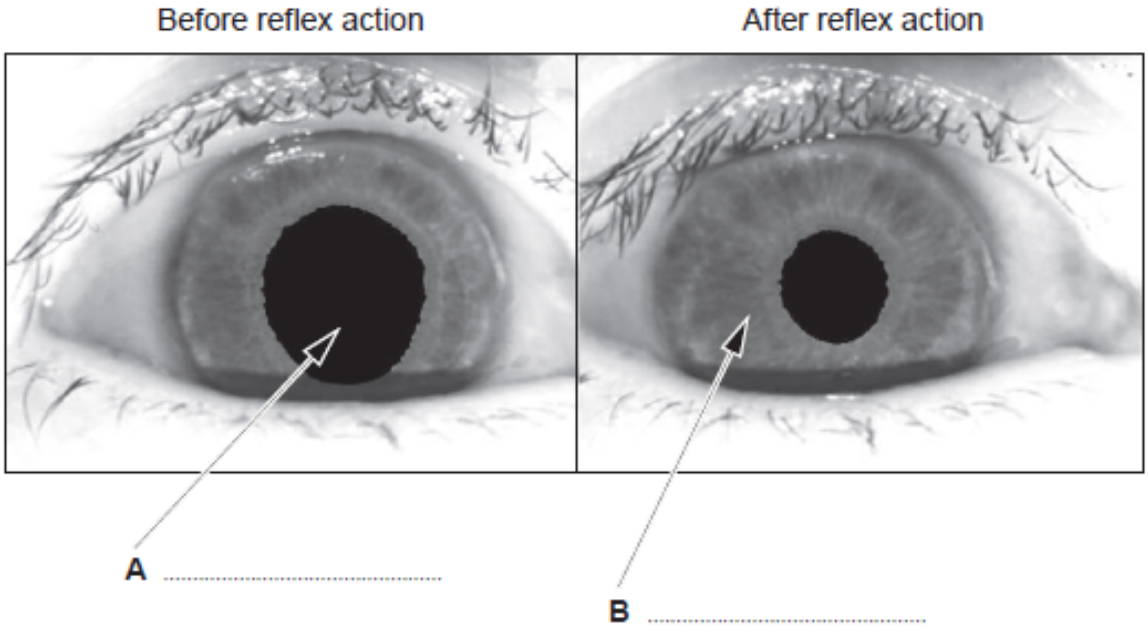
12. The photographs below show the appearance of an eye before and after a reflex action which occurs in response to a change in light intensity.



(a) (i) Label **A** and **B** on the diagram. [1]

(ii) From the photographs, describe how **and** why parts **A** and **B** of the eye alter when the light intensity changes. [3]

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.....

(iii) State **two** features of **all** reflex actions. [1]

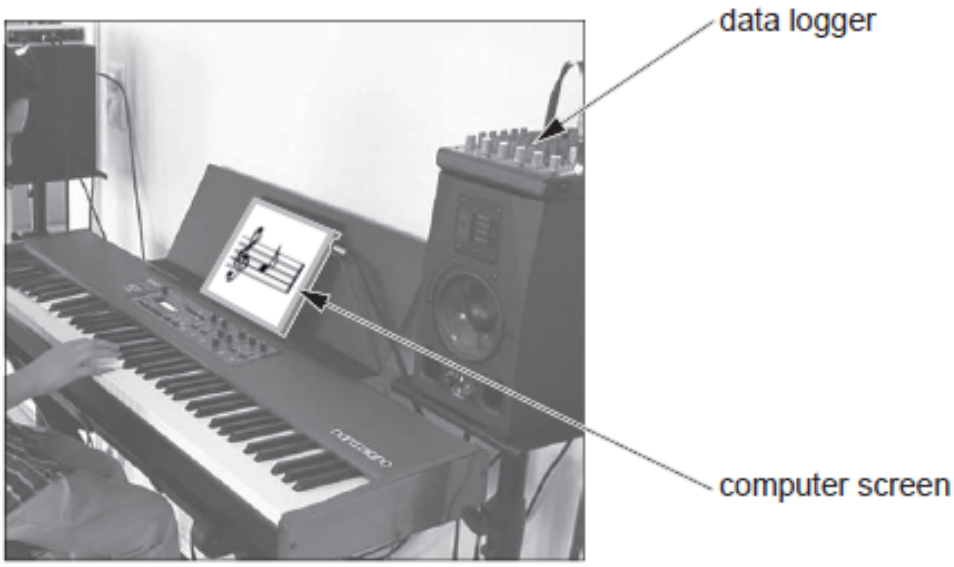
.....

(b) Josie investigated reaction time in humans.

