VERY IMPORTANT - BEFORE YOU START THE EXAM:
1) Bubble in your name.
2) Bubble in your student number into the usual space.
3) There are two versions of this exam. You have version B. Before starting the exam, mark B on question 60.
4) MAKE SURE YOU PUT YOU EXAM IN THE CORRECT (VERSION B) PILE WHEN YOU FINISH!!

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1. Korsakoff's syndrome is typically associated with
   A) a retrograde amnesia that can extend back into childhood.
   B) malnutrition associated with chronic alcohol consumption.
   C) confabulation.
   D) A and B
   E) all of the above

2. Why are memory researchers so interested in the case of H.M.?
   A) His case provided the first evidence that different brain regions are required for implicit and explicit memories.
   B) His case supported the theory that all memories are diffusely stored across the brain.
   C) His case challenged the theory that there were different modes of storage for short and long-term memory.
   D) both A and B
   E) all of the above

3. In addition to both anterograde and retrograde amnesia, Alzheimer's patients commonly experience deficits in
   A) short-term memory.
   B) semantic memory.
   C) implicit memory involving sensorimotor learning (Ex. playing an instrument, dancing).
   D) all of the above
   E) both A and B

4. The theory that older memories are stored in a more permanent form is supported by the nature of post-traumatic amnesia. How?
   A) Only explicit memories are disrupted, while implicit memories remain intact.
B) Only episodic memory is disrupted, while semantic memories remain intact.
C) Recent memories are disrupted following a blow to the head while older, remote memories generally remain intact.
D) The duration of the amnesia is based on the severity of the blow to the head.
E) A concussion only causes retrograde amnesia without causing anterograde amnesia.

5. The Morris water maze task for rodents is often used to test
   A) glial cells.
   B) spatial memory.
   C) classical conditioning.
   D) both B and C
   E) all of the above

6. A hippocampal place cell
   A) is a neuron in the entorhinal cortex.
   B) becomes active when the animal is in a particular location.
   C) fires only when the animal is in an unfamiliar environment.
   D) both A and B
   E) both B and C

7. Long-term potentiation
   A) is usually induced by the intense stimulation of motor neurons.
   B) is a lasting increase in synaptic efficiency resulting from prior activity at the synapse.
   C) cannot be induced experimentally by electrical stimulation.
   D) is not associated with changes in efficiency of synaptic transmission.
   E) B and C

8. Which of the following is evidence that LTP is related to learning and memory?
   A) LTP can be produced experimentally by patterns of electrical stimulation that mimic normal brain activity.
   B) Behavioral conditioning (learning) produces LTP in the hippocampus.
   C) Many drugs that influence learning and memory do not affect LTP.
   D) both A and B
   E) all of the above

9. Why is the NMDA channel considered a coincidence detector?
   A) It requires both pre- and post-synaptic activity.
   B) It requires both glutamate release and glutamate binding.
   C) It requires both glutamate binding and membrane depolarization.
   D) It requires both Ca²⁺ flowing in and Na⁺ flowing out.
10. Which of the following is true of the AMPA receptor?
   A) Its activation allows Ca+ to enter the neuron.
   B) It is a voltage-gated ion channel.
   C) It is a sub-type of GABA receptors.
   D) Its activation requires that the membrane be partially depolarized.
   E) None of the above.

11. Strokes can be caused by
   A) tardive dyskinesia.
   B) cerebral ischemia.
   C) cerebral hemorrhage.
   D) both B and C
   E) all of the above

12. Which of the following statements regarding ischemia and excitotoxicity is(are) true?
   A) Ischemia leads to excessive influx of Ca2+ and Na+ into neurons.
   B) Ischemia causes excessive release of glutamate from presynaptic neurons.
   C) Ischemia causes over-activation of NMDA receptors.
   D) Both A and B are true.
   E) All of the above are true.

13. Which of following treatments may be useful in preventing the damage that follows a stroke.
   A) Blocking excitatory synapses.
   B) Cooling the brain a few degrees below body temperature.
   C) Using tissue plasminogen activator (tPA) to breakup a blood clot
   D) both A and B
   E) all of the above

14. A coma
   A) occurs when the brain slams against the inside of the skull.
   B) occurs in the brain opposite of the site of a blow to the head.
   C) causes a temporary disruption of cerebral function without any observable structural brain damage.
   D) is a complete (and fairly long lasting) loss of consciousness.
   E) all of the above

15. Contusions
   A) occur only when the brain is punctured by a sharp object.
   B) involve hemorrhage and the formation of a hematoma.
   C) are often produced by the brain slamming against the inside of the skull.
   D) all of the above
   E) both B and C
16. Trepanation
   A) results from an embolism.
   B) is the result of an a bacterial infection.
   C) is treated with stem cells
   D) is sometimes used to relieve pressure on the brain resulting from a contusion.
   E) none of the above

17. Dementia pugilistic is
   A) the combativeness sometimes found in patients suffering from Alzheimer’s Disease
   B) caused by repeated head trauma
   C) a form of chronic traumatic encephalopathy
   D) A and B
   E) B and C

18. There is good evidence that in mammals the body’s master clock is located in the
   A) raphe nuclei.
   B) caudal reticular formation.
   C) basal forebrain.
   D) suprachiasmatic nuclei.
   E) optic nerves.

