

1. Describe the cellular structure of our brain, the function of each cellular structure and different types of each cellular structure. (10 points)
2. Describe how neural protein is synthesized and trafficked. (10 points)
3. Describe the central visual pathway and what kind of photoreceptors and neurons exist in the retina. (10 points)
4. If your thesis advisor gave you a brain disease-relevant gene knockout mouse, then how would you characterize this mutant mouse? Please make sure that you provide rationales for each experiment you will plan to do or each question you will plan to address. (10 points)
5. Define the following terms (2 points each)
 - (a) Aphasia
 - (b) Working memory
 - (c) Memory consolidation
 - (d) Motor unit
 - (e) Neurotrophic factor
6. Ice bucket challenge is an activity to promote awareness of the disease-amyotrophic lateral sclerosis (ALS). Please describe the molecular basis of this neurodegenerative disease. (10 points)
7. (a) Please describe the three primary brain vesicles during development. (6 points)
(b) Please describe the neural tube formation during development. (2 points)
(c) What nutrient deficiency in the maternal diet during pregnancy could cause neural tube defects? (2 points)
8. (a) Please describe how serotonin regulates anxiety and aggression? (4 points)
(b) Please design an experiment to evaluate the role of serotonin in memory regulation. (6 points)
9. Please explain how to identify a neurotransmitter using acetylcholine as an example. (8 points)
10. Please describe the classification, structure characteristics and functions of γ -aminobutyric acid (GABA) receptors. (12 points)

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