

**1** Diabetes is a disease in which the concentration of glucose in a person's blood may rise to fatally high levels. Insulin controls the concentration of glucose in the blood.

(a) Where is insulin produced?

Draw a ring around **one** answer.

**gall bladder**

**liver**

**pancreas**

**(1)**

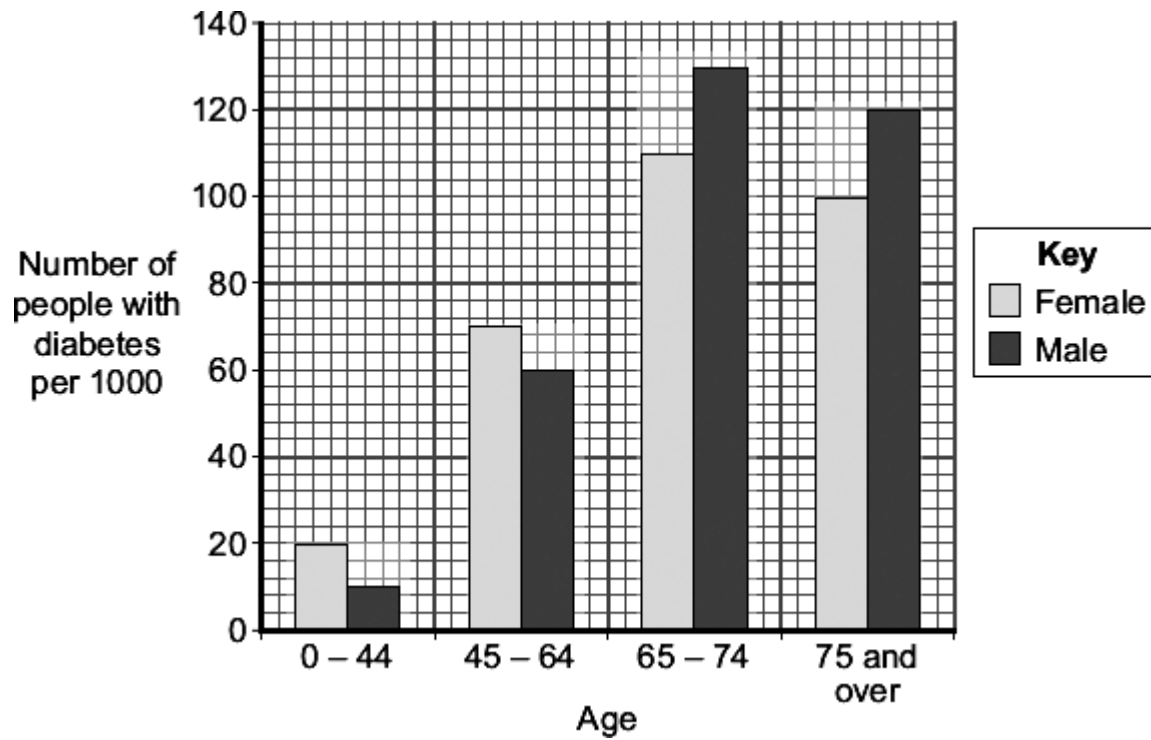
(b) Diabetics may control their blood glucose by injecting insulin.

Apart from using insulin, give **one** other way diabetics may reduce their blood glucose.

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**(1)**

(c) The bar chart shows the number of people with diabetes in different age groups in the UK.



(i) Describe how the number of males with diabetes changes between the ages of 0 - 44 and 75 and over.

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(3)

(ii) Compare the number of males and females with diabetes:  
between the ages of 0 and 64 years

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over the age of 65.

