Chapter 14

Coordination and response

01. 0610_s17_qp_41 Q: 3

Heroin is a drug that acts on the nervous system.

(a) Define the term *drug*.

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.....[2]

There are pain receptors in the skin. These receptors transmit impulses along sensory neurones to the spinal cord.

Fig. 3.1 shows the synapses between sensory neurone **A** and a relay neurone and sensory neurone **B** and a relay neurone, in the spinal cord.

Fig. 3.2 is an enlarged view of the synapse between sensory neurone **A** and the relay neurone, as indicated by the circle on Fig. 3.1.

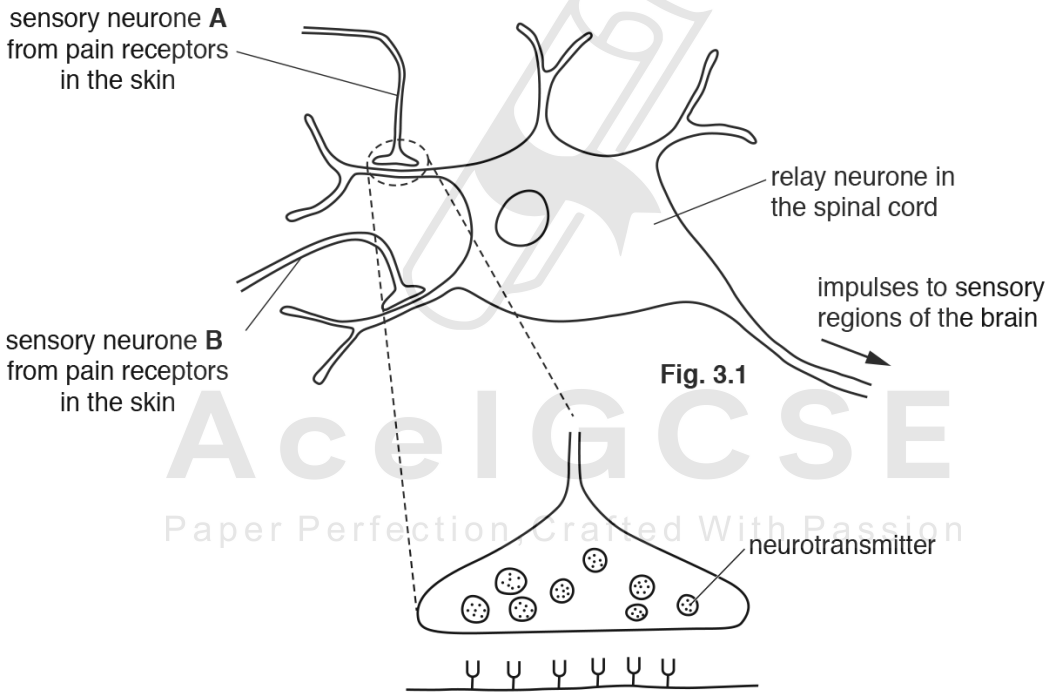

Fig. 3.1

Fig. 3.2

(b) Describe how impulses are transmitted across the synapse.

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.....[4]

(c) Suggest how the structure of a synapse ensures that impulses travel in one direction.

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.....[2]

(d) When an impulse arrives along sensory neurone **B**, a different neurotransmitter is released. This **prevents** the production of an impulse in the relay neurone.

Molecules of heroin have a similar shape to the neurotransmitter released from these neurones.

Explain how heroin affects the function of the synapse.

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.....[3]

(e) List **three** stimuli, other than pain, which humans can detect.

1.....

2.....

3.....

[3]

[Total: 14]

02. 0610_s17_qp_43 Q: 6

Meningitis is a transmissible disease. One form of the disease is caused by the bacterium *Neisseria meningitidis*.

(a) Define the term *transmissible disease*.

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.....[2]

(b) One effect of meningitis is a slowing down of nerve impulses.

State what is meant by a *nerve impulse*.

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.....[2]

(c) The spread of meningitis can be controlled by using vaccines.

(i) Explain how vaccination provides active immunity.

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.....[4]

(ii) If meningitis disappears from a country, explain why the vaccine should continue to be used in that country.

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.....[2]

(d) People who have meningitis are treated with injections of antibodies to give them passive immunity.

(i) Suggest why the antibodies must be injected rather than taking them by mouth.

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.....[2]

(ii) Explain why passive immunity does not give long-term protection against diseases, such as meningitis.

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.....[2]

[Total: 14]

03. 0610_s19_qp_42 Q: 4

Neurones are part of the nervous system. Neurones are connected to each other by synapses.

(a) **(i)** Describe how the structure of a neurone is related to its function.

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..... [3]

(ii) The nervous system is made up of the central nervous system and the peripheral nervous system.

State the names of the organs that make up the central nervous system.

..... [1]

(b) Reflex actions allow the body to respond rapidly to changes in the external environment.

(i) Outline the pathway in a reflex arc in response to shining a bright light into the eye.

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..... [3]

(ii) Doctors sometimes check the reflexes of people who are unconscious.

Suggest why reflexes occur in people who are unconscious.

..... [1]

(c) Fig. 4.1 is a diagram of a synapse and parts of two neurones.

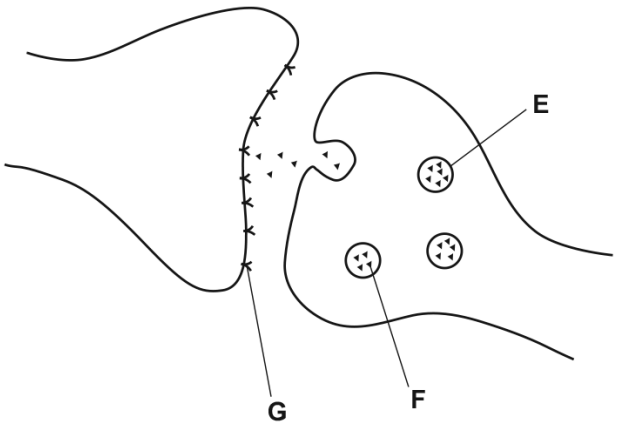

Fig. 4.1

(i) State the names of the labelled parts in Fig. 4.1.

E .....

F .....

G .....

[3]

(ii) Draw an arrow on Fig. 4.1 to show the direction in which the signal travels across the synapse. [1]

[Total: 12]

04. 0610_w17_qp_41 Q: 4

A neurone is a type of specialised animal cell.

(a) **(i)** Neurones develop from unspecialised cells.

State the name of these unspecialised cells.

.....[1]

(ii) All animal cells have some common features.

State **two** structural features common to all animal cells.

1 .....

2 .....
[2]

(iii) Most neurones are longer than other types of animal cell.

Suggest why most neurones are very long.

.....

.....[1]

(b) Some neurones connect to effector organs.

(i) State the name of the type of neurone that connects to an effector organ.

.....[1]

(ii) State **one** example of an effector organ.

.....[1]

(c) Fig. 4.1 shows parts of two neurones. The area in the dashed circle has been magnified.

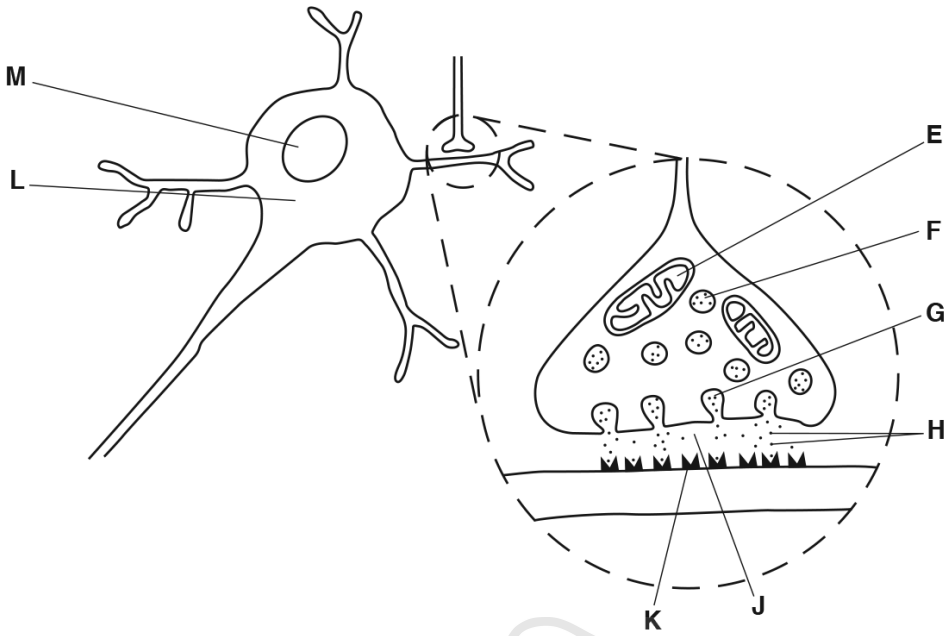

Fig. 4.1

(i) Complete Table 4.1. One row has been done for you.

Table 4.1

letter from Fig. 4.1	name	description
		component of the cell that releases energy during aerobic respiration
H	neurotransmitters	chemicals that transmit signals from one neurone to the next neurone
		the gap between two neurones
		the sac in which neurotransmitters are transported to the cell membrane
		the molecules that the neurotransmitters bind to
		the structure that controls the activities in the cell

[5]

(ii) State where in the body the neurones in Fig. 4.1 would be found.

.....[1]

(d) Describe how neurotransmitters move across the gap between two neurones.

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.....[3]

(e) Nerves and hormones coordinate the functions of the body.

Suggest why blinking of the eyes is coordinated by nerves and not hormones.

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.....[1]

[Total: 16]

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05. 0610_m20_qp_42 Q: 3

(a) One of the characteristics of living organisms is sensitivity.

Define the term sensitivity.

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..... [2]

(b) State the names of **two** sense organs.

1 .....

2 .....

[1]

(c) Scientists investigated the effect of adrenaline on blood glucose concentration in rats.

The rats were put into two groups:

- group **A** was given an injection of adrenaline
- group **B** was given an injection that did **not** contain adrenaline.

The blood glucose concentrations of the rats in both groups were monitored for three hours after the injections.

The rats did not eat for 12 hours before the investigation or while they were being monitored.

The results are shown in Fig. 3.1.

