Homework

c) Control and Communication
HOMEWORK 1 (9 marks)

1. The diagram below shows part of the central nervous system (CNS) and a nerve to the heart.

(a) (i) Name the two parts, shown in the diagram, which make up the CNS.
1. _________________________
2. _________________________ (1)

(ii) Name the area which controls heart rate.
_____________________________ (1)

(b) Reflex arcs may contain relay fibres.
(i) Which structure sends impulses to the relay fibre?
_________________________________ (1)

(ii) What is the function of relay fibres in a reflex arc?
_________________________________ (1)

2. Which label identifies the part of the brain which controls balance?
Correct answer ________ (1)
HOMEWORK 1 (continued)

3. (a) Complete the table below to show parts of the brain and their function.

<table>
<thead>
<tr>
<th>Part of brain</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebrum</td>
<td></td>
</tr>
<tr>
<td>Cerebellum</td>
<td>controls breathing and heart rate</td>
</tr>
</tbody>
</table>

(b) The following table shows the average brain and body masses of several animals.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Average brain mass (g)</th>
<th>Average body mass (g)</th>
<th>Ratio of brain : body mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monkey</td>
<td>100</td>
<td>7000</td>
<td>1 : 70</td>
</tr>
<tr>
<td>Kangaroo</td>
<td>56</td>
<td>35000</td>
<td>1 : 625</td>
</tr>
<tr>
<td>Cat</td>
<td>30</td>
<td>3300</td>
<td>1 : 110</td>
</tr>
<tr>
<td>Raccoon</td>
<td>39</td>
<td>4290</td>
<td>1 : 110</td>
</tr>
<tr>
<td>Squirrel</td>
<td>6</td>
<td>900</td>
<td>1 : 150</td>
</tr>
<tr>
<td>Frog</td>
<td>0.1</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

(i) Complete the table to show the ratio of brain: body mass for the frog.

Space for calculation

(ii) Of the following animals, which has the smallest brain compared to its body mass?

Tick (✓) the correct box.

- Kangaroo
- Cat
- Raccoon
- Squirrel
HOMEWORK 2 (9 marks)

1. The three types of neuron involved in the reflex arc for blinking are shown in the diagram below.

![Diagram of the reflex arc with neurons P and Q labeled.]

(a) **Name** neurons P and Q.

P __________________________

Q __________________________  (2)

(b) Which labelled structure is the effector in this response?

____________________________  (1)

(c) What is the function of a reflex action?

________________________________________________________________________
________________________________________________________________________  (1)

(d) The following stages occur in a reflex action.

1. The effector produces a response.
2. A sense organ is stimulated.
3. An impulse passes along a sensory neuron.
4. An impulse passes along a motor neuron.

The correct order of the stages is _____ _____ _____ _____  (1)
2. A scientist measured the reaction times of five students before and after drinking alcohol. Average reaction times were calculated for each student. The graph below shows their average reaction times before and after drinking alcohol.

(a) What conclusion can be drawn about the results?
____________________________________________________
____________________________________________________
(1)

(b) Why did the scientist calculate the **average** reaction times?
____________________________________________________
____________________________________________________
(1)

(c) What was the percentage increase in the average reaction time for student 4 after drinking alcohol?
   
   *Space for calculation*
   
   __________ %
(1)

(d) In this investigation, the students had to press a switch when a light flashed. Which part of the brain coordinates this movement?
   
   ______________________
(1)
HOMEWORK 3 (8 marks)

1. (a) Different parts of the brain have different functions.

Draw one line to link each part of the brain with its correct function.

<table>
<thead>
<tr>
<th>Part of the brain</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebrum</td>
<td>regulation of temperature</td>
</tr>
<tr>
<td>Medulla</td>
<td>control of breathing rate</td>
</tr>
<tr>
<td>Cerebellum</td>
<td>conscious responses</td>
</tr>
<tr>
<td>Hypothalamus</td>
<td>co-ordination of movement</td>
</tr>
</tbody>
</table>

(2)

(b) (i) The flow chart below shows the structures in a reflex arc.

Complete the chart by inserting the names of missing neurons.

(ii) Describe a function of a reflex response.

__________________________________________________________________________
__________________________________________________________________________

(1)
HOMEWORK 3 (continued)

2. The diagram below shows two nerve cells in the brain.

(a) What name is given to the tiny space between cell X and cell Y?

______________________________  (1)

(b) (i) What does structure A contain that will be released across this space to the receptor on Cell Y to trigger an impulse?

______________________________  (1)

(ii) Name the process responsible for the movement of the contents of structure A across the space?

______________________________  (1)
1. (a) What are ‘hormones’?

__________________________________________________________________________  (1)

(b) Which glands in the human body release hormones?

__________________________________________________________________________  (1)

(c) Hormones stimulate particular target tissues.

(i) How do hormones reach these target tissues?

__________________________________________________________________________  (1)

(ii) How does the target tissue become stimulated by a hormone while other tissues remain unaffected?

__________________________________________________________________________  (1)

2. Use internet sources to complete the following table with examples of hormones in the human body, their site of production and their effect.

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Site of production</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreas</td>
<td></td>
<td>Controls conversion of excess glucose into glycogen (stored in the liver)</td>
</tr>
<tr>
<td>Growth hormone</td>
<td></td>
<td>Stimulates growth during development</td>
</tr>
<tr>
<td>Pituitary</td>
<td></td>
<td>Controls the quantity of water reabsorbed into the blood from kidney tubules</td>
</tr>
<tr>
<td>Testosterone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyroxin</td>
<td></td>
<td>Controls rate of growth and development and controls metabolic rate</td>
</tr>
</tbody>
</table>

(6)
HOMEWORK 5 (6 marks)

1. The diagram below shows a hormone, such as insulin, binding with its target cell.

   
   
   (a) (i) **Explain** why a hormone only works on its target cell.
   
   ____________________________________________________________  (1)

   (ii) Hormone messages travel slower than nerve messages. 
   State **one** other difference between these messages.
   ____________________________________________________________  (1)

(b) Diabetes is a condition in which the blood glucose level is not fully controlled by insulin. There are two types of diabetes. The table below shows information on both types.

<table>
<thead>
<tr>
<th>Type 1 diabetes</th>
<th>Type 2 diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin is not produced</td>
<td>Insulin is produced but is not used effectively</td>
</tr>
<tr>
<td>Usually starts at a young age</td>
<td>Often associated with being obese</td>
</tr>
<tr>
<td>Can be triggered by infection</td>
<td>Can be controlled with diet and exercise</td>
</tr>
<tr>
<td>Daily insulin injections</td>
<td>Medication can be given in tablet form</td>
</tr>
</tbody>
</table>

A person with diabetes was treated with daily insulin injections.

(i) Using information from the table, state which type of diabetes this person had and why this treatment was required.

__________________________________________________________  (1)
(ii) Describe what would happen to this person’s blood glucose level if they had not been treated.

______________________________________________________  (1)

(iii) Name the organ which is not functioning properly, causing type 1 diabetes.

__________________________  (1)

2. Sperm production in humans is controlled by two hormones, P and Q. As levels of P rise, sperm production increases. As levels of Q rise, sperm production decreases. Which of the graphs below shows the changes in hormone levels of a man whose sperm production is decreasing?

Correct answer ________  (1)