

## Part A: Brain Workouts

1. What is brain plasticity? **(0.5 pts)**

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2. What is the term that refers to the formation of new neurons? **(0.5 pts)**

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3. What term refers to the genetically programmed death of neurons in the brain? Is this genetically programmed neuronal death only found in the brains of people with Alzheimer's disease? Please explain. **(2 pts)**

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4. Explain what dendritic spines, sprouting, branching, and arborization are and how these concepts relate to synapses. Then, draw a picture that you could share with Anthony and Darrell that demonstrates these concepts and that will help them understand. Be sure to label the neurons' other relevant structures, as well. Insert your drawing below. **(2 pts)**

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5. Anthony is correct that there are chemicals in the brain that help neurons survive, help promote neural growth, and are involved in neurogenesis. These are called neurotrophins. Describe how the neurotrophins nerve growth factor (NGF) and brain-derived neurotrophic factor (BDNF) promote neuron survival, growth, and/or neurogenesis? **(1 pt)**

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6. Darrell's father used the phrase, "use it or lose it." What neuronal activities are related to this idea? **(1 pt)**

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7. Darrell's dad insists that there are scientific research findings supporting his claim that playing brain games helps one's brain and keeps memory from declining, whereas Anthony's dad insists that there are scientific research results supporting his claim that physical exercise helps one's brain and slows memory decline. Based on what you've learned about synapses and about the chemicals

that promote neural survival and growth, is one of the dads correct? Is neither correct? Are both correct? Give evidence to support your answer. **(2 pts)**

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**8.** Which of these two "brain workouts" do you believe would be the most beneficial for you as you experience adulthood and aging? Why? Which of these brain workouts do you believe would be the most beneficial for you in terms of learning material in your current college classes? Why? **(2 pt)**

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## Part B: Neurophysiology

**9.** Where on the leech are the initial dissection cuts made, and why are they made there? **(1 pt)**

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**10.** How many different types of neurons are probed and identified in the simulation? **(0.5 pts)**

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**11.** What part of the neuron is the fluorescent dye injected? **(0.5 pts)**

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**12.** The simulation provided two tools by which to identify a neuron. Please explain what those two factors are, and which factor was easier for you to use when identifying the neuron? **(1 pt)**

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## Part C: Brain Control

**13.** It is difficult to measure feelings and emotions experimentally. How does Dr. Tyee overcome this problem in her research? **(1 pt)**

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