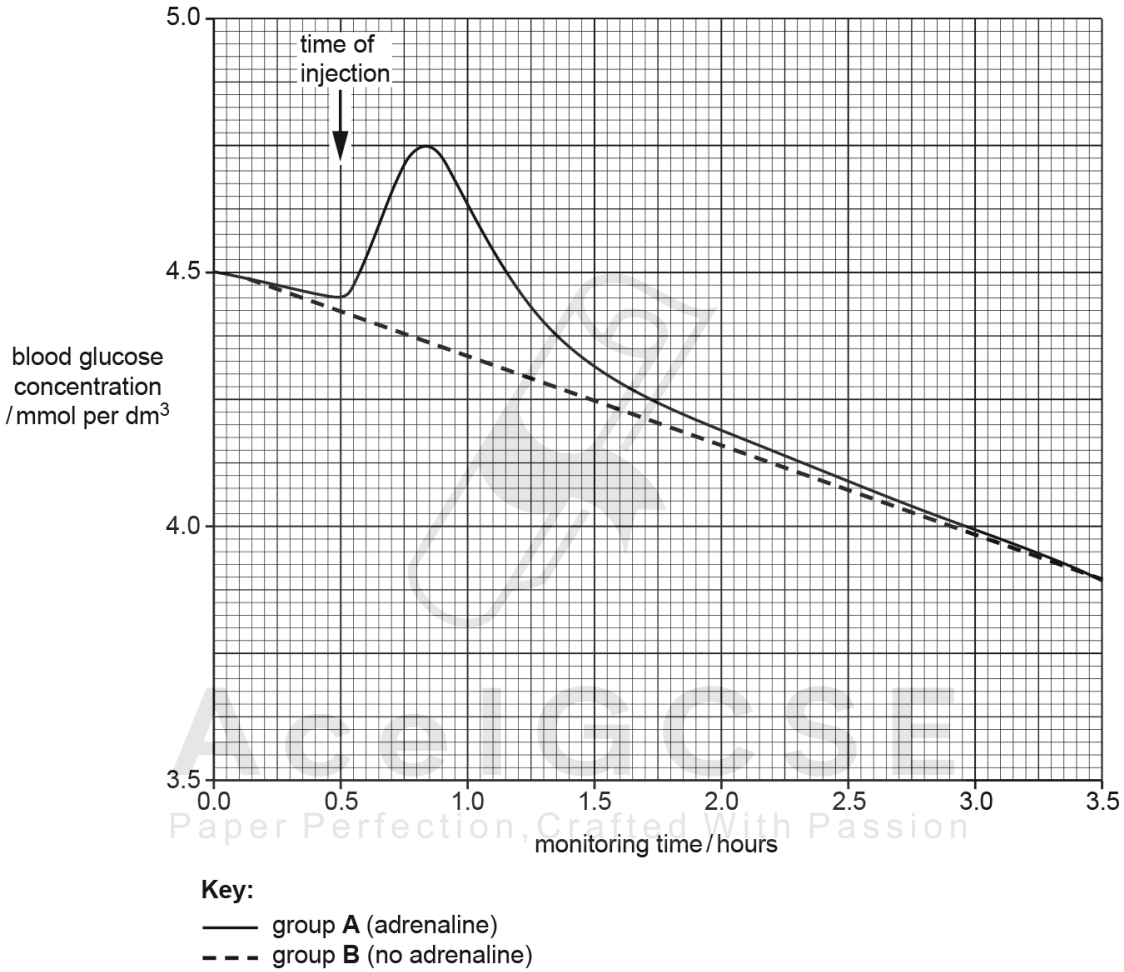

Fig. 3.1

(i) Suggest why group **B** was given an injection that did **not** contain adrenaline.

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..... [2]

(ii) Describe and explain the results shown in Fig. 3.1 for group **A**.

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..... [5]

(d) Another group of rats was given an injection that did **not** contain adrenaline.

These rats were given food after 2 hours of monitoring.

Predict the changes to blood glucose concentration in this group of rats.

Sketch a line to show your prediction on the graph in Fig. 3.1. [2]

(e) Describe **two** effects of adrenaline on the body, **other** than a change in blood glucose concentration.

1 .....

2 .....

[2]

[Total: 14]

06. 0610_p20_qp_40 Q: 3

(a) Define the term *sensitivity*.

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.....

..... [1]

Fig. 3.1 shows the reflex arc involved in a simple reflex action.

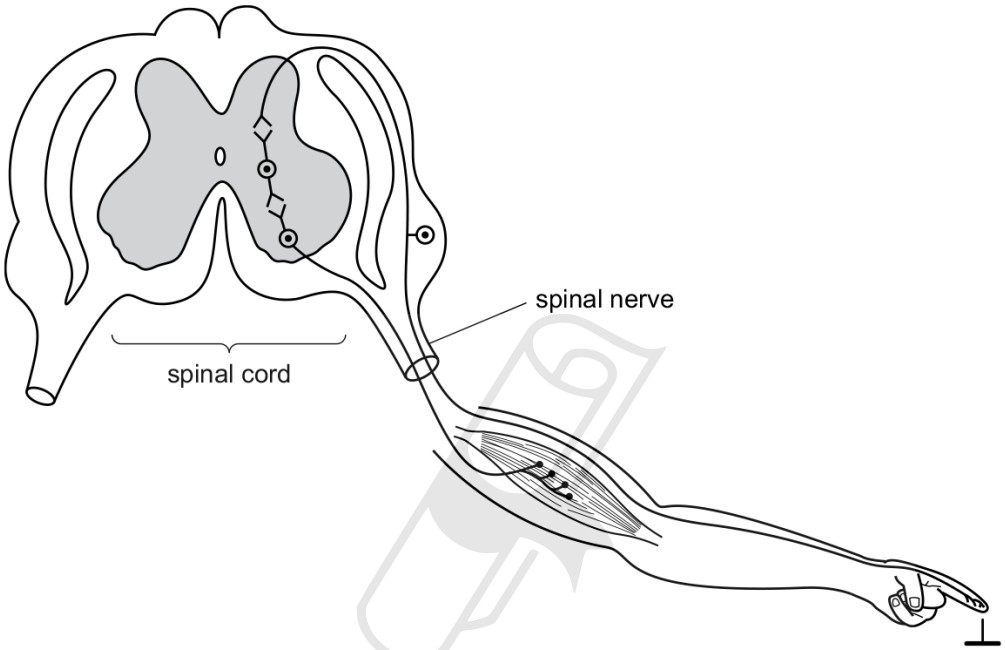

Fig 3.1

(b) On Fig. 3.1 use label lines to identify and name the three types of neurone shown. [3]

(c) A reflex is an involuntary action.

Explain what is meant by the term *involuntary action*.

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.....

..... [2]

(d) **(i)** Define the term *synapse*.

.....

..... [1]

(ii) Describe how impulses are transmitted across a synapse.

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..... [3]

(e) When a body senses danger, more adrenaline is secreted from the adrenal glands.

Describe **two** ways in which the hormone adrenaline affects the body in preparation for action.

1 .....

.....

2 .....

..... [2]

(f) State **one** difference between nervous and hormonal control systems.

..... [1]

[Total: 13]

07. 0610_p16_qp_40 Q: 3

(a) Define the term *sensitivity*.

.....

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..... [1]

Fig. 3.1 shows the reflex arc involved in a simple reflex action.

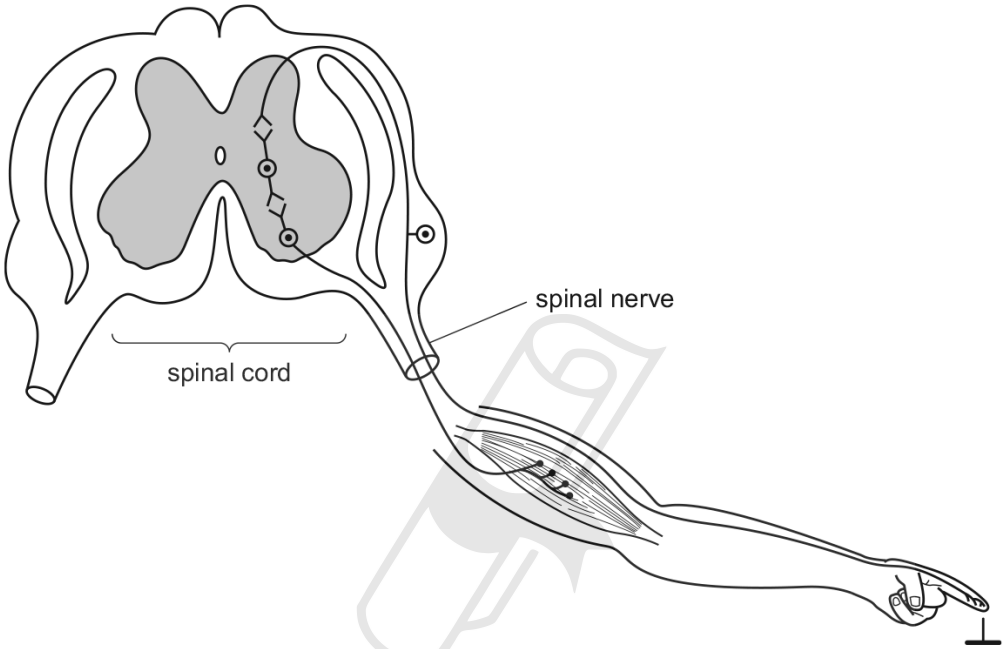

Fig 3.1

(b) On Fig. 3.1 use label lines to identify and name the three types of neurone shown. [3]

(c) A reflex is an involuntary action.

Explain what is meant by the term *involuntary action*.

.....

.....

.....

..... [2]

(d) **(i)** Define the term *synapse*.

.....

..... [1]

(ii) Describe how impulses are transmitted across a synapse.

.....

.....

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.....

..... [3]

(e) When a body senses danger, more adrenaline is secreted from the adrenal glands.

Describe **two** ways in which the hormone adrenaline affects the body in preparation for action.

1 .....

.....

2 .....

..... [2]

(f) State **one** difference between nervous and hormonal control systems.

..... [1]

[Total: 13]

08. 0610_m20_qp_42 Q: 2

(a) Fig. 2.1 shows the transfer of materials between blood and tissues.

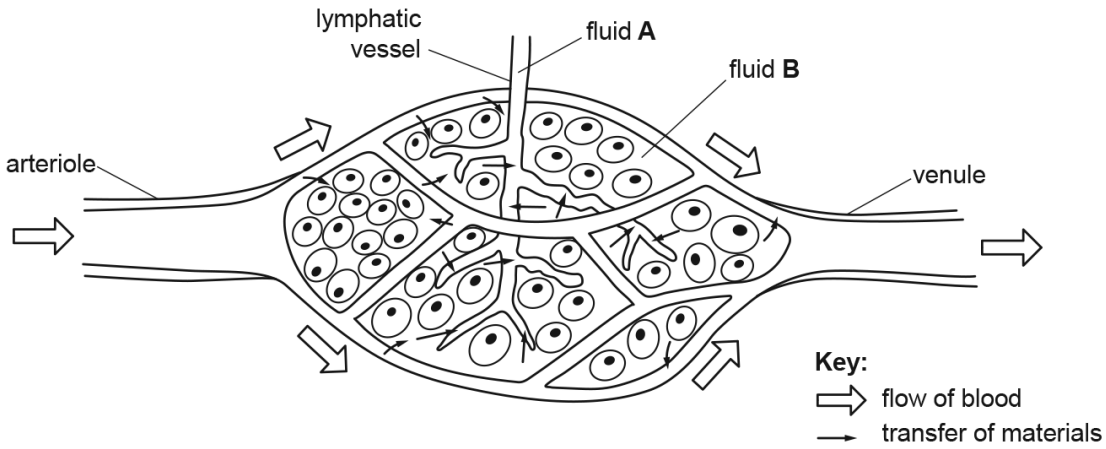

Fig. 2.1

(i) Complete Table 2.1 by:

- stating the names of the fluids
- writing **yes** if the fluid contains red blood cells or **no** if the fluid does **not** contain red blood cells.

Table 2.1

letter on Fig. 2.1	name of the fluid	contains red blood cells
A		
B		

[2]

(ii) State the name of the process by which oxygen is transferred from fluid **B** to the cells.

..... [1]

(iii) Explain why cells need oxygen.

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..... [2]

(b) Describe the functions of arterioles in the skin.

