93. Which of the following organs monitors body temperature?

A  Hypothalamus  
B  Pituitary gland  
C  Prostate gland  
D  Spleen

94. The graph below shows an individual’s skin temperature and rate of sweat production over a period of 50 minutes.

What is the skin temperature when the rate of sweat production is at a maximum?

A  3.2 °C  
B  4.5 °C  
C  36.7 °C  
D  38.0 °C

95. The diagram below shows the main parts of the brain as seen in vertical section. Which line in the table below correctly identifies the functions of two areas of the brain?

Which line in the table below correctly identifies the functions of two areas of the brain?

<table>
<thead>
<tr>
<th>Communication between hemispheres</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>W</td>
</tr>
<tr>
<td>B</td>
<td>X</td>
</tr>
<tr>
<td>C</td>
<td>W</td>
</tr>
<tr>
<td>D</td>
<td>Z</td>
</tr>
</tbody>
</table>
96. Which of the following statements is correct?

A  The somatic nervous system controls mainly involuntary actions using sensory nerves.
B  The somatic nervous system controls mainly voluntary actions using sympathetic nerves.
C  The autonomic nervous system controls some involuntary actions using parasympathetic nerves.
D  The autonomic nervous system controls some voluntary actions using motor nerves.

97. The somatic nervous system controls the

A  skeletal muscles
B  heart and blood vessels
C  endocrine glands
D  muscular wall of the gut.

98. The table below shows the changes in brain volume that have occurred during human evolution.

<table>
<thead>
<tr>
<th>Time (million years ago)</th>
<th>Brain volume (cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>500</td>
</tr>
<tr>
<td>2</td>
<td>600</td>
</tr>
<tr>
<td>1</td>
<td>800</td>
</tr>
<tr>
<td>0</td>
<td>1400</td>
</tr>
</tbody>
</table>

By how much has brain volume increased during the last three million years?

A  36%
B  64%
C  180%
D  280%

99. The following histogram shows the percentage distribution of IQ rating in a sample of 1000 Scottish children.

How many children have an IQ of over 100?

A  38
B  53
C  380
D  530
100. A person produces 0.75 litres of urine in 24 hours. The urine contains 18 g of urea. What is the concentration of urea in the urine?

A  1.0 g/100cm³
B  1.8 g/100cm³
C  2.4 g/litre
D  2.4 g/100cm³

101. When there is a decrease in the water concentration of the blood, which of the following series of events occur during the negative feedback response of the body?

<table>
<thead>
<tr>
<th>Concentration of ADH</th>
<th>Permeability of kidney tubules</th>
<th>Volume of urine</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>increases</td>
<td>increases</td>
</tr>
<tr>
<td>B</td>
<td>decreases</td>
<td>decreases</td>
</tr>
<tr>
<td>C</td>
<td>increases</td>
<td>increases</td>
</tr>
<tr>
<td>D</td>
<td>decreases</td>
<td>increases</td>
</tr>
</tbody>
</table>

102. Which of the following is triggered by the hypothalamus in response to an increase in the temperature of the body?

A  Decreased sweat production and vasodilation of the skin arterioles
B  Increased sweat production and vasoconstriction of the skin arterioles
C  Increased sweat production and vasodilation of the skin arterioles
D  Decreased sweat production and vasoconstriction of the skin arterioles

103. The graph below shows the rate of sweating of an individual in different environmental conditions.

How long after entering the warm area did it take for the volume of sweat production to increase by 100%?

A  8 minutes
B  13 minutes
C  20 minutes
D  23 minutes
104. The diagram shows a section through part of the central nervous system.

![Diagram of brain and spinal cord](image)

a) The table contains information about three parts of the central nervous system. Complete the table to identify the parts and their functions.

<table>
<thead>
<tr>
<th>Label</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Cerebellum</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Spinal cord</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Medulla</td>
<td></td>
</tr>
</tbody>
</table>

b) Complete the following sentences by underlining one option from each pair of options shown in **bold**.  

The parasympathetic nervous system is part of the **autonomic** / **somatic** nervous system which originates in the **medulla** / **cerebellum**. Parasympathetic nerves **speed up** / **slow down** heart rate.