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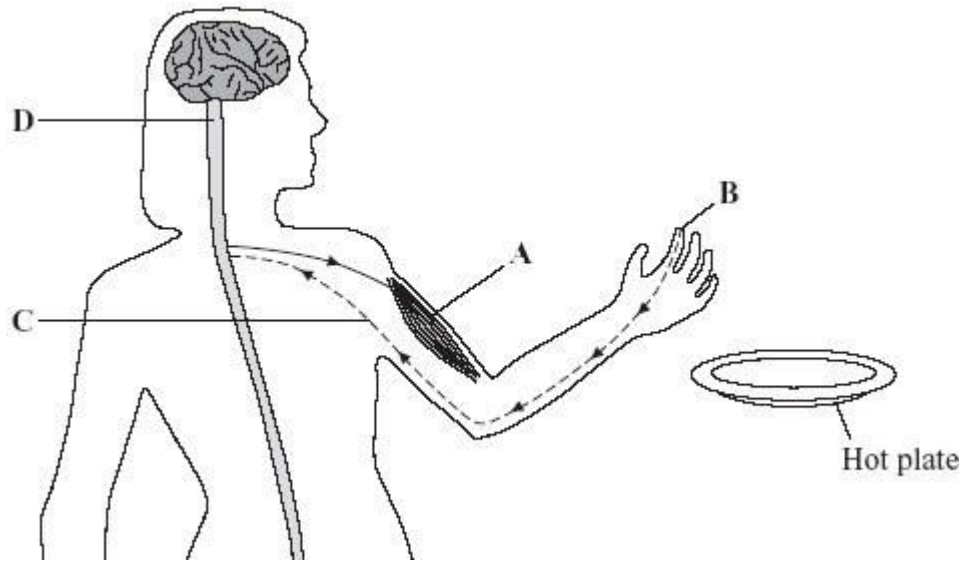
(2)

(Total 7 marks)

2

A girl picks up a hot plate. A reflex action causes her to drop it.

The diagram shows some of the structures involved in this reflex action.



Use words from the box to name the structures labelled A, B, C and D.

brain	gland	muscle	neurone	receptor	spinal cord
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A \_\_\_\_\_

B \_\_\_\_\_

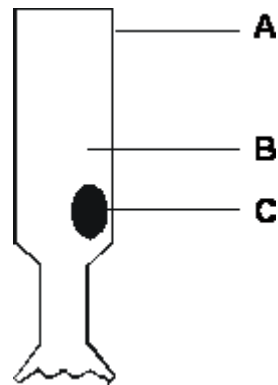
C \_\_\_\_\_

D \_\_\_\_\_

(Total 4 marks)

3

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.

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(3)

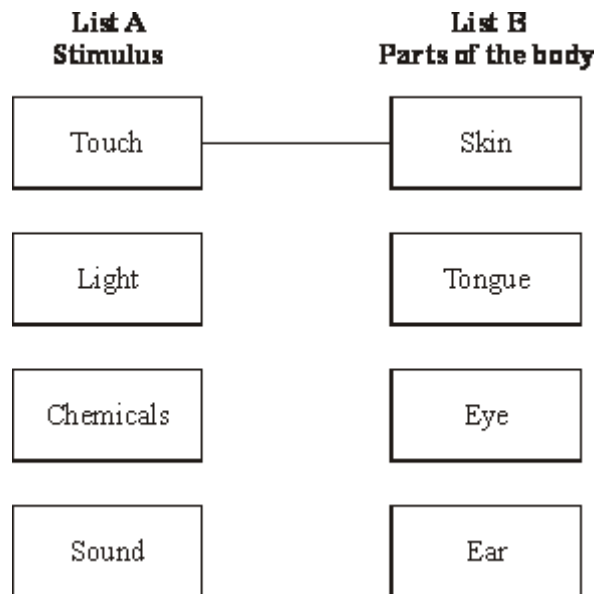
(Total 6 marks)

4

(a) List **A** gives the names of four stimuli. List **B** gives four parts of the human body.

Draw a straight line from each stimulus in List **A** to the part of the body in List **B** which has receptors for that stimulus.

(One has been done for you.)