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..... [3]

(c) Describe the functions of lymph nodes in the lymphatic system.

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..... [2]

(d) Lacteals are part of the lymphatic system.

(i) State where in the body lacteals are found.

..... [1]

(ii) Describe the role of lacteals.

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..... [1]

[Total: 12]

09. 0610_p20_qp_40 Q: 2

Fig. 2.1 shows a person sitting in a room. A thermometer shows the temperature of the room.

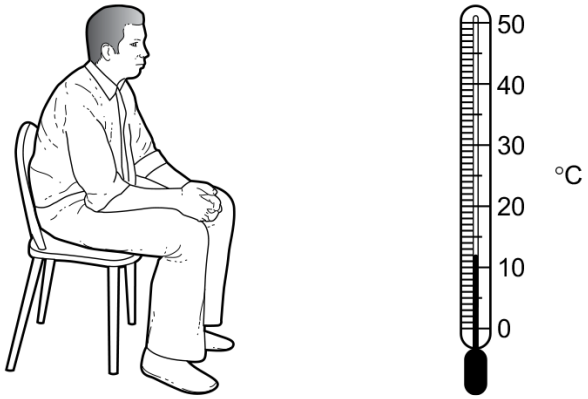

Fig. 2.1

(a) Give **three** uses of energy in the body of the person in Fig. 2.1.

1 .....

2 .....

3 ..... [3]

(b) **(i)** Name the process carried out by the person in Fig. 2.1 that releases energy.

..... [1]

(ii) State the balanced chemical equation that describes this process.

..... [1]

(c) The person leaves the room and runs very fast for 200 m. When the person stops running, his breathing rate and his heart rate remain high for several minutes.

Explain why the person's breathing rate and heart rate remain high.

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..... [4]

(d) The run results in changes in the skin involving the blood vessels and the sweat glands.

Describe what happens to the blood vessels and sweat glands during the run.

Explain why these changes happen.

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..... [5]

[Total: 14]

10. 0610_s20_qp_42 Q: 1

Homeostasis is the maintenance of a constant internal environment.

(a) Human skin is involved in the maintenance of a constant internal body temperature.

(i) Skin is an organ.

State why the skin is an organ.

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..... [1]

(ii) State the name of the organ that coordinates the control of body temperature.

..... [1]

Fig. 1.1 shows a diagram of a section through human skin.

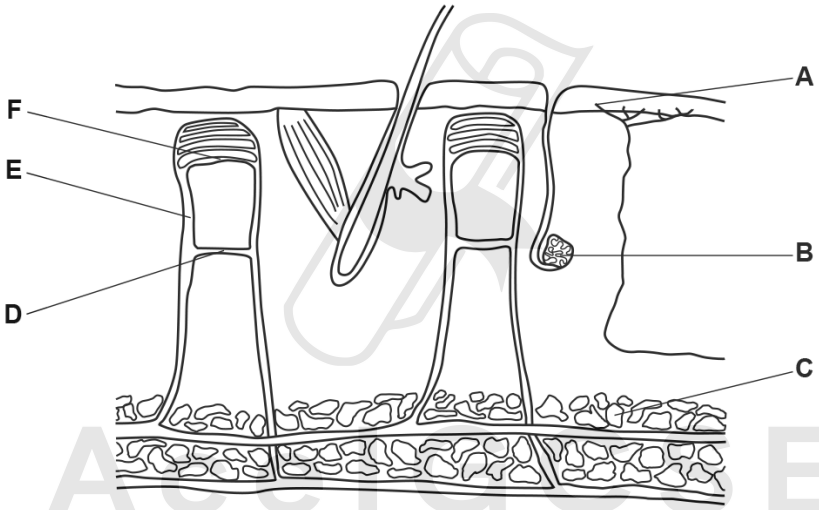

Fig. 1.1

(iii) State the names of structures **A**, **B** and **C** in Fig. 1.1.

A .....

B .....

C .....

[3]

(iv) Structure **D** is a shunt vessel and **E** is an arteriole.

Describe how these blood vessels are involved in maintaining a constant internal body temperature in a cold environment.

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..... [3]

(b) Energy is used to maintain body temperature.

State **three other** uses of energy in humans.

1 .....

2 .....

3 .....

[3]

[Total: 11]

11. 0610_s18_qp_41 Q: 4

The flow of blood through the skin can be investigated by using a flow-meter.

Fig. 4.1 shows a flow-meter above a section through the skin.

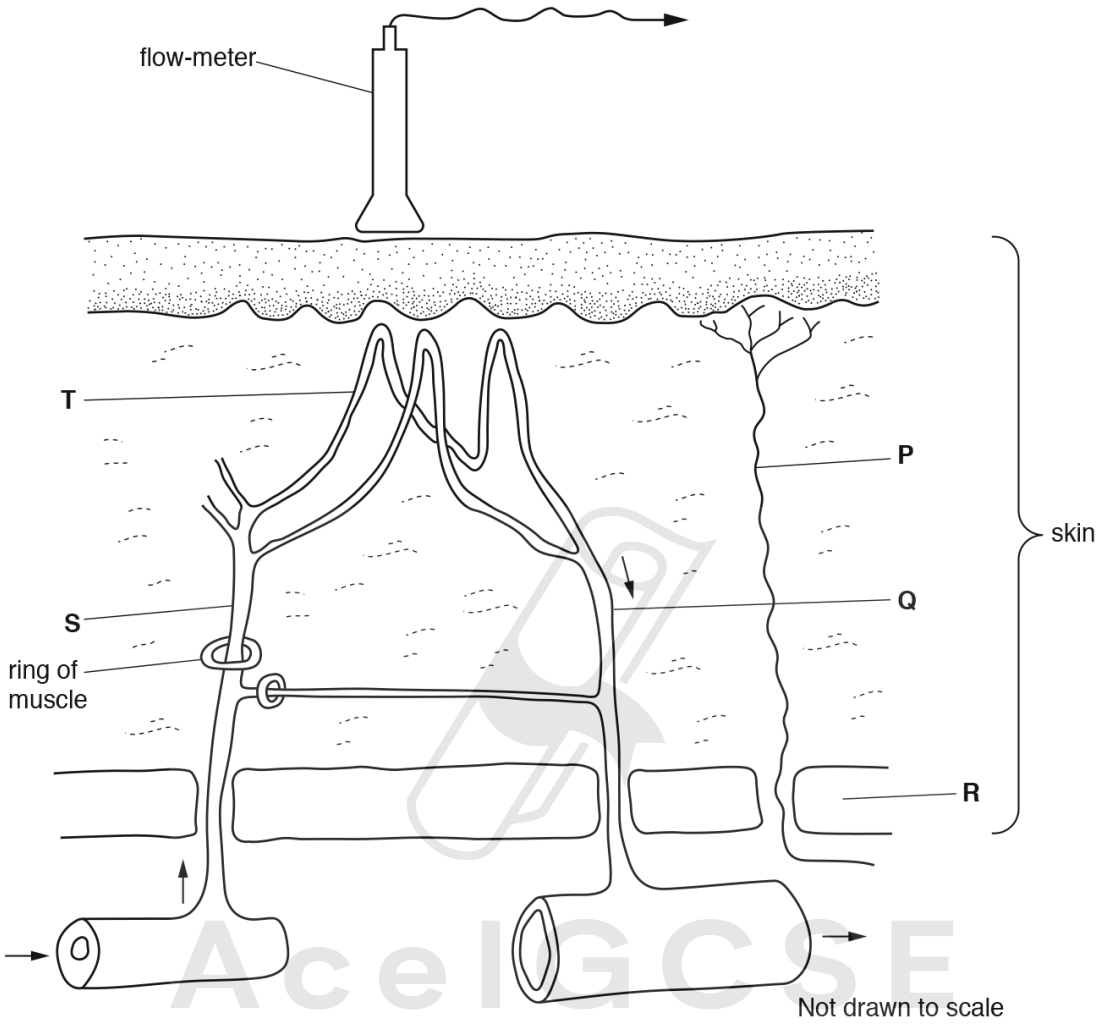

Fig. 4.1

(a) (i) State the name of cell **P**.

.....[1]

(ii) State the types of blood vessel labelled **Q**, **S** and **T**.

Q .....

S .....

T .....

[3]

(iii) State the name of the tissue at **R** that provides insulation.

.....[1]

(b) The blood flow through the skin of some volunteers was measured with a flow-meter when their skin was exposed to different temperatures.

Capsaicin is a compound that gives people the sensation of feeling hot when it is put on the skin. Researchers applied capsaicin to the skin of the volunteers and again measured the blood flow through their skin at different temperatures.

Fig. 4.2 shows the results.

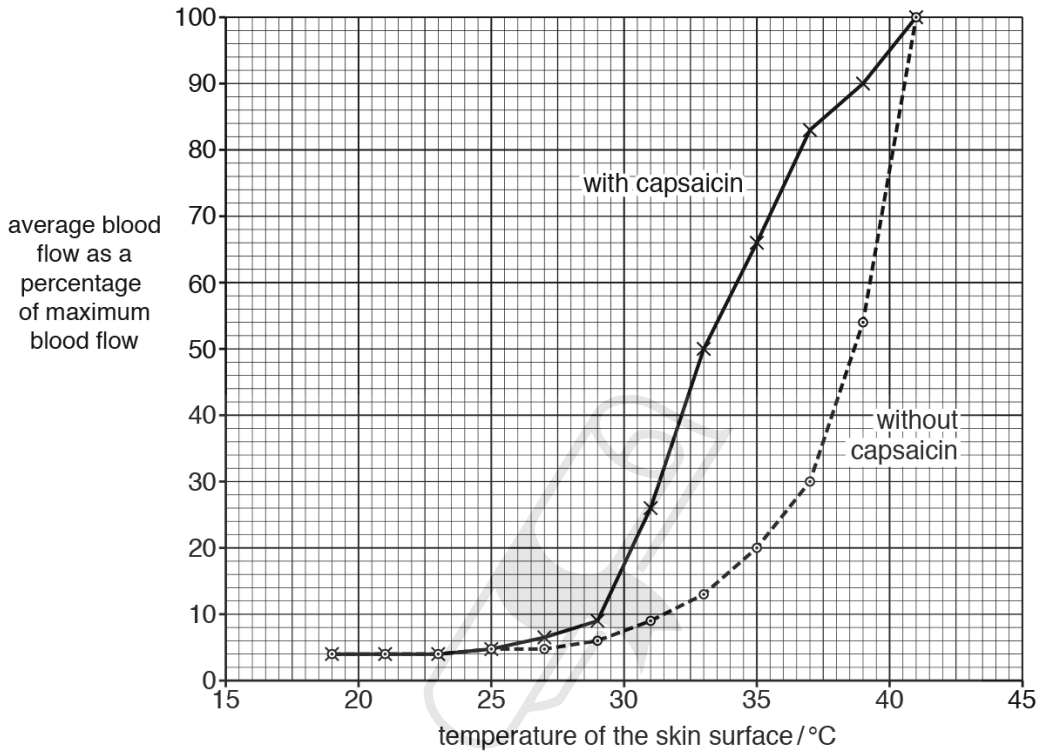

Fig. 4.2

(i) Use the information in Fig. 4.2 to describe the effect of increasing the temperature of the skin surface on blood flow to the skin **without** capsaicin.

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.....[3]

(ii) Explain the mechanism that increases blood flow through the skin.

