**Key Stage 4**

**The Brain Game**

**Student worksheet**

**The amazing brain**

Scientists estimate that an average mature brain contains around 86 billion neurones (nerve cells). Incredibly, this is around the same as the number of stars in the Milky Way.

Each neurone, on average, is transmitting an impulse 200 times per second and connects to about 1000 other neurones in neural pathways via synapses. This means when each neurone transmits an impulse 1000 others get the same impulse. All in all this is an amazing 17 terabits (million billion bits) of information whizzing around the brain every second.

**How the brain changes**

Your brain at birth contained about all the neurones you will ever have.

Childhood is a time of incredible learning. When you were a baby synapses were being formed at a fast rate, in fact you had twice as many as you will need in adulthood. As you grew, your senses were constantly reporting to your brain about your environment and experiences, and this input stimulated electrical impulses in neurones in the brain; learning was taking place. Neural pathways that were used more often were strengthened. Those that were not used often were lost, a process called neural pruning. Pruning happens at different rates in different areas of the brain.

**The teenage years**

Scientists think that in teenagers, the parts of the brain involved in emotional responses are fully developed, while the parts of the brain involved in keeping emotional, impulsive responses in check are yet to mature fully. Such imbalances might be the reason why teenagers have an appetite for new experiences but may also act on impulse, without regarding risk.

**Your task**

Test the different regions of your brain by playing the brain game in a group of 3.

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Game board

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**The Brain Game**

### The Brain Game Rules

1. Shuffle the cards and place them face down in a pile.
2. The youngest player goes first. The person to their left takes a card and reads it out to them. The player completes the task on the card. If they complete it correctly, they get to strengthen a pathway on the game board. This is **one** line from a dot to another dot next to it.
3. Play passes to the person on their right and continues. If a player completes a full triangle, they should write their initials inside it.
4. Play continues until all game cards have been used. The person with the most triangles is the winner.

<table>
<thead>
<tr>
<th>Test your <strong>occipital lobe A</strong></th>
<th>Test your <strong>occipital lobe B</strong></th>
<th>Test your <strong>occipital lobe C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>You have 10 seconds to count the number of <strong>circles</strong>.</td>
<td>You have 5 seconds to name the <strong>two</strong> different objects in this drawing.</td>
<td>Which box is a different colour?</td>
</tr>
</tbody>
</table>

A  B  C

D  E  F

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Test your **parietal lobe A**

You need to get 5 or more of these sums correct in 30 seconds:

<table>
<thead>
<tr>
<th>Sum</th>
<th>Correct</th>
<th>Wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 + 10</td>
<td>100-25</td>
<td>98-43</td>
</tr>
<tr>
<td>40 - 20</td>
<td>46 + 14</td>
<td>123-45</td>
</tr>
<tr>
<td>76 - 25</td>
<td>37 + 62</td>
<td>144-67</td>
</tr>
<tr>
<td>13 + 12</td>
<td></td>
<td>235-78</td>
</tr>
</tbody>
</table>

Test your **parietal lobe B**

Which pattern, when folded, makes the cube?

Test your **parietal lobe C**

How many cubes are there?

Test your **parietal lobe D**

Which shape was cut out? The shape can be turned.

Test your **temporal lobe A**

You need to listen to these number sequences one at a time and repeat each one back with no mistakes.

6-4-3-9
7-5-8-3-6
5-9-1-7-4-2-8
2-7-5-8-6-2-5-8-4

Test your **temporal lobe B**

You need to listen to these letter sequences one at a time and say how many Rs, Ts and Ss are in each.

R T R R S
S R R T S T
T T S S R S R
T S R S T T S R

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#### The Brain Game

<table>
<thead>
<tr>
<th>Test your <strong>temporal lobe A</strong></th>
<th>Test your <strong>temporal lobe B</strong></th>
<th>Test your <strong>temporal lobe C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Read the tongue twister out loud as fast as you can 5 times with no mistakes: pad kid poured curd pulled cold</td>
<td>Read out this paragraph as quickly as you can: Unisg the icndeblire pweor of the hmuan mnid it dseno't mttaer in waht oderr the iterets in a wrod are, the olny irpoamtn tihng is taht the frsit and lsat itteer be in the rhgit pclae. The res can be a taotl mses and you can stll raed it whoutit a pboerlm. Aaznmig, and I awlyas tghhuot slelinpg was ipmorantt!</td>
<td>You need to listen to this list of objects and repeat them in any order: A dishwasher A cutlery set A pair of slippers A cuddly toy An alarm clock A laptop computer Tickets to the Bahamas</td>
</tr>
<tr>
<td>Test your <strong>frontal lobe A</strong></td>
<td>Test your <strong>frontal lobe B</strong></td>
<td>Test your <strong>frontal lobe C</strong></td>
</tr>
<tr>
<td>How many triangles are there?</td>
<td>Answer these puzzles: 1. LIGHT is to DARK as HAPPY is to: GLAD SAD JOY EAGER 2. LOVE is to HATE as FRIEND is to LOVER PAL OBEY ENEMY 3. GROUND is to FOOT as RAIL is to WHEEL TRAIN IRON STATION</td>
<td>What are these sayings?</td>
</tr>
</tbody>
</table>

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## The Brain Game

<table>
<thead>
<tr>
<th>Test your <strong>frontal lobe D</strong></th>
<th>Test your <strong>frontal lobe E</strong></th>
<th>Test your <strong>frontal lobe F</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>What number comes next in each sequence?</td>
<td>Which shape completes the sequence?</td>
<td>Which shape completes the sequence?</td>
</tr>
<tr>
<td>1. 5, 7, 12, 19, 31, 50,...</td>
<td><img src="image1.png" alt="Sequence" /></td>
<td><img src="image2.png" alt="Sequence" /></td>
</tr>
<tr>
<td>2. 0, 4, 2, 6, 4, 8,...</td>
<td><img src="image3.png" alt="Sequence" /></td>
<td><img src="image4.png" alt="Sequence" /></td>
</tr>
<tr>
<td>3. 1, 2, 6, 24, 120,...</td>
<td><img src="image5.png" alt="Sequence" /></td>
<td><img src="image6.png" alt="Sequence" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test your <strong>cerebellum A</strong></th>
<th>Test your <strong>cerebellum B</strong></th>
<th>Test your <strong>cerebellum C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand up and raise one leg, bending the knee about 45 degrees with your hands down by your sides. Stay like this for 30 seconds without wobbling.</td>
<td>Draw a circle so the lines do not cross when they join.</td>
<td>Place one arm out in front of you, close your eyes and quickly bring your finger to touch the <strong>tip</strong> of your nose.</td>
</tr>
</tbody>
</table>

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### Game answers

Test your **occipital lobe** A: 18; B: horse and frog; C: F; D: 4

Test your **parietal lobe** A: answers are going down each column from left to right: 35, 20, 51, 25, 75, 60, 99, 55, 78, 77, 157; B: B; C: 10

Test your **frontal lobe** A: 10; B: 1: sad, 2: enemy, 3: wheel; C: falling temperature, fat chance, head in the sand, broken heart; D: 1: 81 (a+b=c, b+c=d, c+d=e), 2: 6 (+4, -2, +4, -2, +4, -2), 3: 720 (×2, ×3, ×4, ×5, ×6); E: B (each column contains 3 red flowers); F: E

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