(3)

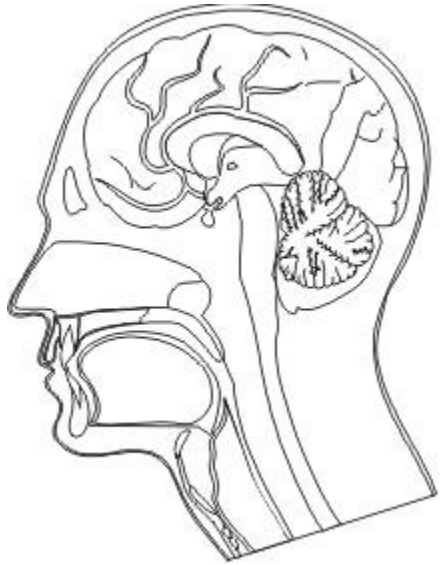
(b) Complete the following sentence by choosing the correct words from the box.

brain   glands   motor   sensory

To make us aware of a stimulus, impulses are sent along a \_\_\_\_\_  
neurone to the \_\_\_\_\_

(2)  
(Total 5 marks)

5



(a) On the diagram, use guidelines to label:

1 the brain;

2 the spinal cord.

(2)

- (b) Some students are investigating the behaviour of a mouse. They use a large empty box. The box has squares marked on the floor, as shown in the diagram.

(C = corner square, S = side square, I = inside square)

C <sub>1</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	C <sub>2</sub>
S <sub>10</sub>	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	S <sub>4</sub>
S <sub>9</sub>	I <sub>6</sub>	I <sub>5</sub>	I <sub>4</sub>	S <sub>5</sub>
C <sub>4</sub>	S <sub>8</sub>	S <sub>7</sub>	S <sub>6</sub>	C <sub>3</sub>

They put a mouse in the empty box. They record which square the mouse is in every minute for 15 minutes. They get these results.

Time (minutes)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Position of mouse	C <sub>1</sub>	C <sub>1</sub>	S <sub>2</sub>	C <sub>3</sub>	C <sub>3</sub>	S <sub>9</sub>	I <sub>3</sub>	C <sub>1</sub>	C <sub>1</sub>	C <sub>1</sub>	S <sub>8</sub>	C <sub>4</sub>	C <sub>4</sub>	C <sub>1</sub>	S <sub>2</sub>

- (i) Fill in the table below to show how much time the mouse spends in the corner squares (C), the side squares (S) and the inside squares (I).

POSITION	TIME (minutes)
Corner (C)	
Side (S)	
Inside (I)	

(3)

- (ii) What pattern is shown by the results?

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(1)

(iii) Suggest how the behaviour of the mouse might help its survival.

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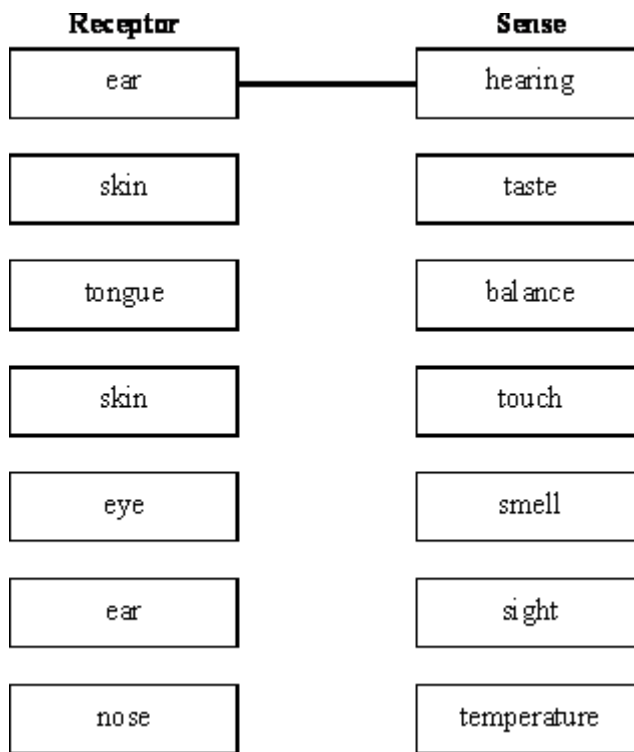
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(2)  
(Total 8 marks)