(c) What structural feature of motor and sensory neurones speeds up the transmission of nerve impulses?
105. The diagrams below show two possible ways of classifying the nervous system.

![Diagram of nervous system classification]

a) (i) Identify A to D.  

A  
B  
C  
D  

(ii) Describe one function of the somatic nervous system.

(b) The brain contains two cerebral hemispheres.  
(i) Name the structure which links these two hemispheres.

(ii) In which area of the brain does the sympathetic nervous system originate?

(iii) Describe a situation which would lead to stimulation of the sympathetic nervous system.
(c) The diagram below shows some of the nerve connections between the brain and three parts of the body.

(i) Identify the part of the brain labelled X.

(ii) The sympathetic and parasympathetic systems are often described as antagonistic to one another. Explain the meaning of *antagonistic*.

(iii) Complete the table to show the effect of sympathetic stimulation on the heart, sweat glands and small intestine.

<table>
<thead>
<tr>
<th>Part of body</th>
<th>Sympathetic effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td></td>
</tr>
<tr>
<td>Sweat glands</td>
<td></td>
</tr>
<tr>
<td>Small intestine</td>
<td></td>
</tr>
</tbody>
</table>
106. Split brain patients cannot transfer information between their left and right cerebral hemispheres because the band of nerve fibres connecting these areas of the brain has been cut.

Some of the functions of each hemisphere are described in the table below. These functions are unaffected in split brain patients.

<table>
<thead>
<tr>
<th>Left cerebral hemisphere</th>
<th>Right cerebral hemisphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>processes information from right eye</td>
<td>processes information from left eye</td>
</tr>
<tr>
<td>controls language production</td>
<td>controls movements of left hand</td>
</tr>
</tbody>
</table>

The diagram below shows an experiment on a split brain patient.

The patient was asked to stare at a spot in the centre of a screen and the words “key” and “spoon” were flashed briefly onto the screen in the positions shown.

The patient was then told to use his left hand to pick up the objects he saw named on the screen.

a) Explain why the patient picked up the key but not the spoon.

_______________________________________________________________________________________________

_______________________________________________________________________________________________

_______________________________________________________________________________________________

b) The patient was then asked to say what he saw written on the screen. Predict what he would have said and give a reason for your answer.

Prediction ____________________________________________

Reason ______________________________________________

_______________________________________________________________________________________________

_______________________________________________________________________________________________

c) Name the process which the brain uses to make sense of incoming sensory information and explain how this process leads to the recognition of objects.

Process ____________________________________________

_______________________________________________________________________________________________

_______________________________________________________________________________________________
107. The table shows average quantities of substances filtered and excreted by the kidney per day.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Quantity filtered per day</th>
<th>Quantity excreted per day</th>
<th>Quantity reabsorbed per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>180 dm³</td>
<td>1.5 dm³</td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td>175 g</td>
<td>0 g</td>
<td></td>
</tr>
<tr>
<td>Urea</td>
<td>48 g</td>
<td>31 g</td>
<td>0 g</td>
</tr>
<tr>
<td>Protein</td>
<td>0 g</td>
<td>0 g</td>
<td>0 g</td>
</tr>
</tbody>
</table>

(i) Complete the table by calculating the quantities reabsorbed per day for water, glucose and urea.  

(ii) What percentage of water filtered by the kidney is reabsorbed?  

Space for calculation

___________________%  

(iii) In which part of the kidney is water reabsorbed?  

108. Give an account of the nervous system under the following headings:

(i) the somatic nervous system  

(ii) the autonomic nervous system

HOMEWORK 9  

TOTAL 43
109. The following diagram represents four neurones in a neural pathway.

Which line in the table describes the pathway correctly?

<table>
<thead>
<tr>
<th>Type of pathway</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A motor</td>
<td>divergent</td>
</tr>
<tr>
<td>B motor</td>
<td>convergent</td>
</tr>
<tr>
<td>C sensory</td>
<td>divergent</td>
</tr>
<tr>
<td>D sensory</td>
<td>convergent</td>
</tr>
</tbody>
</table>

110. Which of the following shows the direction of a nerve impulse in a neurone?

A  Axon → cell body → dendrite  
B  Cell body → dendrite → axon  
C  Cell body → axon → dendrite  
D  Dendrite → cell body → axon

111. The diagram below illustrates the relationship between short and long-term memory.

Which arrow represents the process of rehearsal?