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.....[3]

(iii) State the difference between the average blood flow for the treatments (with and without capsaicin) at 35 °C.

Space for working.

..... % [1]

(iv) The researchers thought that capsaicin stimulated receptors in the skin.

Explain the process by which capsaicin could reach these receptors.

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.....[3]

(c) Explain the importance of regulating body temperature in humans.

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.....[4]

(d) Body temperature is controlled by both hormones and nerves.

Explain how co-ordination by hormones differs from co-ordination by nerves.

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.....[3]

[Total: 22]

12. 0610_w18_qp_42 Q: 4

Insulin is a hormone that regulates the concentration of glucose in the blood.

(a) Define the term *hormone*.

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..... [3]

(b) Two people, **A** and **B**, visited a doctor to discuss their similar symptoms. The doctor thought that their blood glucose concentrations were not very well controlled. A glucose tolerance test was carried out on both people.

A and **B** did not eat or drink anything other than water for eight hours before the test. They then drank a glucose solution. Blood samples were taken at 30 minute intervals. The samples were tested for glucose concentration.

The results are shown in Fig. 4.1.

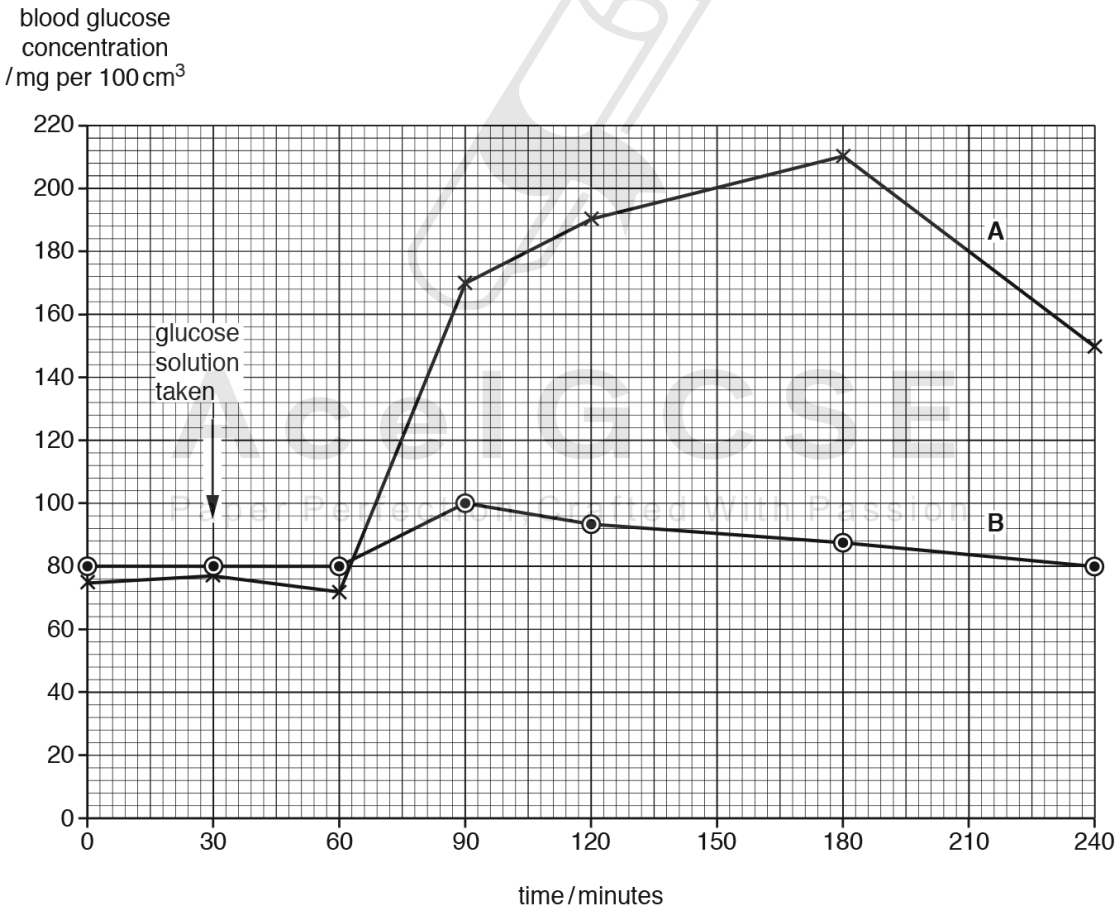

Fig. 4.1

(i) Use Fig. 4.1 to state the blood glucose concentrations of **A** and **B** at 180 minutes.

A ..... mg per 100 cm^3

B ..... mg per 100 cm^3
[1]

(ii) Calculate the percentage increase in the blood glucose concentration in person **A** between 60 and 90 minutes.

Give your answer to the nearest whole number.

Show your working.

..... %
[2]

(iii) Describe how the response of person **A** differs from the response of person **B** in Fig. 4.1.

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..... [2]

(iv) Explain the results of the glucose tolerance test shown by person **B**.

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..... [4]

(v) The doctor thought that person **A** had Type 1 diabetes.

Describe **three** symptoms of Type 1 diabetes.

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..... [3]

[Total: 15]

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13. 0610_w17_qp_42 Q: 6

Glucose is absorbed into the blood in the small intestine. Fig. 6.1 shows the human circulatory system and the pathway taken by molecules, such as glucose, when they travel in the blood.

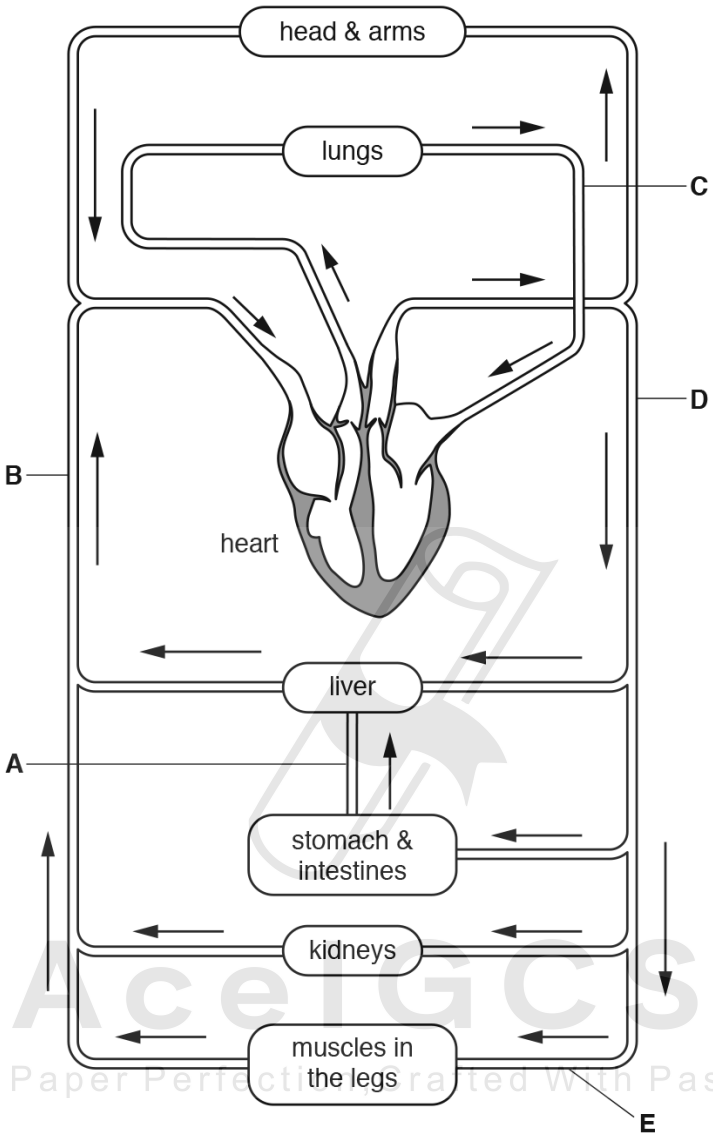

Fig. 6.1

(a) Complete Table 6.1 by naming the blood vessels labelled on Fig. 6.1 and stating whether they contain oxygenated blood or deoxygenated blood. One row has been completed for you.

Table 6.1

letter on Fig. 6.1	name of the blood vessel	oxygenated or deoxygenated blood
A		
B		
C		
D		
E	femoral artery	oxygenated

[4]

(b) Insulin is a hormone that is secreted by the pancreas.

(i) Define the term *hormone*.

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.....[2]

(ii) Describe the role of insulin in the body.

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.....[3]

(c) Explain how blood flow in the skin helps to maintain a constant body temperature in very hot conditions.

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.....[3]

[Total: 12]

14. 0610_w17_qp_43 Q: 6

Fig. 6.1 is a flow chart of some of the events that occur to maintain a constant body temperature.

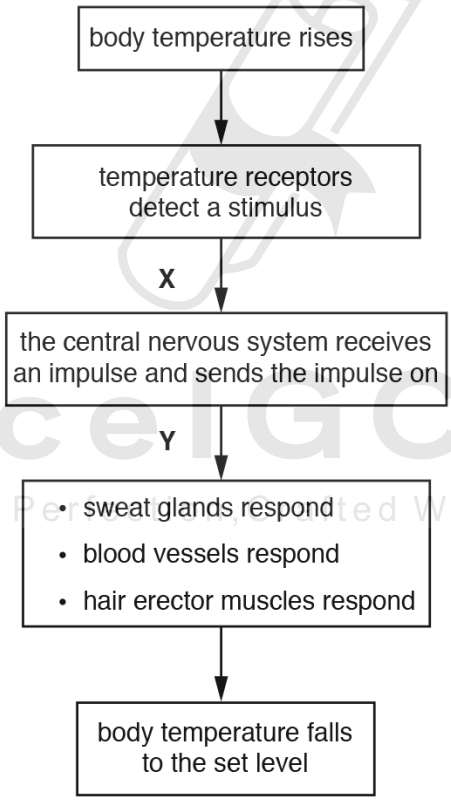

Fig. 6.1

(a) (i) State the names of the types of neurones at **X** and **Y** in Fig. 6.1.

X .....

Y .....
[2]

(ii) State the name of **one** effector shown in Fig. 6.1.

.....[1]

(iii) State the name of the mechanism that controls homeostasis which is represented by the flowchart in Fig. 6.1.

.....[1]

(b) (i) Describe how shunt vessels in the skin function to help cool the body when the body temperature is high.

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.....[3]

(ii) Describe how the sweat glands and the hair erector muscles function in mammals when the external environment is hot.

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.....[3]

(c) **(i)** Suggest an advantage of using neurones rather than hormones to regulate body temperature.

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.....[1]

(ii) List **two** hormones that are involved in homeostasis.

1 .....

2 .....

[2]

[Total: 13]

15. 0610_p16_qp_40 Q: 2

Fig. 2.1 shows a person sitting in a room. A thermometer shows the temperature of the room.

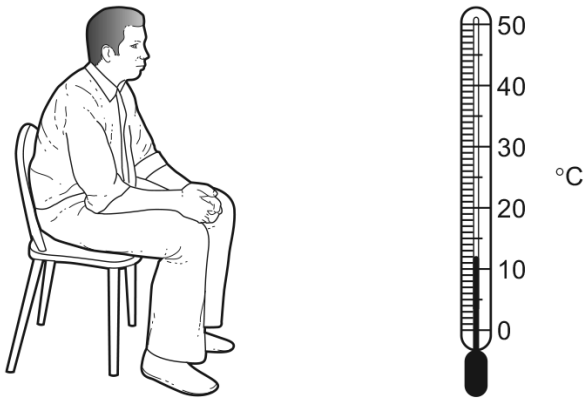

Fig. 2.1

(a) Give **three** uses of energy in the body of the person in Fig. 2.1.

