

# LESSON 1: Science

## Finding out about the brain

<b>OBJECTIVES</b>	<p>To show the complexity of the brain. To demonstrate the complexity of the brain's structure and function.</p>
<b>NATIONAL CURRICULUM LINKS</b>	<p><b>How Science Works</b></p> <ul style="list-style-type: none"><li>- 4b: consider how and why decisions about science and technology are made, including those that raise ethical issues, and about the social, economic and environmental effects of such decisions.</li></ul> <p><b>AQA</b></p> <ul style="list-style-type: none"><li>- 10.8: Societal aspects of scientific evidence The uses of science and technology developments can raise ethical, social, economic and environmental issues.;</li><li>- 10.9: Limitations of scientific evidence.</li></ul> <p><b>Edexcel - How Science Works</b></p> <ul style="list-style-type: none"><li>- The collection and analysis of scientific data</li></ul> <p><b>Twenty First Century</b></p> <ul style="list-style-type: none"><li>- Module B2: Keeping Healthy;</li><li>- Making decisions about science and technology (Idea about Science). Personal and social decisions require an understanding of the science involved but also knowledge and values beyond science. In this module, students consider particular ethical issues arising in modern medicine, for example the right of individual choice versus social policy, illustrated through vaccination policy.</li></ul> <p><b>AO1 Knowledge and understanding</b></p> <ul style="list-style-type: none"><li>- Demonstrate understanding of the power and limitations of scientific ideas and factors affecting how these ideas develop;</li><li>- Draw on existing knowledge to show understanding of the benefits and drawbacks of applications of science.</li></ul>

**ACTIVITY A**

The brain is made up of neurones. Our abilities and intelligence depend on making as many possible connections between neurones. There are 100 billion (100 000 000 000) neurones in a human brain

**Procedure:**

- Using a marker or felt pen, draw ten dots down one side of a piece of paper.
- Draw ten dots down the other side of a piece of paper. • Each dot represents a neurone.
- Starting with the top left-hand dot. Use a thin felt pen and a ruler to join it to each of the right hand dots in turn.
- Now repeat for the second, third, fourth dots, etc