6

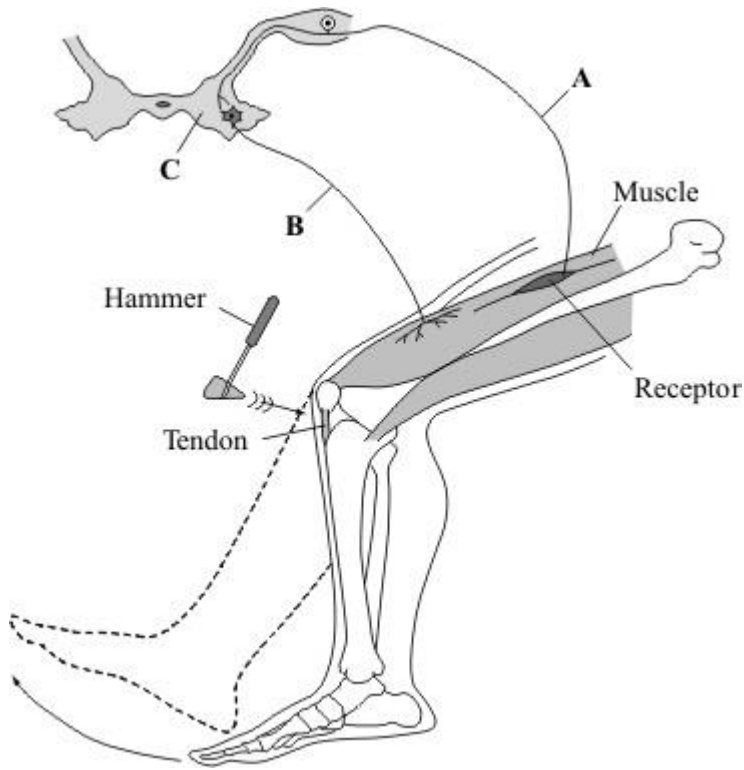
Humans use receptors to help them to respond to stimuli in the environment. Match up each receptor with the correct sense. One has been done for you.



(Total 5 marks)

7

The diagram shows the structures involved in the knee-jerk reflex. When the tendon is struck with the hammer, the receptor is stimulated and the lower leg moves forward.



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

**A** \_\_\_\_\_

**B** \_\_\_\_\_

**C** \_\_\_\_\_

(3)

(b) How is information passed from structure **A** to structure **B**?

\_\_\_\_\_

\_\_\_\_\_

(1)

(c) What is the effector in this response?

\_\_\_\_\_

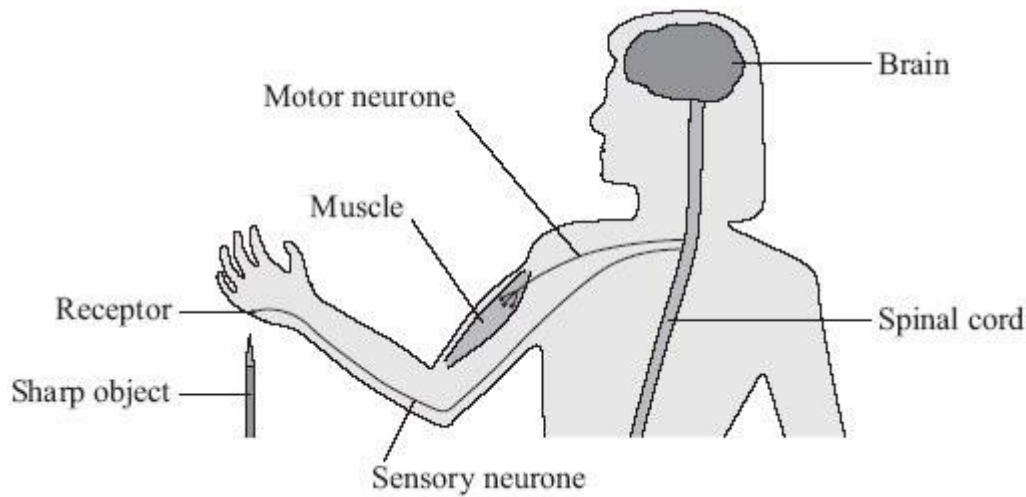
(1)

(Total 5 marks)



8

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)**

9

The photograph shows a girl waiting to cross a road.