1 .....

2 .....

3 ..... [3]

(b) **(i)** Name the process carried out by the person in Fig. 2.1 that releases energy.

..... [1]

(ii) State the balanced chemical equation that describes this process.

..... [1]

(c) The person leaves the room and runs very fast for 200 m. When the person stops running, his breathing rate and his heart rate remain high for several minutes.

Explain why the person's breathing rate and heart rate remain high.

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..... [4]

(d) The run results in changes in the skin involving the blood vessels and the sweat glands.

Describe what happens to the blood vessels and sweat glands during the run.

Explain why these changes happen.

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..... [5]

[Total: 14]

16. 0610_s16_qp_42 Q: 6

Fig. 6.1 shows the changes in glucose concentration of the blood.

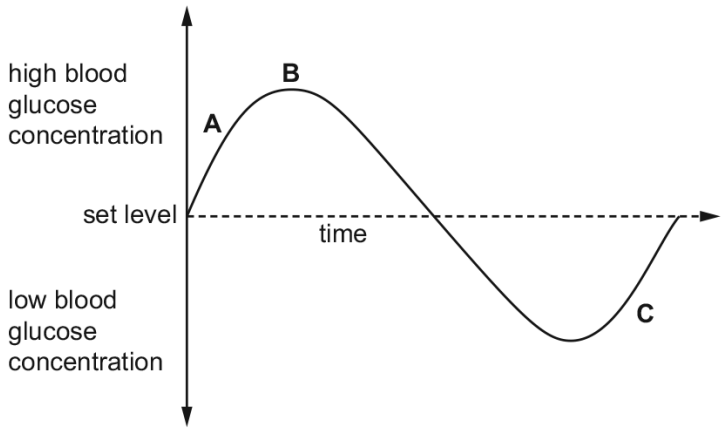

Fig. 6.1

(a) Name the process that maintains blood glucose concentration within set limits.

..... [1]

(b) **(i)** Name the hormone that would be secreted in response to the increasing blood glucose concentration at **A** in Fig. 6.1.

..... [1]

(ii) Name an organ that is responsible for the decrease in blood glucose concentration after **B** in Fig. 6.1.

..... [1]

(iii) Name the compound that is converted to glucose at **C** in Fig. 6.1.

..... [1]

(c) Describe the symptoms **and** treatment of Type 1 diabetes.

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..... [5]

[Total: 9]

17. 0610_m18_qp_42 Q: 5

2,4-D is a synthetic plant auxin that is used as a weedkiller.

Researchers investigated the effectiveness of different treatments of 2,4-D on the control of the weed *Conyza canadensis* in fields of maize, *Zea mays*.

The results are shown in Table 5.1.

Table 5.1

treatment	time of treatment			mean dry mass of weeds / g per m^2	weed density / number of weeds per m^2
	day 7	day 23	day 33		
A	✓			7.40	6.20
B		✓		3.90	4.90
C			✓	0.50	1.20
D	✓	✓		0.66	1.90
E	✓		✓	0.18	0.98
F		✓	✓	0.07	0.29
G	✓	✓	✓	0.08	0.51

(a) (i) Maize farmers that had been using treatment **C** were advised by the researchers to change to treatment **F**.

Discuss the advantages and disadvantages of changing to treatment **F**.

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.....

.....[4]

(ii) Suggest **two** factors that could decrease the effectiveness of 2,4-D.

1 .....

2 .....
[2]

(iii) Explain how 2,4-D acts as a weedkiller.

.....

.....

.....

.....

.....

.....

.....[3]

(b) Auxin causes the shoots of a plant to grow away from gravity.

State the name of this response.

.....[2]

[Total: 11]

18. 0610_s18_qp_43 Q: 4

(a) The endocrine system in mammals produces hormones.

Define the term *hormone*.

.....

.....

.....

.....

.....[2]

(b) The responses of the human body to danger are coordinated by the nervous and endocrine systems.

Fig. 4.1 shows the sequence of events that occurs in response to a dangerous situation that is detected by the eyes.

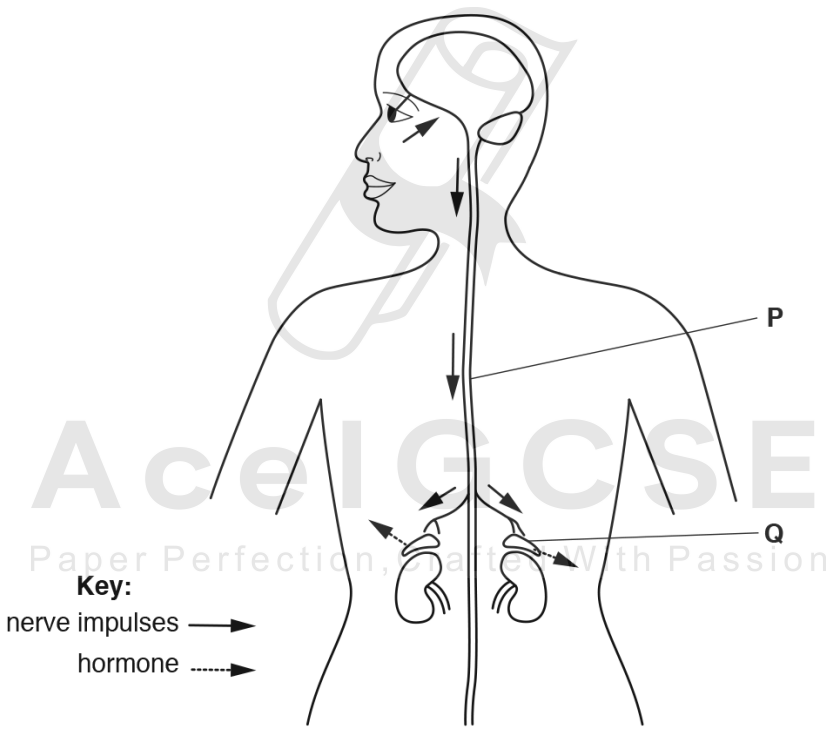


Fig. 4.1

(i) State the tissue in the eye that converts light energy into nerve impulses.

.....[1]

(ii) State the part of the eye that has the highest concentration of light-sensitive cells and gives the most detailed image.

.....[1]

(iii) State the type of neurone that conducts impulses from the eye to the brain.

.....[1]

(iv) State the nerve that contains these neurones that conduct impulses from the eye to the brain.

.....[1]

(v) Identify the organ labelled **P**.

.....[1]

(vi) Identify the gland labelled **Q**.

.....[1]

(c) Complete Table 4.1 to describe the effects of the hormone released when a person is in a dangerous situation.

Table 4.1

organ	effect of the hormone
heart	
liver	
lungs	
eyes	

[4]

(d) Explain the advantages of coordinating the response to a dangerous situation using both the nervous system and the endocrine system.

.....

.....

.....

.....

.....

.....

.....[4]

(e) **(i)** Plants also make hormones.

State the name of **one** hormone made by plants.

.....[1]

(ii) Some plant hormones are manufactured and applied to crops to alter aspects of plant growth.

Describe how the synthetic plant hormone 2,4-D is used in agriculture.

.....

.....

.....

.....

.....[2]

[Total: 19]

19. 0610_s16_qp_41 Q: 2

The nervous system coordinates the responses of animals to changes in their environment.

(a) Fig. 2.1 shows the arrangement of the nervous system in a mammal.

Complete Fig. 2.1 by writing the names of the missing parts of the mammalian nervous system in the boxes.

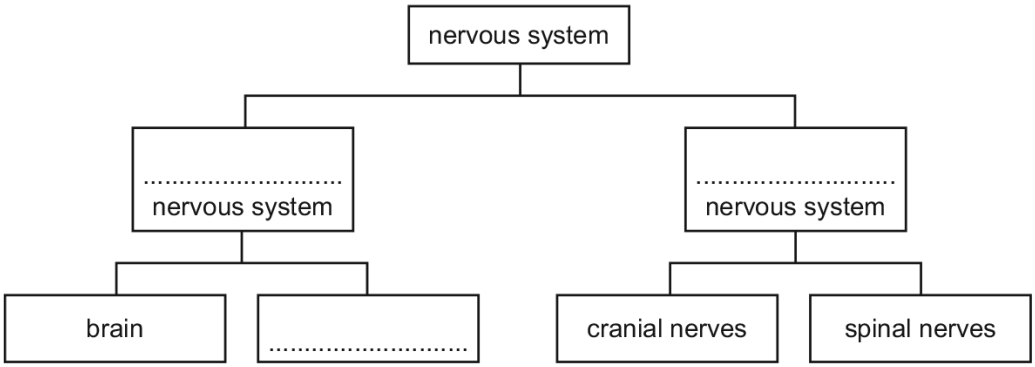


Fig. 2.1

[3]

(b) Fig. 2.2 is a flow chart that shows how an involuntary action is controlled.

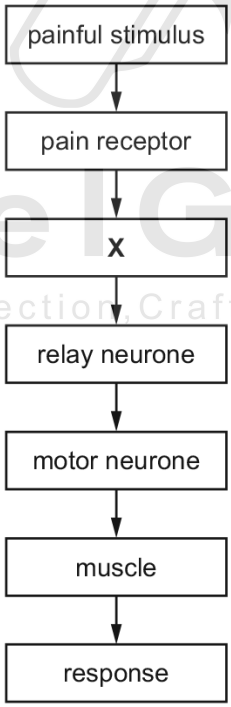


Fig. 2.2

(i) State the structure found at **X**.

..... [1]

(ii) State the type of involuntary action shown by the flow chart.

..... [1]

(iii) State **two** ways in which a voluntary action differs from an involuntary action.

1 .....

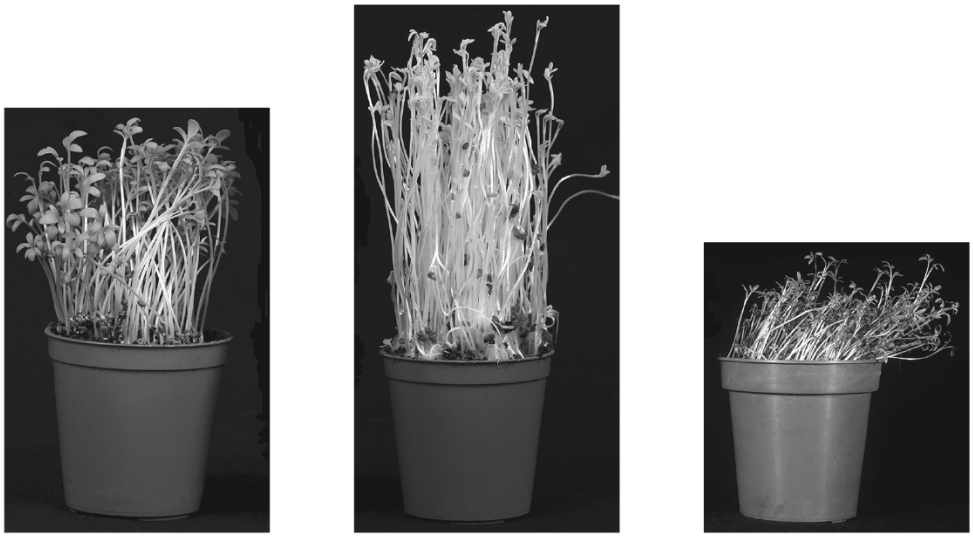
.....