112. Which of the following carries an impulse towards a nerve cell body?

A  Dendrite  
B  Axon  
C  Myelin  
D  Myosin
113. Which of the following statements describes a neurotransmitter and its method of removal?

A Adrenaline is removed by reabsorption.
B Adrenaline is removed by enzyme degradation.
C Noradrenaline is removed by enzyme degradation.
D Noradrenaline is removed by reabsorption.

114. Which of the following statements about diverging neural pathways is correct?

A They accelerate the transmission of sensory impulses.
B They suppress the transmission of sensory impulses.
C They decrease the degree of fine motor control.
D They increase the degree of fine motor control.

115. The diagram below represents the passage of information through memory.

(a) (i) Identify processes X, Y and Z.

X ________________________
Y ________________________
Z ________________________

(ii) State two forms of information which can enter short term memory.

1 ____________________________
2 ____________________________

(iii) Describe how contextual cues help recall from long-term memory.

______________________________________________________________________________________________
______________________________________________________________________________________________

b) A student had to learn her SQA candidate number which contained 9 digits. She was advised to use chunking to help her memorise it. Explain why the process of chunking would help her memorise this number.
An investigation was carried out into the effects of organisation on improving the recall of information. Four students were each asked to look at a card containing 25 words organised into a branching diagram. The card is shown below.

The card was removed after three minutes and each student had to write down as many words as he or she could recall. A score out of 25 was recorded for each student and these were added together to give a total score out of 100 for the group. The procedure was repeated twice. Each time the students were given cards containing 25 different words also organised into branching diagrams. Another group of four students took part in the control for this investigation. The words on their cards were not organised. The results are shown in the table below.

<table>
<thead>
<tr>
<th>Student Group</th>
<th>1st card</th>
<th>2nd card</th>
<th>3rd card</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>75</td>
<td>78</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>53</td>
<td>57</td>
<td>55</td>
<td></td>
</tr>
</tbody>
</table>

**a)** Complete the table by calculating the average number of words recalled by each student group.

Space for calculation

---

**b)** In what way would the content of the control cards be similar to the experimental cards? ____________________________________________________________________________________________

_____________________________________________________________________________________________________________________________________

In what way would the content of the control cards be different from the experimental cards? ____________________________________________________________________________________________

_____________________________________________________________________________________________________________________________________

---
c) Suggest two variables, not already mentioned in the description of this investigation, which would have to be kept constant to ensure that a valid comparison could be made between the two groups.

1

2

d) State a conclusion that can be drawn from the results.

1


e) How could the reliability of the results of this investigation be improved?

1

f) In a further investigation into recall, students were given the same card to memorise on three successive occasions. Predict what would happen to the number of words recalled on each successive attempt. Explain your prediction.

1

Prediction

Explanation
a) Name the parts of the neurone labelled A, B and C on the diagram.

A ______________________________  
B ______________________________  
C ______________________________  

b) Neurotransmitters bind to receptors on skeletal muscle tissue triggering contraction.

(i) Name two neurotransmitters.

1 _________________________________________________________________  
2 _________________________________________________________________  

(ii) Explain why the release of neurotransmitter into a synaptic cleft may sometimes fail to trigger muscle contraction.

_______________________________________________________________  
_______________________________________________________________  
_______________________________________________________________  
_______________________________________________________________  

(c) State the importance of the myelin sheath in the transmission of impulses.

___________________________________________________________________  
___________________________________________________________________  
___________________________________________________________________  
___________________________________________________________________  

___________________________________________________________________  
}\n
---

117. The diagram below shows a motor neurone and its junction with skeletal muscle tissue.
118. The diagram below shows a synapse which links a nerve cell with the sinoatrial node (SAN) in the heart.

a) (i) Where in the heart is the SAN located?  

__________________________________________________________________________ 1

(ii) Describe the function of molecule X.  

__________________________________________________________________________ 1

b) One example of a neurotransmitter is acetylcholine. How is acetylcholine removed from the synapse?  

__________________________________________________________________________ 1

c) (i) In which area of the brain does the sympathetic nervous system originate?  