© Lionel Lassman

(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

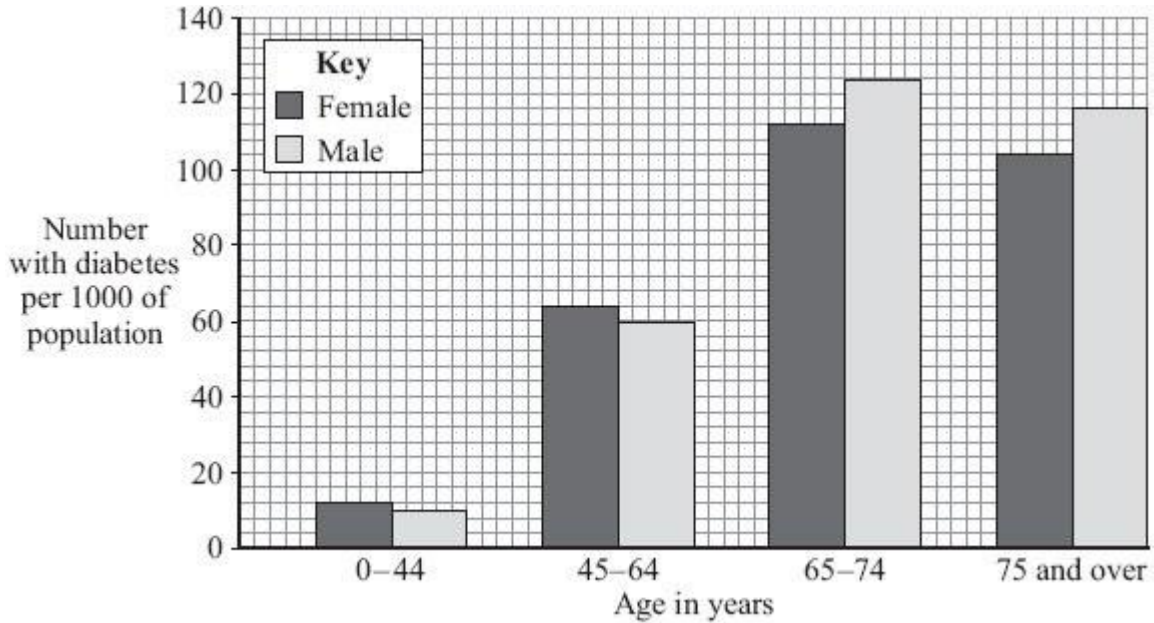
(1)

(Total 5 marks)

10

Diabetes is caused when the body does not produce enough insulin.

(a) The bar graph shows the number of people with diabetes per 1000 of population.



(i) How many more males aged between 45 and 64 years of age have diabetes than males under 45 years of age?

Show clearly how you work out your answer.

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Answer \_\_\_\_\_ per 1000 of population

(2)

(ii) Describe the way in which the number of females with diabetes changes with age.

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(2)

(b) One way of treating diabetes is by injecting insulin.

Insulin is a protein.

(i) If insulin is taken by mouth, it is broken down in the digestive system.

Where in the digestive system would insulin be broken down?

Draw a ring around your answer.

**liver**

**mouth**

**stomach**

(1)

(ii) Give **one** way of treating diabetes instead of using insulin.

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(1)

(Total 6 marks)

## Mark schemes

- 1 (a) pancreas 1
- (b) any **one** from
- (controlling / changing) diet  
*accept descriptions as to how diet could be changed eg eat less sugar(y foods) ignore reference to fat / protein*
  - exercise  
*accept example eg go for a run*
  - pancreas transplant  
*accept named drug eg metformin*
- (c) (i) increase 1
- ignore reference to women*
- then fall 1
- relevant data quote (for male)
- max at ages 65 - 74*
- eg starts at 10 (per thousand) or max at 130 (per thousand) or ends at 120 (per thousand)*
- accept a difference between any pairs of numbers in data set quoting of scale or per thousand but not 'thousands' accuracy  $\pm 2$*
- (ii) *ignore numbers* 1
- (between 0 and 64) more females (than males) / less males  
*allow eg females more diabetic than males* 1
- (over 65) more males (than females) / less females 1

[7]

- 2 A – muscle 1
- B – receptor 1
- C – neurone 1
- D – spinal cord 1

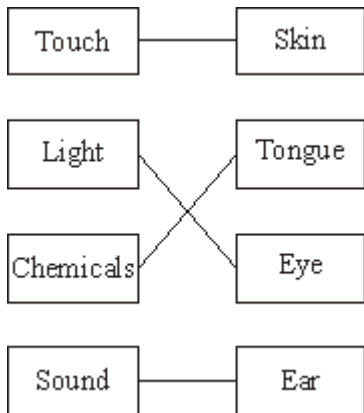
[4]