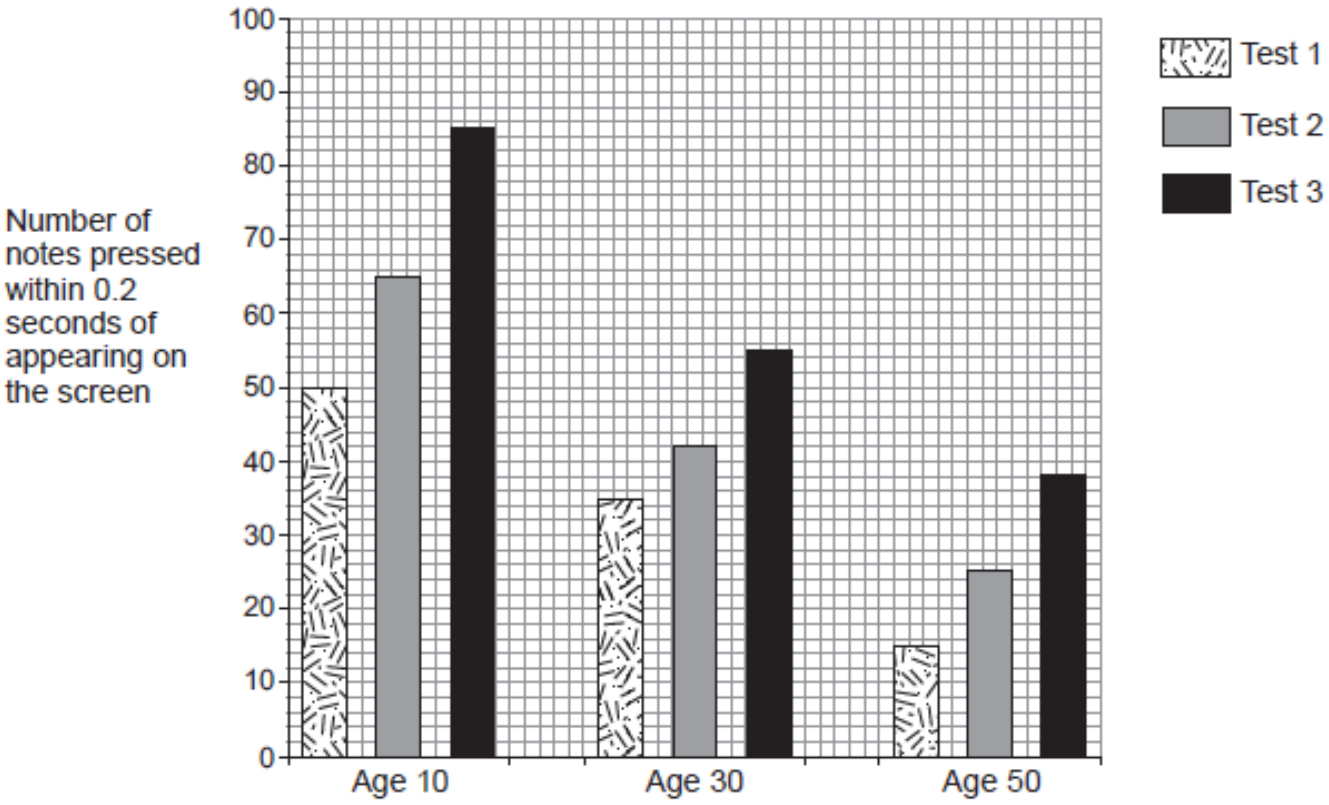
She tested three people, two males and one female of ages 10, 30 and 50 years old. They had between one and 20 years experience of playing the keyboard.

By means of a computer app, 90 random music notes flashed one by one onto a screen. The person being tested then instantly pressed each note on the keyboard as soon as it was seen. Each person did the test three times. No incorrect notes were pressed.

A data logger recorded the number of notes which were pressed within 0.2 seconds of appearing on the screen.



The bar chart shows the results of the investigation.



Use the bar chart to answer the questions.

(i) How does repeating the test affect reaction time? [1]

.....

(ii) Calculate the percentage change between tests 1 and 2 for age 50. Give your answer to one decimal place. [2]

Percentage change = ... %

(iii) From the data, what **two** conclusions could you make about the effects of age on reaction time? [2]

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(iv) I. Josie decided to try the investigation again and make it a fairer test of the effects of age. State **two** variables which she should control. [2]

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.....

II. State **one** *other* way in which the investigation could be improved. [1]

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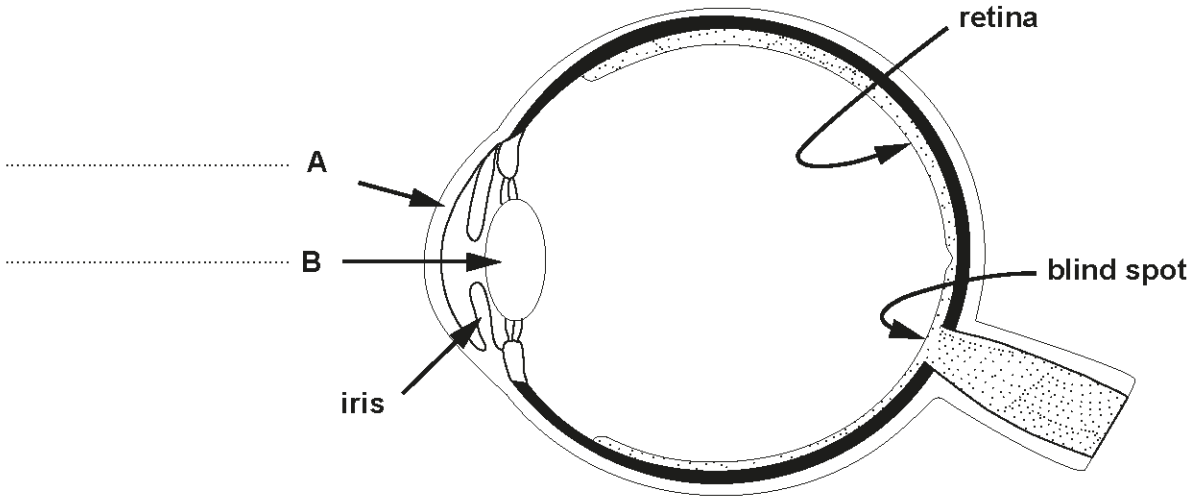
13. The diagram below shows a section through the human eye, with some parts labelled.



(a) (i) Label **A** and **B** on the diagram. [2]

(ii) The retina is the light sensitive layer of the eye where images are formed. Explain why no image is detected at the blind spot. [2]

.....

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(b) Name the parts of the eye described below. [2]

Description	Part of the eye
tough, protective coating	.....
layer containing blood vessels	.....

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