2 .....

.....

[2]

(c) Fig. 2.3 shows three pots of seedlings that have been kept in different conditions.



pot **P** pot **Q** pot **R**

Fig. 2.3

(i) State the conditions in which pots **P** and **Q** were kept.

P .....

Q .....

[1]

(ii) State the name of the growth response shown by the seedlings in pot **R**.

..... [2]

(iii) Explain the advantage to the seedlings of this growth response.

.....

.....

.....

.....

..... [2]

(iv) Auxins control the growth responses of seedlings.

Explain how auxins control the growth response of the seedlings in pot **R**.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 16]

20. 0610_s16_qp_43 Q: 2

Fig. 2.1 is a flow chart that shows the events that occur as light travels through the eye.

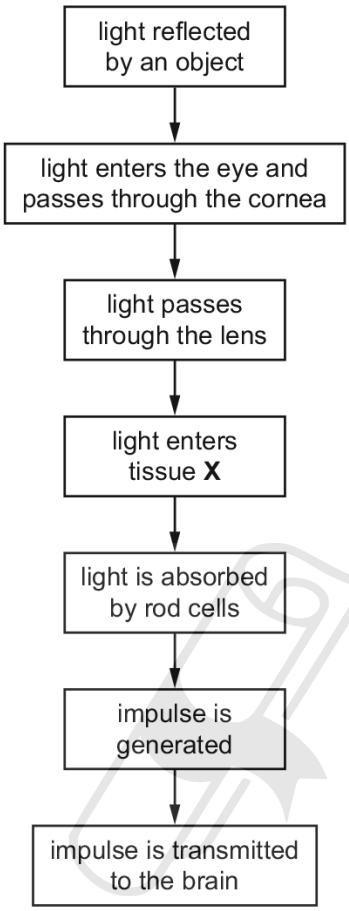


Fig. 2.1

(a) **(i)** State the name of the tissue **X**.

..... [1]

(ii) State the name of the nerve that transmits impulses from the eye to the brain.

..... [1]

(iii) State what happens to rays of light as they enter the cornea and the lens.

..... [1]

(iv) Describe the role of rod cells.

.....

.....

.....

.....

..... [2]

(b) A plant, *Arabidopsis thaliana*, was placed on its side in the dark. Fig. 2.2 is a series of drawings made of the plant, over seven days, as it responded to a change in its surroundings.

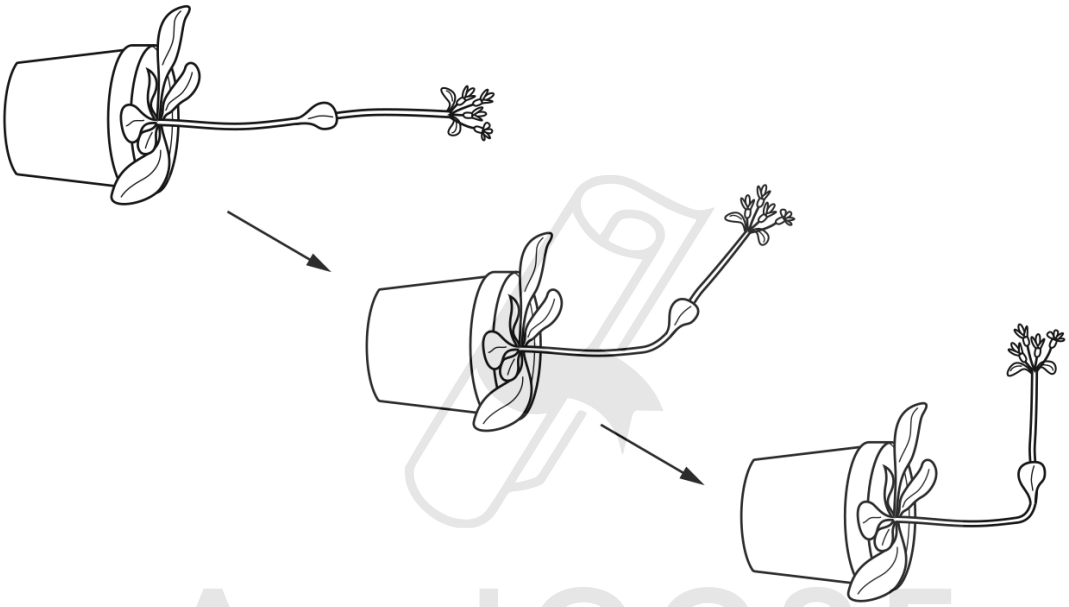


Fig. 2.2

(i) State the stimulus to which the plant responded.

..... [1]

(ii) Name the growth response shown by the plant.

..... [2]

(iii) Explain the advantage to plants of the growth response shown in Fig. 2.2.

.....

.....

.....

.....

..... [2]

(iv) Auxins control the growth responses of seedlings.

Explain how auxins control the growth response of *A. thaliana*, shown in Fig. 2.2.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 14]

01. 0610_s17_MS_41 Q: 3

	Answer	Mark	Partial Marks
(a)	any, chemical / substance, taken into / AW, the body ; modifies / affects / changes / AW, (chemical) reactions / metabolism ;	2	**I** behaviour
(b)	**1** vesicles (containing neurotransmitter) move to the cell membrane ; **2** vesicles fuse with cell membrane ; **3** release of neurotransmitter ; **4** (neurotransmitters/chemicals) diffuse across, synapse / synaptic cleft *or* gap ; **5** neurotransmitter binds to, receptor / protein on cell surface ; **6** neurotransmitter and receptor are complementary / AW ; **7** results in an impulse in, relay / next, neurone ;	4	**A** stimulates the, relay / next, neurone
(c)	neurotransmitter released / vesicles, on one side of synapse ; receptors / described, only found on the opposite side of synapse ;	2	
(d)	**1** heroin is converted into morphine ; **2** heroin diffuses into synapse ; **3** heroin binds to receptors (for neurotransmitter) ; **4** ref to, endorphin / encephalin, receptors / neurotransmitter ; **5** ref to heroin being complementary to receptor ; **6** blocks neurotransmitter entering receptor site ; **7** (or) stimulates receptor ; **8** reduced / increased, pain perception ; as appropriate **9** AVP ; morphine stimulates release of dopamine acts on relay neurone even when no impulse in neurone **B**	3	**A** competes for binds **R** 'same shape' as receptor **I** ref to summation **A** antagonist **A** agonist
(e)	light ; temperature / heat / cold ; sound / vibration ; chemicals / taste / smell / pH ; pressure / touch ; position / gravity ; movement ; stretch (in muscle / tendons) ;	3	

02. 0610_s17_MS_43 Q: 6

	Answer	Mark	Partial Marks
(a)	(disease is caused by) a pathogen ; passes from one host to another ;	2	
(b)	1 electrical signal ; 2 passes along / AW, a, nerve cell / neurone ; 3 in one direction ;	2	**I** impulse
(c)(i)	1 (vaccine contains) harmless / attenuated / dead / AW, form of, (named) pathogen / antigen ; 2 (antigens / vaccine) stimulate an immune response ; 3 ref to lymphocytes ; 4 lymphocytes / white blood cells, make antibodies ; 5 ref to specificity ; 6 production of memory cells ; 7 rapid, immune response / AW, if exposed to same, pathogen / antigen ; 8 gives long-term immunity ; 9 AVP ;	4	
(c)(ii)	1 bacteria may still be present (in the population) ; 2 in carriers / in people who have no symptoms ; 3 infected people moving into the, country / area / AW ; 4 if few people are, immune / vaccinated, bacterium is more likely to be transmitted ; 5 idea of herd immunity ; 6 some people cannot respond to, antigens / vaccines ; 7 protects people who travel to other countries ; 8 booster vaccinations are sometimes required) / AW ;	2	**MP5 A** new people arriving in a country (who are not vaccinated) **MP6** e.g. people with HIV / babies / elderly
(d)(i)	1 antibodies are made of protein ; 2 proteins / antibodies, are digested / denatured, in the alimentary canal ; 3 direct route to site of infection ;	2	
(d)(ii)	1 no (active) immune response ; 2 no memory cells ; 3 antibodies are broken down in the body ; 4 antibodies are not made by body's own lymphocytes ;	2	

03. 0610_s19_MS_42 Q: 4

	Answer	Mark	Partial Marks
(a)	long, to transmit (impulse), over (long) distance / faster / direct connection ; mitochondria to (release energy), for transmission impulse / protein synthesis / active transport / making (neuro)transmitters ; vesicles to, carry / hold / release, chemicals / (neuro)transmitters (into synapse) ; (neuro)transmitters are released, to allow connection to other neurones / across a synapse ; receptors / vesicles, allow unidirectional transmission ; AVP ;;	3	
(a)(ii)	brain and spinal cord (only) ;	1	
(b)(i)	stimulus / light (detected by) retina / rod / cone / receptor ; *reference to* (electrical) impulse / electrical signal ; sensory neurone → relay / connector, neurone → motor neurone ; *reference to* synapses between neurones ; effector / (circular) muscles (in iris), contract / respond ;	3	
(b)(ii)	automatic / involuntary ; receptors / neurones / nerve, still function ;	1	
(c)(i)	**E** – vesicle ; **F** – neurotransmitter ; **G** – (neurotransmitter) receptor (molecule / site / protein) ;	3	
(c)(ii)	arrow drawn from right to left, pointing left ;	1	

04. 0610_w17_MS_41 Q: 4

<table>
<tr><th></th><th>Answer</th><th>Mark</th><th>Partial Marks</th></tr>
<tr><td>(a)(i)</td><td>stem (cells) ;</td><td>1</td><td></td></tr>
<tr><td>(a)(ii)</td><td>nucleus / nucleolus / nuclear membrane ;
cell membrane ;
cytoplasm ;
ribosomes ;
mitochondria ;
endoplasmic reticulum / ER ;
vesicle / vacuole ;.
AVP ;</td><td>2</td><td>R large permanent vacuole
A Golgi apparatus, lysosome, centrioles</td></tr>
<tr><td>(a)(iii)</td><td>(transmit impulses) from one (distant) part of the body to another / AW;
so (impulse) is fast / AW ;</td><td>1</td><td></td></tr>
<tr><td>(b)(i)</td><td>motor (neurones) ;</td><td>1</td><td></td></tr>
<tr><td>(b)(ii)</td><td>muscle ;
gland ;</td><td>1</td><td></td></tr>
<tr><td>(c)(i)</td><td>
<table>
<tr><th>letter from Fig. 4.1</th><th>name</th><th>description</th></tr>
<tr><td>E</td><td>mitochondrion / mitochondria ;</td><td>component of the cell that releases energy during aerobic respiration</td></tr>
<tr><td>H</td><td>neurotransmitters</td><td>chemicals that transmit signals from one neurone to the next neurone</td></tr>
<tr><td>J</td><td>synapse ;</td><td>the gap between two neurones</td></tr>
<tr><td>F/G</td><td>vesicle ;</td><td>the sac in which neurotransmitters are transported to the cell membrane</td></tr>
<tr><td>K</td><td>receptors ;</td><td>the molecules that the neurotransmitters bind to</td></tr>
<tr><td>M</td><td>nucleus ;</td><td>the structure that controls the activities in the cell</td></tr>
</table>
</td><td>5</td><td>one mark per correct row</td></tr>
<tr><td>(c)(ii)</td><td>brain / spinal cord / central nervous system / CNS ;</td><td>1</td><td></td></tr>
<tr><td>(d)</td><td>diffusion ;
from high concentration to low concentration / down a concentration gradient ;
direction described ;
AVP ;</td><td>3</td><td></td></tr>
<tr><td>(e)</td><td>nerves faster / hormones slower ;
nerve impulses are a short lived response / ora ;</td><td>1</td><td></td></tr>
</table>

