Memory Lanes, Part 1

If you are asked to name the months of the year in 30 seconds, could you do it? What if you were asked to complete the same task, but in alphabetical order? You will be given 30 seconds to try this.

1. 7.
2. 8.
3. 9.
4. 10.
5. 11.
6. 12.

Discuss with your class the difference in the two tasks above. What did you have to do that was different when asked to remember something in alphabetical order? What happens in your brain when you form a memory? How do you store a memory? How do you retrieve a memory? The concept of memory formation is very complex and a major topic of study for many scientists in the field of neuroscience.

You will now have a chance to interact with a group of four types of drivers in the city of London who are trying to locate a particular landmark. Who will find the site by the most direct and quickest route? Barry, Raj, Robert, or David? How does driving affect our memory?

View the animation called Memory Lanes-Brain Imaging and Taxi Drivers (#1723) on G2C Online. You can type “Memory Lanes” into the search box for easy access to the animation. Read the introduction.

Roll-over the cars to read a profile of each driver. Once you have read the profiles, choose a destination and wait to see who arrives first. Who do you think will be the quickest for each destination?

Studies by Eleanor Maguire and colleagues at University College London in the years 2000 and 2006 looked at the effects of practice on the structure of the brain. Among the individuals studied were bus drivers, taxi drivers, and ordinary drivers. Individuals had different levels of experience in driving in London and the researchers sought to determine whether these experiences affected the structures of their brains.
In the *Brain Imaging and Taxi Drivers* you compared the driving performance of some of these drivers and now will examine whether their driving experience has had any effects on their brains.

Drag a member from each group into the scanner. Once you have selected your participants, hit “perform subtraction.” Choose two groups to compare their brains. [Note: No data is available to compare regular drivers and bus drivers, but all other combinations are possible.]

What conclusions can you draw from your observations? Discuss the results with your class.
Memory Lanes, Part 2

Based on the results of the study, the members of your class have each been assigned to a research team studying memory. Each team should decide how to divide up the following tasks. The team members should be assigned one of the levels of organization as seen in the subway line at the top of G2C Online.

#1 Genes  
#2 Biochemistry  
#3 Cells  
#4 Brain Anatomy  
#5 Cognition and Environment

Each team member will be provided with an Individual Research Notes sheet on which to record their research. They should search G2C Online to find information on memory that pertains to their particular level of organization. They should record their information on the Individual Research Notes sheet. For each item they reference, they should record the item number and title of the item and information they found out relating to how we form our memories. You will have the opportunity to listen to interviews with top scientists in their field, view animations and read short articles on current topics in the field of neuroscience as well as explore the relationships between these items in the form of a concept map.

When everyone has completed their research, the team will come together for a group meeting at which time they will share their research. They will then prepare a presentation to share with the rest of the class. The following information will be included in their presentation.

The entire team will use information from the G2C Online to try to write a hypothesis to account for the possible change in the brain structure of the London taxi drivers. Each group member must contribute evidence from the information they found when researching their level of organization. The presentation may be in the form of a news conference, an article for a science magazine, an interactive game, a scripted dramatization, a poster session, or any other creative way in which the group would like to present their information. A written copy of the presentation must also be handed in to the teacher. It should address the following:

- The group hypothesis supported by the research of the group members
- At least two examples from each level of organization
- The research notes created by each individual member of the group
- At least two examples of other professions that might potentially show similar changes in the brain and an explanation that supports this hypothesis. (more research may be necessary to answer this question)
Each individual student on the team will also choose one of the following assignments:

1. Choose 10 words from the *Word Splash* and write a paragraph on what current research has shown us about how we form memories. Underline each word in the paragraph. Make sure that you try to use at least one vocabulary word from each level of organization.

or

2. Choose 10 words from the *Word Splash* and create a concept map using the *Simple Mapper* tool on the website. This can be accessed from the home page by going to Targeted Content. You may add concepts as needed. Make sure to try to use at least one vocabulary word from each level of organization.
Name _________________________________________

Genes → Biochemicals → Cells → Brain Anatomy → Cognition → Environment

**Memory Lanes: Individual Research Notes**

**Level of Organization**

**Source:** Item #__________  Title____________________