

9.01 Final Exam, Dec. 16, 2002 NAME _____

- 1) Fixed Action Patterns are fixed in the _____. (1 point)
- 2) The effect of TTX (tetrodotoxin, **from the Japanese puffer fish**) that is of great interest to neuroscientists is _____. (2 points)
- 3) Karl Lashley's 1917 paper, "The problem of serial order in behavior", was concerned with a basic issue in CNS control of movement. Briefly explain his argument and his conclusion. (5 points)
- 4) Describe an attack of cataplexy in a narcoleptic individual (human or dog) What triggers it and how can it be characterized? (4 points)
- 5) Name the locus of a brain lesion that results in a large disturbance in sleep-waking control. Then, describe the disturbance. (3 points)
- 6) What is the "model of the stimulus" in the theory of habituation described by the Russian neuroscientist Eugene Sokolov? (3 points)

- 7) Describe a biological clock of a mammal: a) Where is it in the brain? (Name the structure or describe its location.) b) How fast does it run? c) How can it be re-set by stimulation from the outside? (4 points)
- 8) Where is the optic chiasm located? _____
Name the cells of origin of the axons in the optic chiasm.
_____ (3 points)
- 9) Name three neuronal cell types in the vertebrate CNS that communicate with other cells without action potentials. (Remember: the retina is part of the CNS.) (3 points)
- 10) The visual cortex of the right hemisphere represents what part of the visual field of the left eye? And what part of the visual field of the right eye? (3 points)
- 11) Describe a test that has given evidence of vision in people with striate cortex lesions, within their scotomata, although they said "I see nothing" when shown something within a scotoma? (3 points)

- 12) Describe the brain lesion in cats made by James Sprague that resulted in a permanent diaschisis effect on the superior colliculus. What was the second lesion he made, and what was the result (the “Sprague effect”)? (4 points)
- 13) What are three non-local sources of input to the inferotemporal neocortex? (3 points)
- 14) What are “recurrent connections” in the neocortex? Give an example for the visual system. (4 points)
- 15) Describe two major effects of SC (superior colliculus) ablation in hamsters. (2 points)
- 16) Why do superior colliculus lesions in neonate hamsters have effects different from those of lesions in adults? (2 points)

- 17) What is visual acuity? Describe two reasons why visual acuity is much greater in the fovea than in the periphery of the visual field. (5 points)
- 18) Describe briefly the properties of receptive fields for two neocortical cells, one in the "primary" visual cortex (striate cortex = area 17) and one in an extrastriate area. (6 points)
- 19) Nucleus laminaris in the chicken is like the medial nucleus of the superior olive in mammals. The neurons of nucleus laminaris receive inputs from what secondary sensory cells? _____. Nuc. laminaris neurons fire action potentials under what conditions? _____
_____. What property of the stimulus do these neurons encode? _____ (5 points)
- 20) Distinguish between the functions of the "two auditory pathways" (referring to ascending projections in the brainstem). (2 points)

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21) What was the discovery that encouraged Fernando Nottebohm at Rockefeller University to write the paper "A brain for all seasons" ? (5 points)

22) The aversiveness of loud sounds depends on what structure in rats?
_____ (1 point)

23) Describe the lesion and the major symptoms of the Brown-Sequard syndrome. (5 points)

24) What is the anatomical defect in someone with congenital insensitivity to pain? (2 points)

25) What are endogenous opioids? Give a specific example of their action. (4 points)

- 26) Why does a person usually perceive a limb (a "phantom limb") after the actual limb has been amputated? (2 points)
- 27) Describe an adaptive function of "overeating" and weight gain. Name the species that needs this function, or once needed it in its evolution. (3 points)
- 28) Describe the weight regulation seen in rats with a) lesions of the ventromedial hypothalamus that destroy descending axons from the paraventricular nucleus, and b) lesions of the lateral hypothalamic area. What molecule may be involved? (5 points)
- 29) Describe one method for measuring the reward effects of brain stimulation. Where in the brain can an electrode be placed that is very likely to cause rewarding effects (pleasure) when stimulated? (4 points)

- 30) What is “quiet biting attack” in cats? How can we be sure that it is an innate behavior pattern? Is the hypothalamus necessary for this behavior to occur? How do you know that? (6 points)
- 31) How is olfactory information, detected by primary sensory neurons of the nasal epithelium, organized in the olfactory cortex? [Rosenzweig ch. 9] (3 points)
- 32) Describe two differences (dimorphisms) between the brains of male and female animals or people. [Rosenzweig ch. 12] (4 points)
- 33) What are two kinds of thirst, with different triggering stimuli? [Rosenzweig ch 13, 15] (4 points)

34) What is D. O. Hebb's hypothesis regarding the conditions under which synaptic strengths may change? [Rosenzweig ch. 18; also: exper. of Kelso & Brown (1986) in support.] (4 points)