05. 0610_m20_MS_42 Q: 3

	Answer	Mark	Partial Marks
(a)	as the ability to detect or sense stimuli in the internal or external environment ; and to make appropriate responses ;	2	
(b)	eye and skin ; AVP ;	1	apply list rule
(c)(i)	as a control / for a comparison / AW ; to see if blood glucose (concentration) was affected by an injection ; so there is no effect, on water potential / osmotic effect ;	2	
(c)(ii)	(before the injection) blood glucose was decreasing ; *after the injection:* peaks at 4.75 mmol per dm^3 ; increase is immediate / steep (after injection of adrenaline) ; less steep / gradual, decrease after peak ; decreases below initial starting value / below 4.4 or 4.5 mmol per dm^3 / decreases to 3.9 mmol per dm^3 ; *blood glucose increases* converts glycogen to glucose ; in the liver ; *blood glucose decreases* glucose used in respiration ; AVP ;; e.g. insulin causes blood glucose concentration to decrease / glucagon causes the blood glucose concentration to increase	5	
(d)	line sketched on the graph showing an increase ; increase starts after 2 hours ;	2	
(e)	*any two from:* widened / dilated pupils ; increased, pulse / heart, rate ; increased breathing rate ; increased blood pressure ; AVP ;;	2	apply list rule

06. 0610_p20_MS_40 Q: 3

(a) ability to detect and respond to changes in the environment; [1]

(b) correct label and name of:
sensory neurone;
relay / connector / intermediate neurone;
motor / effector neurone; [3]

(c) automatic / no thought required / not a conscious action;
allow: no (higher centres in) brain involved
ignore: reference to speed of response
stimulus always leads to the same response;
allow: fixed response [2]

(d) **(i)** a junction between two neurones; [1]
(ii) Any three from:
(an impulse triggers) the release of neurotransmitters (into the gap);
diffuse across the gap;
binds to receptors;
which allows the passage of the impulse; [max 3]

(e) Any two from:
heart beats faster / increased pulse;
increased rate of breathing;
stimulates breakdown of glycogen in the liver;
increases blood glucose concentration;
dilate pupils;
heightened sensitivity / increased mental awareness / owtte;
allow: sharper senses / more alert / owtte [max 2]

(f) Any one from:
nervous control is faster / ora;
hormonal control is longer-lasting / ora;
note: comparison must be made [max 1]

07. 0610_p16_MS_40 Q: 3

(a) ability to detect and respond to changes in the environment; [1]

(b) correct label and name of:
sensory neurone;
relay / connector / intermediate neurone;
motor / effector neurone; [3]

(c) automatic / no thought required / not a conscious action;
allow: no (higher centres in) brain involved
ignore: reference to speed of response
stimulus always leads to the same response;
allow: fixed response [2]

(d) **(i)** a junction between two neurones; [1]

(ii) Any three from:
(an impulse triggers) the release of neurotransmitters (into the gap);
diffuse across the gap;
binds to receptors;
which allows the passage of the impulse; [max 3]

(e) Any two from:
heart beats faster / increased pulse;
increased rate of breathing;
stimulates breakdown of glycogen in the liver;
increases blood glucose concentration;
dilate pupils;
heightened sensitivity / increased mental awareness / owtte;
allow: sharper senses / more alert / owtte [max 2]

(f) Any one from:
nervous control is faster / ora;
hormonal control is longer-lasting / ora;
note: comparison must be made [max 1]

<table>
<tr><th></th><th>Answer</th><th>Mark</th><th>Partial Marks</th></tr>
<tr><td>(a)(i)</td><td><table><tr><th>letter on Fig. 2.1</th><th>name of the fluid</th><th>contains red blood cells</th></tr><tr><td>A</td><td>lymph</td><td>no</td></tr><tr><td>B</td><td>tissue</td><td>no</td></tr></table>;;</td><td>2</td><td>1 mark for each correct column</td></tr>
<tr><td>(a)(ii)</td><td>diffusion ;</td><td>1</td><td></td></tr>
<tr><td>(a)(iii)</td><td>(aerobic) respiration ;
for the release of energy ;
for a (named) metabolic process ;</td><td>2</td><td></td></tr>
<tr><td>(b)</td><td>1 deliver / supplies, blood / oxygen / glucose (from arteries) to, capillaries / shunt vessels ;
2 controls blood flow, through capillaries / to the surface of the skin ;
3 by vasoconstriction / vasodilation ;
4 ref to (arteriole) muscle contraction / relaxation ;
5 ref to maintenance of body temperature / homeostasis / description of ;</td><td>3</td><td></td></tr>
<tr><td>(c)</td><td>contains lymphocytes (which produce antibodies) ;
filters the lymph ;
ref. to immunity / defends against disease / ref. to destruction of (named) pathogens ;</td><td>2</td><td>A stores I produces</td></tr>
<tr><td>(d)(i)</td><td>small intestine / villi ;</td><td>1</td><td></td></tr>
<tr><td>(d)(ii)</td><td>fat, absorption / transport ;</td><td>1</td><td></td></tr>
</table>

09. 0610_p20_MS_40 Q: 2

(a) Any three from:
muscular contraction / movement / pump blood;
allow: maintain posture
maintenance of body temperature;
active transport described / example such as nerve impulses;
metabolic reactions / named example (e.g. excretion / biosynthesis / digestion);
mitosis / nuclear division / cell division;
growth / replacement / repair;
making gametes / owtte;
avp; [max 3]

(b) **(i)** respiration; [1]

(ii) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ [1]

(c) Any four from:
takes time for;
oxygen debt (to be repaid);
more oxygen needed;
lactic acid / lactate;
builds up in muscles / needs to be cleared away;
lactic acid is broken down / respired; [max 4]

(d) Any five from:
as body temperature increases;
vasodilation;
(relaxation / owtte) of arterioles;
allow: arteries
increase in supply of blood to skin capillaries;
(causes) loss of heat;
by, conduction / convection / radiation;
increase in blood flow to sweat glands;
increased production of sweat;
loss of heat by evaporation; [max 5]

10. 0610_s20_MS_42 Q: 1

(a)(i)	(because it is made of) a group of tissues working together to perform specific functions ;	1
(a)(ii)	brain ;	1
(a)(iii)	**A** (thermo)receptor ; **B** sweat gland ; **F** fatty tissue / fat cell(s) ;	3
(a)(iv)	*any three from:* vasoconstriction (of arterioles / **E**) ; shunt vessels / **D**, dilate / widen ; less blood flow to skin (capillaries) / **F** ; reduces heat loss from blood ;	3
(b)	*any three from:* muscle contraction ; protein synthesis ; cell division ; active transport ; growth ; passage of nerve impulses ;	3

11. 0610_s18_MS_41 Q: 4

	Answer	Mark	Partial Marks
(a)(i)	sensory neurone / (temperature / thermo-) receptor (neurone) ;	1	
(a)(ii)	**Q** venule ; **S** arteriole ; **T** capillary ;	3	
(a)(iii)	fat / fatty tissue ;	1	
(b)(i)	blood flow remains constant **and** then increases / AW ; blood flow remains at, 4 / 5% ; increase in blood flow from 25 (□2) °C ; to, maximum / 100%, at 41 °C ;	3	
(b)(ii)	detection by, sensory neurone / receptor (in skin) ; brain / hypothalamus, as control centre / AW ; impulses in, motor / effector, neurones ; muscles in, shunt vessels contract / arterioles relax ; so shunt vessels, constrict / close ; arterioles dilate / vasodilation ; increased / more, blood flow, into capillaries / near surface (of skin) ;	3	**A** brain / hypothalamus, detecting temperature
(b)(iii)	46 (%) ;	1	
(b)(iv)	diffusion ; down concentration gradient / high to low concentration ; active transport ; through epidermis ; between / into / through, cells ; across cell membranes ; AVP ;	3	
(c)	(so that) enzymes do not denature / enzymes remain active / maintains optimum temperature for enzymes ; *idea of* maintaining a constant rate of, reactions / metabolism / respiration ; avoids to damage to other named (type of) protein ; avoids damage to cell membranes ; avoids, heatstroke / hyperthermia / overheating / dehydration / freezing / chills / becoming too cold / hypothermia ; at high temperature sperm production, reduced / harmed ; AVP ;	4	e.g. (permits) colonisation of different parts of the world / different climates active in, both day and night / different seasons
(d)	hormones are chemicals / hormonal coordination is only chemical ; transported in the, blood / circulatory system ; (effects are) slower (than nerves) ; **ora** (effects are) longer lasting ; **ora** each hormone may have more than one target, organ / tissue / cells ; **ora**	3	

12. 0610_w18_MS_42 Q: 4

	Answer	Mark	Partial Marks
(a)	chemical substance produced by a (endocrine) gland ; carried by the blood ; alters the activity of specific target organs / AW ;	3	
(b)(i)	(**A**) 210 (mg 100 per cm^3) **and** (**B**) 88 (mg 100 per cm^3) ;	1	
(b)(ii)	136 (%) ;;	2	
(b)(iii)	increases / decreases, more steeply / faster ; increases to / has, a higher concentration ; reaches a peak / decreases, (much) later ; does not return to, starting concentration / original value / normal / AW ; any comparative use of figures with correct units ;	2	
(b)(iv)	increase in glucose concentration detected (by pancreas) ; insulin is, secreted / released (into the blood) ; *role of* the pancreas in, detection / secretion of hormones ; insulin, stimulates / AW, liver / muscle ; increase, uptake / respiration, of glucose ; glucose is converted to glycogen ; activation / AW, of enzymes (in liver cells) ; (blood) glucose concentration, decreases / maintained ; *ref. to* homeostasis / negative feedback ;	4	
(b)(v)	tiredness / lethargy / fatigue / described ; breathlessness ; dizziness / fainting / light-headedness / coma ; frequent urination / AW ; sticky / sweet, urine ; urinary tract infection / UTI ; recurrent thrush ; thirsty (all the time) / drinking lots of water ; dry mouth ; weight loss ; hunger / eating a lot of food ; sweet-smelling breath ; change(s) in behaviour ; e.g. irritability / confusion / mood swings nausea / vomiting ; blurred vision / blindness ; cuts / grazes / wounds, that do not heal ; AVP ;	3	