__________________________________________________________________________ 1

(ii) Describe a situation which would lead to stimulation of the sympathetic nervous system  

__________________________________________________________________________ 1
119. The diagram below shows two different neural pathways. Nerve impulses are travelling from left to right in both pathways.

**Pathway A**

**Pathway B**

a) Name the types of pathway represented by A and B.

A __________________________________________________________

B __________________________________________________________

b) Pathway A helps the hand to function. Explain how it does this.

_______________________________________________________________________________________________

_______________________________________________________________________________________________

_______________________________________________________________________________________________

_______________________________________________________________________________________________

_______________________________________________________________________________________________
120. The diagram below shows a synapse between two nerve cells in the brain and a magnified view of a receptor called NMDA.

![Diagram of a synapse with vesicles and NMDA receptor](image)

a) Describe how the neurotransmitter in the vesicle reaches cell Y.

_______________________________________________________________________________________________
_______________________________________________________________________________________________
_______________________________________________________________________________________________

b) The diagram above shows a single neural pathway. Explain how a converging neural pathway would be more likely to generate an impulse in nerve cell Y.

_______________________________________________________________________________________________
_______________________________________________________________________________________________
_______________________________________________________________________________________________

121. Give an account of the function of a synapse under the following headings:

(i) release of neurotransmitter
(ii) action of neurotransmitter
(iii) removal of neurotransmitter

AND/OR Give an account of memory under the following headings:

(i) encoding into short-term memory
(ii) transfer from short-term to long-term memory
(iii) retrieval from long-term memory

OR Discuss memory under the following headings:

(i) short-term memory
(ii) the transfer of information between short and long-term memory.
122. The diagram below shows the ages (in months) at which children reach various stages in their development. The left end of each bar indicates the age by which 25% of infants have reached the stated performance. The right end of each bar indicates the age by which 90% of infants have reached the stated performance. The vertical bar indicates the age by which 50% of infants have reached the stated performance.

An eight-month old infant can walk with support but cannot stand alone. In what percentage of the population is this child found?

A  Less than 25%
B  Between 25% and 50%
C  Around 50%
D  Between 50% and 90%

123. Which of the following terms describes the process by which a person learns to distinguish between different but related stimuli?

A  Generalisation
B  Imitation
C  Discrimination
D  Identification

124. Which of the following describes the change in an individual’s behaviour where the presence of others causes the individual to show less restraint and become more impulsive?

A  Social facilitation
B  Shaping
C  Generalisation
D  Deindividuation

125. A young person does not smoke because she has seen an advertising campaign showing pictures of famous sports stars who do not smoke. This is an example of a behaviour called

A  identification
B  discrimination
C  generalisation
D  deindividuation.

126. An athlete has a much better chance of achieving a “personal best” time in a race rather than in training because of

A  internalisation
B  deindividuation
C  identification
D  social facilitation.
127. The rewarding of patterns of behaviour which approximate to desired behaviour is called

A. generalisation  
B. discrimination  
C. extinction  
D. shaping.

128. The graph below shows the results of a survey carried out on members of an athletic club who ran an 800m course under different conditions.

What is the percentage improvement in the time taken to run 800m between those athletes training on their own and those training with others?

A. 40%  
B. 25%  
C. 24%  
D. 20%

129. An investigation was carried out to determine how long it takes students to learn to run a finger maze. A blindfolded student was allowed to run the maze on ten occasions. The results are given in the table below.

<table>
<thead>
<tr>
<th>Trial</th>
<th>Time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

How could the investigation be improved to make the results more reliable?

A. Allow other students to try to run the maze ten times, whilst blindfolded  
B. Allow the same student some additional trials on the same maze  
C. Change the shape of the maze and allow the same student to repeat ten trials  
D. Record the times to one decimal place
An investigation was carried out to find out how an infant’s play was affected by the presence or absence of an adult. The infant was tested at three-month intervals using the following procedure.

1. The infant was placed in a room with an adult and some toys.
2. The infant was allowed to play with the toys for five minutes, then the adult left the room.
3. The infant was allowed to continue to play with the toys for another five minutes alone.

Playing time was measured by the number of seconds the infant spent playing per minute. The graph shows the change in time spent playing, at each age, after the adult left the room.