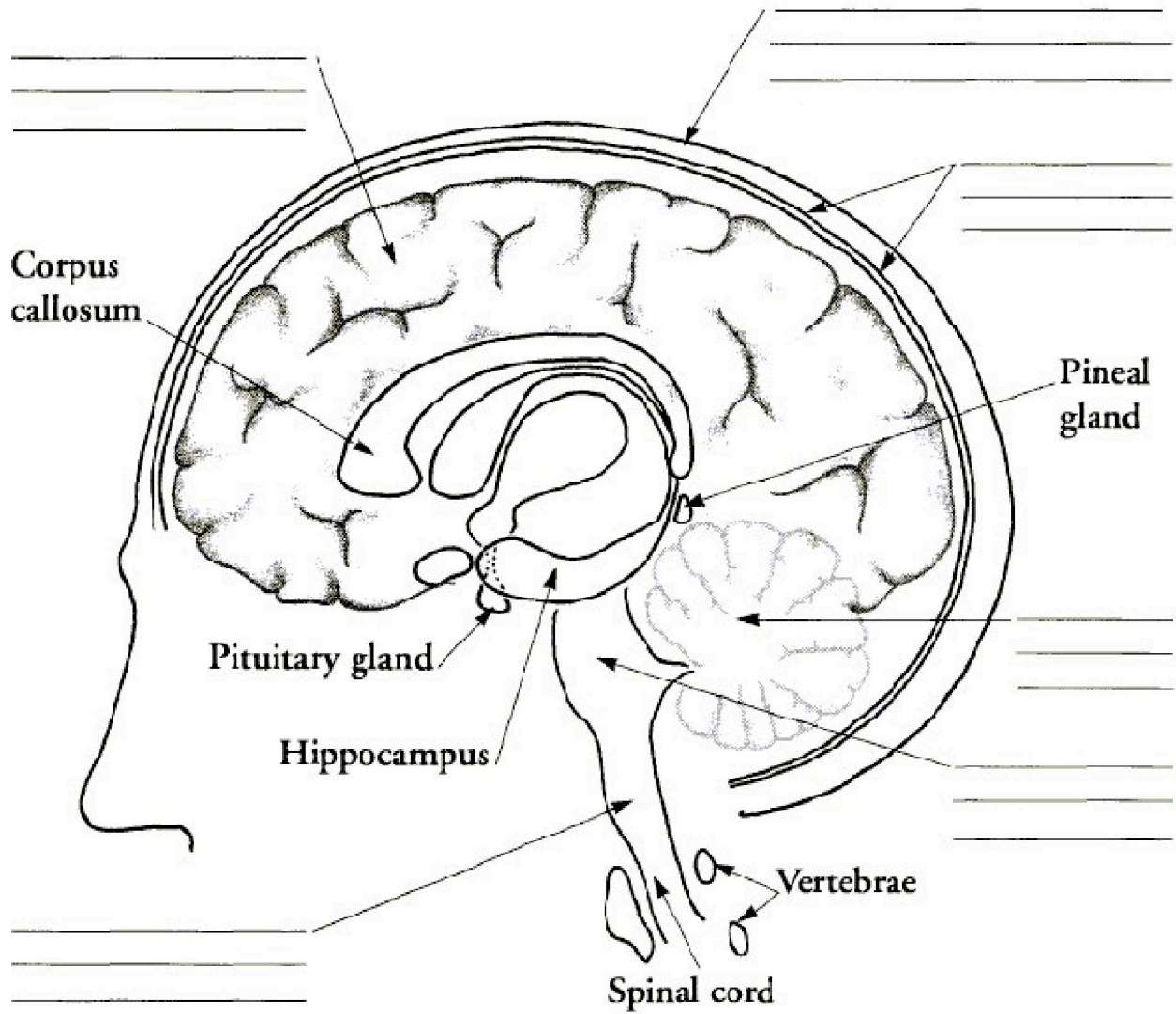
**ACTIVITY B****Brain geography****Requirements:**

- Understanding the brain activity sheet 1
- Understanding the brain activity sheet 2

Use the information in understanding the brain activity sheet 2 to complete the diagram of the brain, brain activity sheet 1.

# Understanding the brain activity sheet 1

## Brain Geography



## Understanding the brain activity sheet 2

Encased in bone and surrounded by three protective membranes, called meninges, the brain is by far the most complicated part of our nervous system and is responsible for controlling our body.

The **cerebrum** is made up of two **hemispheres** that sit on top of the brain. The **neurones** make up the grey matter of the brain, connected by the white axons, forming a structure called the **corpus callosum**. The corpus callosum allows the left and right hemispheres to communicate with one another. The **cerebral hemispheres** are the central headquarters of the brain, controlling the more intelligent activities such as sensing, memory, planning and thinking.

Structures between the **corpus callosum** and the **pons** make up the limbic system. Their function is to generate our emotions, such as happiness and fear. Scientists believe that the structures in the limbic system are also responsible for aggressive behaviour, though the cerebrum usually has the final say whether we express that emotion.

The **pons** is connected to a tiny gland called the pineal gland which is like a 'third eye' since it is able to detect the length of daylight, sending us to sleep or waking us up. People suffering from jet-lag are likely to have confused the pons by spending 'too long' in the light or dark as they have travelled across time zones in an aeroplane.

Not only does the brain control the nervous system in our body, it also releases chemical hormones, which themselves switch on or off other hormones produced elsewhere in our body. These are released from the pituitary gland, a tiny structure located just below the **hypothalamus**. The **hypothalamus** detects changing conditions, like the concentration of water in the blood passing through it and the blood's temperature, so that it can set about resetting them back to the right level (equilibrium).

The part of the brain that allows a pianist to play a tune smoothly, or a premier league footballer to keep his balance, is a structure which, in a flat diagram, looks like a broad leaf. This is the **cerebellum**, and its function is to control posture and coordination. The medulla, found at the top of the spinal cord and below the hemispheres of the brain, control the most vital functions of the body, such as breathing, heart rhythms and blood pressure.