- 3 (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]

- 4 (a) **Stimulus**      **Part of the body**



*1 mark for each correct line*  
*if 2 lines to **one** box, CANCEL mark*

max 3

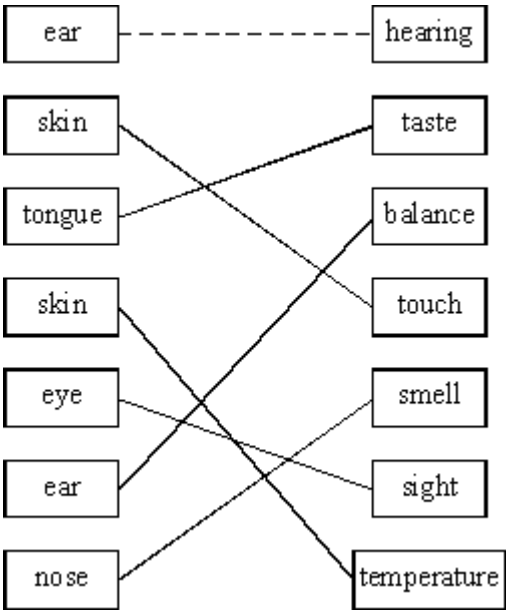
- (b) in correct sequence:
- sensory 1
- brain 1

[5]

- 5 (a) brain correctly labelled spine correctly labelled  
for 1 mark each 2
- (b) (i) 10  
4  
1  
for 1 mark each 3
- mouse spends most time in corners  
for 1 mark 1
- (ii) 2 of:  
idea that it is trying to make itself less conspicuous to predators  
idea of looking for food  
any 2 for 1 mark each 2

[8]

6



one correct 1 mark  
two correct 2 marks  
three correct 3 marks  
four correct 4 marks  
five or six correct 5 marks  
(• for 6<sup>th</sup> correct mark)

both skin boxes can be connected to either touch or temperature  
do **not** credit where more than one link goes to or from any box  
(except for skin, touch and temperature)

[5]

<b>7</b>	(a)	<b>A</b> sensory (neurone)		
			<i>ignore nerve</i>	1
		<b>B</b> motor (neurone)		
			<i>ignore nerve</i>	1
		<b>C</b> spinal cord / central nervous system / grey matter		1
	(b)	by chemical / substance		
			<i>allow transmitter</i>	1
	(c)	muscle		
			<i>allow extensor</i>	
			<i>ignore muscle names</i>	1
				<b>[5]</b>
<b>8</b>	(a)	(i)	receptor	1
		(ii)	sensory neurone	1
		(iii)	motor neurone	1
		(iv)	muscle	1
	(b)	(i)	eye(s)	
			<i>allow retina</i>	
			<i>ignore sight</i>	1
		(ii)	ear(s)	
			<i>ignore hearing</i>	
			<i>do <b>not</b> allow ear drum</i>	1
	(iii)	ear(s)		
		<i>ignore balance</i>	1	
				<b>[7]</b>



- 9** (a) eye / sight / eyesight  
*either order* 1
- ear / hearing  
*ignore light* 1
- (b) ear 1
- (c) (i) reflex 1
- (ii) neurons 1

[5]

- 10** (a) (i) 50  
*award 2 marks for correct answer irrespective of working*  
*award 1 mark for selection of 60 **and** 10* 2
- (ii) any **two** from:  
  - increases
  - (then) decreases
  - highest at 65 – 74 (years old) **or** maximum 112 (perthousand)  
*allow peaks at 65 - 74*  
*ignore comparisons with men* 2
- (b) (i) stomach 1
- (ii) any sensible reference to diet **or** carbohydrate intake **or** pancreas / stem cell transplant  
*eg eat less / no sugary food **or** eat more fibre **or** go on a diet **or** watch what you eat*  
*ignore eat more protein*  
*do **not** accept reduce salt* 1

[6]