35) Describe Seasonal Affective Disorder. [Rosenzweig ch. 16] (3 points)

36) Describe 2 kinds of specific evidence that limbic forebrain structures are important in emotion. (4 points)

37) One area of neocortex has been found to have direct connections to the hypothalamus. That neocortical area is _____. (2 points)

38) Name or describe two pathologies that involve dissociated mental states that include memory dissociation. (4 points)

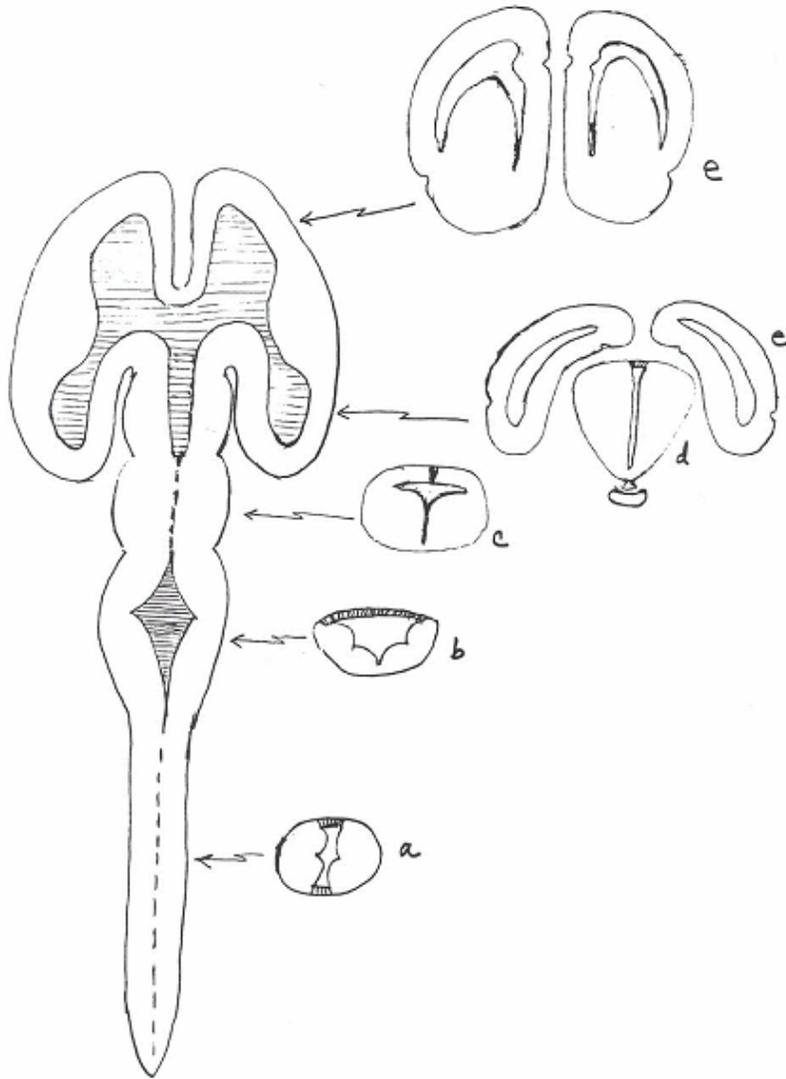
39) Describe three findings that indicate that the human brain is not symmetric for cognitive or affective functions. (6 points)

40) Describe tests for hemispheric dominance for language functions and for detecting facial expression of emotion. What is the most common result in each case? (5 points)

41) Why is a tachistoscope important for studies of split brain patients, when the experimentors are investigating differences in the function of the right and left hemispheres? (5 points)

- 42) Give examples of an autonomic effect of hypoglycemia (low blood glucose) and a CNS effect. (4 points)
- 43) What is meant by “cross-cuing” in the behavior of a split brain patient? (4 points)
- 44) Experimental studies of the patient known as H.M., a man with bilateral lesions of the hippocampal formation, led to two major dissociations in the study of memory. What are they? (4 points)
- 45) Why is an innervated muscle fiber needed within the muscle spindle, a sensory organ? (3 points)
- 46) At the junction of hindbrain and spinal cord, there are two major decussations. Define “decussation” and name or describe one of these major decussations. (3 points)
- 47) The _____ forebrain bundle runs through the lateral hypothalamus. It contains axons coming from the _____ system structures of the endbrain. (2 points)
- 48) Karl Wernicke, in the 1870s, formulated a model of the brain mechanisms for language processes. What are the two major brain areas involved (name them or give the major function), and how are these two connected? (4 points)
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49) In the figure below, identify by name each of the five levels of the embryonic CNS. You may use the English or the Latin or Greek names. Then, identify three parts at level “e” or “d”. Indicate clearly the part you are identifying, and give the name. (8 points)



DISCARDS:

For the visual system, describe two distinct routes that information can take from the retina to the neocortex.