13. 0610_w17_MS_42 Q: 6

<table>
<tr><th></th><th>Answer</th><th>Mark</th><th>Partial Marks</th></tr>
<tr><td>(a)</td><td>
<table>
<tr><th>blood vessel</th><th>name of blood vessel</th><th>oxygenated / deoxygenated</th></tr>
<tr><td>A</td><td>hepatic portal vein</td><td>deoxygenated ;</td></tr>
<tr><td>B</td><td>(inferior) vena cava</td><td>deoxygenated ;</td></tr>
<tr><td>C</td><td>pulmonary vein</td><td>oxygenated ;</td></tr>
<tr><td>D</td><td>aorta</td><td>oxygenated ;</td></tr>
<tr><td>E</td><td>femoral artery</td><td>oxygenated ;</td></tr>
</table>
</td><td>4</td><td></td></tr>
<tr><td>(b)(i)</td><td>chemical / substance, made by a gland ;
travels in the blood (plasma) ;
alters the activity of one or more specific target organs ;</td><td>2</td><td>I proteins R enzymes

A alters activity of / affects, target organ(s)
A controls</td></tr>
<tr><td>(b)(ii)</td><td>1 controls blood, glucose / sugar, concentration / level ;
2 increased, uptake / respiration, of glucose ;
3 (simulates cells to) convert glucose to glycogen ;
4 idea that target organs are, muscle / liver ;
5 (so) decreases blood glucose concentration ;
6 ref to, negative feedback / homeostasis ;</td><td>3</td><td></td></tr>
<tr><td>(c)</td><td>1 shunt vessels, constrict / close / AW ;
2 less blood flow through shunt vessels ;
3 arterioles, widen / dilate / relax ;
4 vasodilation (in context of arteries and arterioles) ;

5 more blood flow (through capillaries) near the surface of the skin / AW ;
6 (more) heat loss from blood (by radiation) ;</td><td>3</td><td>

R if in context of capillaries / veins
A ‘blood vessels’</td></tr>
</table>

14. 0610_w17_MS_43 Q: 6

<table>
<tr><th></th><th>Answer</th><th>Mark</th><th>Partial Marks</th></tr>
<tr><td>(a)(ii)</td><td>sweat glands ;
blood vessels ;
hair erector muscles ;</td><td>1</td><td></td></tr>
<tr><td>(a)(iii)</td><td>negative feedback ;</td><td>1</td><td></td></tr>
<tr><td>(b)(i)</td><td>shunt vessels, constrict / close / AW ;
more / redirect, blood flow to skin (capillaries) ;
heat from blood, lost / radiates ;
vasodilation (of arterioles) ;</td><td>3</td><td>A vasoconstriction

A heat loss from blood vessels</td></tr>
<tr><td>(b)(ii)</td><td>sweat, secreted / made (by sweat glands) ;
evaporative (cooling) ;
hair erector muscles relax ;
(hairs lie flat) so that less (air) insulation / allows more air movement (across skin) ;</td><td>3</td><td>

A less air trapped</td></tr>
<tr><td>(c)(i)</td><td>quick(er) (response) ;
long-term response is not required ;</td><td>1</td><td></td></tr>
<tr><td>(c)(ii)</td><td>insulin ;
glucagon ;
ADH ;
AVP ;</td><td>2</td><td></td></tr>
</table>

15. 0610_p16_MS_40 Q: 2

(a) Any three from:
muscular contraction / movement / pump blood;
allow: maintain posture
maintenance of body temperature;
active transport described / example such as nerve impulses;
metabolic reactions / named example (e.g. excretion / biosynthesis / digestion);
mitosis / nuclear division / cell division;
growth / replacement / repair;
making gametes / owtte;
avp; [max 3]

(b) **(i)** respiration; [1]

(ii) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ [1]

(c) Any four from:
takes time for;
oxygen debt (to be repaid);
more oxygen needed;
lactic acid / lactate;
builds up in muscles / needs to be cleared away;
lactic acid is broken down / respired; [max 4]

(d) Any five from:
as body temperature increases;
vasodilation;
(relaxation / owtte) of arterioles;
allow: arteries
increase in supply of blood to skin capillaries;
(causes) loss of heat;
by, conduction / convection / radiation;
increase in blood flow to sweat glands;
increased production of sweat;
loss of heat by evaporation; [max 5]

16. 0610_s16_MS_42 Q: 6

	Answer	Mark	Partial Marks
(a)	homeostasis / negative feedback ;	[1]	
(b) (i)	insulin ;	[1]	
(ii)	liver / muscle / pancreas ;	[1]	
(iii)	glycogen ;	[1]	
(c)	*Symptoms:* fatigue / AW ; thirst / AW ; increased urination / glucose in urine / fruity breath / ketosis / flushed face; weight loss / nausea / vomiting / abdominal pain / hunger ; blurred vision / glaucoma ; behavioural changes / confusion / faint / unconscious / coma(tose) / dizzy / rapid breathing / deep breathing ; slow (wound) healing / poor circulation ; *Treatment:* insulin ; by injection / insulin pump ; regular blood glucose tests ; regular meals / controlled diet ;	[max 5]	max 3 from either section **A** weakness **I** death **A** meal plan / healthy eating / monitoring carbohydrates / avoid sugary foods, drinks and fruit juices / eat complex carbohydrates / intake of sugar if blood sugar concentration is too low
		[Total: 9]	

17. 0610_m18_MS_42 Q: 5

	Answer	Mark	Partial Marks
(a)(i)	*advantages* **1** lower (dry) mass ; **2** fewer weeds / lower weed density ; **3** less competition ; **4** therefore higher yield of crop ; *disadvantages* **5** more treatments ; **6** higher cost / time / effort ; **7** idea of increased environmental impact ; **8** increased health risks ;	**4**	
(a)(ii)	increased strength of wind ; increased precipitation ; resistance ; type of weed ; AVP ;; e.g. ref. to amount / too much time between treatments	**2**	
(a)(iii)	**1** absorbed by (broad leaved) weeds / selective for weeds ; **2** less absorption by (narrow leaved) crops ; **3** increase the growth (rate) of weeds ; **4** plant cannot produce enough, glucose / photosynthesise fast enough ; **5** weeds cannot maintain rate of growth ; **6** AVP ; e.g. falls over and can't absorb sunlight	**3**	
(b)	gravi / geo ; tropism ;	**2**	

18. 0610_s18_MS_43 Q: 4

<table>
<tr><th></th><th>Answer</th><th>Mark</th><th>Partial Marks</th></tr>
<tr><td>(a)(i)</td><td>chemical / substance, produced by a gland ;
transported in the blood (plasma) ;
alters the activity of one of more specific target, organs / tissues / cells ;</td><td>2</td><td></td></tr>
<tr><td>(b)(i)</td><td>retina ;</td><td>1</td><td></td></tr>
<tr><td>(b)(ii)</td><td>fovea ;</td><td>1</td><td></td></tr>
<tr><td>(b)(iii)</td><td>sensory (neurone / nerve cell) ;</td><td>1</td><td></td></tr>
<tr><td>(b)(iv)</td><td>optic ;</td><td>1</td><td></td></tr>
<tr><td>(b)(v)</td><td>spinal cord ;</td><td>1</td><td></td></tr>
<tr><td>(b)(vi)</td><td>adrenal (gland) ;</td><td>1</td><td></td></tr>
<tr><td>(c)</td><td><table><tr><th>organ</th><th>effect of the hormone</th></tr><tr><td>heart</td><td>increased, pulse / heart, rate / beat ;</td></tr><tr><td>liver</td><td>conversion of glycogen to glucose /
increased blood glucose (concentration) ;</td></tr><tr><td>lungs</td><td>increase, (rate) / depth, of breathing ;</td></tr><tr><td>eyes</td><td>dilated pupils /
radial muscles (in iris) contract ;</td></tr></table></td><td>4</td><td></td></tr>
<tr><td>(d)</td><td>nervous system, responds quickly / immediately ; ora
idea that (nerve) impulses travel to, (specific) muscles / (adrenal) glands / effector(s) ;
effects of endocrine system are long lasting ; ora
hormones / adrenaline, travels throughout the body / allows multiple (target) organs to respond (to same signal) ;
idea that less energy required than to have nerves going to every, cell / tissue ;
stimulate both voluntary and involuntary responses (simultaneously) ;
more effective / enhanced, response (than using one system alone) ;</td><td>4</td><td></td></tr>
<tr><td>(e)(i)</td><td>auxin ;</td><td>1</td><td></td></tr>
<tr><td>(e)(ii)</td><td>2,4-D is a weedkiller / AW ;
sprayed on crops / applied to leaves ;
specific to broadleaved weeds ;
does not affect, cereals / narrow-leaved crop plants ;
causes uncontrolled growth ;</td><td>2</td><td></td></tr>
</table>

19. 0610_s16_MS_41 Q: 2

	Answer	Mark	Partial Marks
(a)	central (nervous system) ; peripheral (nervous system) ; spinal cord ;	[3]	**R** spine
(b) (i)	sensory neurone ;	[1]	**A** afferent neurone **R** sensory nerve
(ii)	simple reflex / reflex ;	[1]	**A** reflex arc
(iii)	slower / takes more time ; needs thought / uses (higher centres of) the brain / conscious control ; learnt / not inherited / not innate / needs training / AW ; not automatic ; response is not always the same to the stimulus ;	[max 2]	
(c) (i)	*either* **pot P** – (uniform) light AND **pot Q** – no light / dark / covered (up) ; *or* **pot P** – (uniform) with / plus, magnesium AND **pot Q** – no magnesium ;	[1]	**A** pot P has all nutrients
(ii)	positive ; (photo)tropism / (photo)tropic ;	[2]	**R** (photo)trophic / geotropic / gravitropic
(iii)	*idea that* leaves / seedlings / plants / chloroplasts, get more light ; more (light) energy, absorbed / trapped / AW ; more photosynthesis ; more, growth / biomass / glucose / starch / AW ;	[max 2]	'more' is only required once
(iv)	(auxins) made / produced, in (shoot), tip / apex ; pass / move / diffuse / spread (down the stem) ; auxins collect in the side, in the dark / away from light ; greater (cell) elongation on side in the dark ; AVP ; e.g. absorption of water (by osmosis) / stretching of cell walls / phototropin(s) / plants detect *or* sense light / ref to turgor pressure	[max 4]	**I** 'found, in / on' **A** 'dark / shaded, side' **I** comments about roots
		[Total: 16]	

20. 0610_s16_MS_43 Q: 2

	Answer	Mark	Partial Marks
(a) (i)	retina ;	[1]	
(ii)	optic (nerve) ;	[1]	**I** sensory neurone
(iii)	(light is) refracted ;	[1]	**A** description of refraction
(iv)	sensitive to / detect, light ; in low intensity / night ; pass impulse to, sensory neurone / optic nerve ; AVP ;	[max 2]	sensitive in dim light = 2 marks **A** provides night vision
(b) (i)	gravity ;	[1]	
(ii)	negative / away from (gravity) ; (gravi)tropism / (geo)tropism ;	[2]	
(iii)	*upwards* grow towards (where) light (should be) ; more, light absorbed / photosynthesis ; more growth ; flowers more likely to attract, insects / pollinators ; more likely to, release / shed / disperse, seeds ; *downwards* better, anchorage / AW ; absorb, water / mineral ions ; AVP ; ref to competition / damage	[max 2]	
(iv)	auxins made in shoot tip ; (auxin) spread / move / diffuse ; *idea of* unequal distribution of auxin ; auxins collect, in lower side of stem ; auxin stimulates (cell) elongation (where it accumulates) ; AVP ;	[max 4]	**I** found in tip **I** growth e.g. (by) absorption of water (by osmosis) / ref to turgor pressure (and) stretching of cell walls / statoliths / detect gravity
		[Total: 14]	