(a) At what ages does the departure of any adult have the greatest and least effect on the length of play time?

Greatest effect ___________ months  Least effect ___________ months

(b) When the child was 21 months old, what was the total increase in playing time, over the 5-minute period, when the stranger left the room?

___________________ Seconds

(i) Compare the effect of the departure of the mother with the departure of the father.

___________________________________________________________________________________________

_______________________________________________________________________________________________

(ii) Suggest a reason for this difference.

_______________________________________________________________________________________________

_______________________________________________________________________________________________
(c) (i) Compare the effect of the departure of the stranger with the departure of the parents.

_______________________________________________________________________________________________

(ii) Suggest reasons for this difference.

_______________________________________________________________________________________________

(d) How could the reliability of this investigation be improved?

_______________________________________________________________________________________________

_______________________________________________________________________________________________

131. An investigation was carried out on the effect of strobe lighting and loud noise on the ability of students to perform calculations. Twenty students were divided into two equal groups, A and B. Each group was given 20 calculations to complete.

**Group A** sat in an evenly lit, quiet room.

**Group B** sat in a room where there was strobe lighting and loud noise.

The numbers of errors the students made, while doing the calculations, are shown in **Table 1**.

**Table 1**

<table>
<thead>
<tr>
<th>Student</th>
<th>Group A Number of errors</th>
<th>Student</th>
<th>Group B Number of errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

(a) By how many times has the average number of errors increased as a result of the distractions? **1**

*Space for calculation*

_________________________ times
(b) State three factors which would need to be kept constant during this investigation.

1. __________________________________________________________

2. __________________________________________________________

3. __________________________________________________________

A third group of ten students carried out the investigation under the same conditions as group B, but were tested six times instead of only once. Each test comprised different calculations. The average percentage of errors is shown in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Trial</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average percentage error</td>
<td>34</td>
<td>30</td>
<td>24</td>
<td>20</td>
<td>20</td>
<td>19</td>
</tr>
</tbody>
</table>

(c) Construct a line graph to show the data in the table.

(d) Suggest an explanation for the shape of the graph

(e) How could the design of the investigation be altered to demonstrate the effect of social facilitation?
An investigation was carried out into the influence of adults on the behaviour of young children. Some groups of children watched a recording of either a man or a woman being physically and verbally aggressive to a large plastic clown. Other groups of children watched either a man or a woman behaving in a non-aggressive manner towards the clown. Each child was then placed in a room on their own with the clown. The number of aggressive acts they committed over a five minute period was counted. The figures in the table below show the average number of aggressive acts that the children committed while in the room.

<table>
<thead>
<tr>
<th>Gender of children</th>
<th>Aggressive man observed</th>
<th>Aggressive woman observed</th>
<th>Non-aggressive man observed</th>
<th>Non-aggressive woman observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>18.7</td>
<td>7.9</td>
<td>1.0</td>
<td>0.6</td>
</tr>
<tr>
<td>Girls</td>
<td>4.4</td>
<td>9.2</td>
<td>0.2</td>
<td>0.8</td>
</tr>
</tbody>
</table>

(a) (i) Which adult/child combination resulted in the least aggression?  
_______________________________________________________________________________________________  
_______________________________________________________________________________________________

(ii) Calculate the percentage increase in aggressive acts committed by boys when they observe an aggressive man rather than a non-aggressive man.  
Space for calculation  

%  

(iii) State a conclusion that can be drawn from these results regarding the gender of the aggressive adult.  
_______________________________________________________________________________________________  
_______________________________________________________________________________________________

(b) The children are observing and then repeating the acts of adults. What form of learning are they using?  
_______________________________________________________________________________________________

(c) Suggest a control that could have also been used in this investigation.  
_______________________________________________________________________________________________

(d) Anti-social behaviour can occur when people are together in a group such as at a music festival. What is the name of this effect and why does it occur?  
_______________________________________________________________________________________________

Name  
_______________________________________________________________________________________________

Cause  
_______________________________________________________________________________________________
133. Give an account of communication under the following headings:

(i) the use of language  
(ii) non-verbal communication

<table>
<thead>
<tr>
<th>HOMEWORK 11</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>