

The Brain and Learning

This unit helps pupils improve their own learning by finding out how the brain and nervous system function. In the introductory activities, pupils explore how reliable their own memories are and how events can be remembered differently. Strategies for improving their memories are explored and tested. How the brain perceives information is compared to the actual information. Pupils learn about the structure and functions of the brain and nervous system. The unit finishes by consolidating pupils' new knowledge in making a personalised plan for better learning.

Key Questions

- 1 [How good is your memory?](#)
- 2 [How are learning and memory connected?](#)
- 3 [How does my brain work?](#)
- 4 [Knowing more about my brain, memory and learning, how can I become a better learner?](#)

Developing Pupils' Knowledge, Understanding and Skills	Links with Other Areas of Learning/Subject Strands
<p>Develop skills in scientific methods of enquiry to further scientific knowledge and understanding:</p> <ul style="list-style-type: none"> - planning for investigations, - obtaining evidence, - presenting and interpreting results. <p>Learn about: Organisms and Health</p> <ul style="list-style-type: none"> - Healthy body and mind. 	<p>PE Role of different parts of brain in movement and perception. Importance of reaction times in sport.</p>
Developing Pupils' Thinking Skills and Personal Capabilities	
<ul style="list-style-type: none"> • Distinguishing fact from opinion • Designing a fair test • Evaluating outcomes and justifying conclusions (Thinking, Problem-Solving, Decision-Making) • Valuing the unexpected and surprising • Experimenting with ideas and questions (Being Creative) 	

How good is your memory?	
Learning Intentions Pupils are learning...	Possible Learning, Teaching and Assessment Activities
<p>...about differences in long-term and short-term memory.</p> <p>... to develop observation and memory skills.</p> <p>... to distinguish fact from opinion.</p> <p>Thinking, Problem-Solving, Decision-Making</p>	<p>Pupils recall their earliest memory or their first day at school. They write down the detail and compare with someone else's. How do people differ in how they remember things, for example, in terms of sounds, colours, events, names?</p> <p>Pupils discuss what age they were in their first memory and why they can't remember anything before this.</p> <p>Stage a robbery in the classroom or show a video clip of a robbery. Some pupils act as eyewitnesses. Other pupils take witness statements. They check and compare the accuracy of the statements.</p> <ul style="list-style-type: none"> • What are the facts? • What are the opinions? <ul style="list-style-type: none"> ○ How do you know they are opinions (for example, language used: I thought... maybe... kind of ...)? • What questions could be asked to cross-examine the witnesses? <p>Discuss the implications of inaccurate statements in real life cases.</p> <p>Play face memory game. http://faculty.washington.edu/chudler/java/facemem.html</p> <p><u>Memory tests</u> Give pupils a list of about twenty random words or numbers to remember. Test after a specified time (2-3 minutes). What is the class average (mean or mode).</p> <p>Discuss strategies to help memorise things, for example, visualisation, association, imagery, etc. A useful resource for memory and strategies: http://www.exploratorium.edu/memory/index.html</p>
<p>...about strategies for memorising information.</p> <p>...to experiment with ideas and questions.</p>	<p>Using a memory strategy, pupils retest their ability to memorise a similar list of words or numbers as before.</p>

Being Creative	<p>Which techniques did they find most effective? Did these work for everyone? Did the class average improve? When do we use associations to help us remember things?</p>
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How are learning and memory connected?

Learning Intentions Pupils are learning...	Possible Learning, Teaching and Assessment Activities
<p>... to design a fair test.</p> <p>... to evaluate outcomes and justify conclusions. <u>Thinking, Problem-Solving,</u></p>	<p><u>Questions to Consider</u></p> <p>What is learning? How is learning connected to memory? What factors could affect learning? Examples include:</p> <ul style="list-style-type: none"> - Environment: light, music, temperature. - Emotions - Relevance - Cues, for example, trigger words and associations. (important for retrieval of information). <p>How can we change our environment for better learning? Is listening to music when studying a good idea? Can pupils think of examples of how cues help them to retrieve information, for example, rhymes etc.</p> <p><u>Investigation</u> Pupils design an investigation to see if music affects learning.</p> <ul style="list-style-type: none"> - A fair test. - Independent, dependent and controlled variables. - How will they record their result? <p>Pupils carry out the investigation.</p> <ul style="list-style-type: none"> - Accurately recording results - Presenting results in a suitable format.

Decision-Making	– What are their conclusions? Can they justify these? How reliable is their evidence?
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How does my brain work?	
Learning Intentions Pupils are learning...	Possible Learning, Teaching and Assessment Activities
<p>... to evaluate the unexpected or surprising. Being Creative</p> <p>... about perception - how our brain interprets its surroundings.</p>	<p><u>Making Sense Activities</u> (Choose from the following activities as appropriate)</p> <ul style="list-style-type: none"> ▪ Read and count the number of 'F's 'finished files are the result of years of scientific study combined with the experience of years' <i>Most will only see 3 'f' initially. The answer is 6. Our brains ignore the 'f' in 'of'. Often, we fail to recognise the smaller words that connect the bigger ones.</i> ▪ Optical illusions Useful resources: http://www.niehs.nih.gov/kids/illusion/illusions.htm http://www.at-bristol.org.uk/Optical/default.htm ▪ Look at familiar products photographed up close. Can pupils identify them? Useful resource: http://www.mysteryphotos.com ▪ Identify mystery sounds. ▪ Identify mystery objects using only sense of touch. ▪ Balance → more difficult to balance on one foot if blindfolded. ▪ Does smell help you to remember things? ▪ Mirror Maze races: Pupils try and trace the outline of a maze pattern while looking into a mirror and forcing their hand to follow the mirror image pattern. <p><u>Pupil Questions</u> What do these activities tell you about how the brain works / interprets information? Are you senses as reliable as you thought they were?</p>

Learning Intentions Pupils are learning...	Possible Learning, Teaching and Assessment Activities
<p>... to become aware of and measure their reaction times.</p> <p>... to measure accurately.</p> <p>... that practising an action can improve its performance.</p> <p>... to apply their mathematical skills in practical contexts.</p> <p>... to realise the importance of fast reaction times, especially in activities such as driving and sports.</p>	<p><u>Reaction times</u> To react, information must pass through the senses, via the nerves to the brain. The brain makes a decision and the message passes via the nerves to the appropriate muscles or glands to carry out an action. It is possible to measure our reaction times. Reaction times are slower with tiredness. Practice can increase our reaction times.</p> <p><u>Measuring reaction times</u></p> <ul style="list-style-type: none"> ▪ Ruler activity. A ruler is held at the 0cm mark. A pupil lets go and then catches the ruler. The number at which the ruler is caught indicates the reaction time. ▪ Stopwatch activity Pupils line up in a row holding hands. The first pupil has a stopwatch, starting it as they squeeze the hand of the person beside them. The pupil with the stopwatch moves to the end of the row. <p>The 'squeeze' is passed along the row. When it reaches the end of the row, the stopwatch is stopped. The total time taken is divided by the number of people in the row. The result gives the average reaction time for each person in the row.</p> <p><u>Opportunity to develop/assess Using Mathematics</u></p> <ul style="list-style-type: none"> • Can the reaction time be improved? • Why are reaction times very important when driving? • What could affect them? • Which sports need a fast reaction time? Why? <p>What have you learned in these activities about the brain and nerves? How could this information make a difference to your everyday life? Did anything grab your attention that you want to find out more? What was it? What will you do?</p>

Knowing more about my brain, memory and learning, how can I become a better learner?	
Learning Intentions Pupils are learning...	Possible Learning, Teaching and Assessment Activities
... to review some aspects of their learning that may be improved. Self-Management	Students produce a personalised learning plan for better learning. This could include: <ul style="list-style-type: none"> - Strategies that they will use. - Their learning environment. - Time(s) for learning.

Links with Learning for Life and Work	Key Element
Personal Development Employability	Personal Understanding
Development of Learning Outcomes	
<ul style="list-style-type: none"> • Demonstrate a range of practical skills in undertaking experiments, including the safe use of scientific equipment and appropriate mathematical calculations. • Use investigative skills to explore scientific issues, solve problems and make informed decisions. • Research and manage information effectively, using Mathematics and ICT where appropriate; • Show deeper scientific understanding by thinking critically and flexibly, solving problems and making informed decisions, using Mathematics and ICT where appropriate. • Work effectively with others. • Demonstrate self management by working systematically, persisting with tasks, evaluating and improving own performance; • Communicate effectively in oral, visual, written, mathematical and ICT formats, showing clear awareness of audience and purpose. 	