19. Under normal circumstances, which portion of a night’s sleep contains the greatest percentage of REM?
   A) the early part of the night
   B) the middle of the night
   C) the last part of the night
   D) the amount of REM sleep is constant across the night.

20. Episodes of REM occur
   A) more frequently during the first four hours of sleep.
   B) more frequently in adults than infants.
   C) every 90 to 120 minutes during a normal night’s sleep.
   D) both A and B
   E) all of the above

21. Stage 4 sleep is characterized by
   A) rapid eye movement.
   B) muscle paralysis.
   C) normal muscle tone.
   D) night nightmares.
   E) an EEG resembling wakefulness.

22. Night terrors occur during
A) REM sleep
B) Stage 1 sleep
C) slow wave sleep
D) both A and B
E) all of the above

23. Lack of Stages 3 and 4 slow wave sleep can produce
   A) REM rebound.
   B) joint and muscle pain.
   C) reduced release of human growth hormone (HGH).
   D) A and C.
   E) B and C.

24. The portion of sleep time spent in REM sleep can be altered
   A) by sleep deprivation.
   B) by treatment with some antidepressants.
   C) by advancing brain development (age).
   D) B and C
   E) all of the above

25. How does prolonged sleep deprivation affect human volunteer test subjects?
   A) It is sometimes fatal.
   B) It decreases later need for sleep.
   C) It increases activity in the cerebellum.
   D) It impairs concentration.
   E) all of the above

26. Which of the following can attack the brain, producing insanity and dementia, years after the initial infection. Before the widespread availability of penicillin, it’s estimated that CNS complications produced by infection with this bacteria accounted for up to 20% of patients in asylums.
   A) syphilis
   B) herpes
   C) polio
   D) rabies
   E) measles

27. The word "crackpot" originally referred to people suffering brain damage from
   A) lead poisoning.
   B) mercury poisoning.
   C) syphilis.
   D) food poisoning.
   E) caffeine poisoning.

28. If the axon of a typical neuron is cut, the distal segment always degenerates. This is called ________ degeneration.
A) distal
B) proximal
C) retrograde
D) transneural
E) anterograde

29. Undamaged axons sometimes respond to the degeneration of nearby axons by producing _______ that grow to the synaptic sites that have been abandoned by the degenerating axons.
   A) phagocytes
   B) dendritic spines
   C) Schwann cells
   D) nodes of Ranvier
   E) collateral branches

30. Mammalian PNS neurons are capable of accurate regeneration if they
   A) receive support and guidance from Schwann cells.
   B) synapse on mammalian CNS neurons.
   C) are unmyelinated.
   D) receive stimulation and guidance from oligodendroglia.
   E) are directed by CNS neurons.

31. Neurotrophic factors
   A) can promote synaptogenesis.
   B) are released by neurons and glia.
   C) can protect cells from dying.
   D) both A and B
   E) all of the above

32. Neurotransplantation of ___________ can replenish dopamine in the striatum of Parkinson's patients.
   A) Schwann cells
   B) stem cells
   C) fetal substantia nigra tissue
   D) striatal tissue
   E) neurotrophic factors

33. Which of the following produce the sensations of a phantom limb?
   A) Increased input from the prefrontal cortex.
   B) Reorganization of the somatosensory cortex.
   C) Sprouting of collateral branches into the area of the somatosensory cortex that originally received input from the missing limb.
   D) All of the above
   E) B and C

34. Ultradian rhythms
35. The most important circadian zeitgeber for many animals including humans is the
   A) somatosensory cortex.
   B) **light-dark cycle**.
   C) free-running period.
   D) amygdala.
   E) hippocampus.

36. Repeated involuntary movements of the legs that may prevent a person from sleeping well are associated with
   A) slow wave movements
   B) night twitch
   C) **restless leg syndrome**
   D) REM sleep
   E) none of the above

37. Which of the following is NOT true about sleepwalking?
   A) It occurs most commonly in children and adolescents.
   B) **It is dangerous to awaken a sleepwalker.**
   C) It tends to run in families.
   D) It occurs most often during slow wave sleep.

38. A condition in which a person’s sleep is repeatedly disrupted by the inability to breath is called
   A) cataplexy.
   B) SIDS.
   C) iatrogenic.
   D) narcolepsy.
   E) **sleep apnea**.

39. Cataplexy is common in cases of
   A) anxiety.
   B) insomnia.
   C) nocturnal myoclonus.
   D) **narcolepsy**.
   E) pseudoinsomnia.

40. During adolescence, most people:
   A) continue their previous patterns of sleep and waking.
   B) require less sleep than at other points in the lifespan.
   C) temporarily act like “larks.”
D) temporarily act like “owls.”
E) None of the above.

41. Which of the following cause phase delays?
   A) daylight savings adjustments in the spring
   B) west-bound flights
   C) shift work
   D) both A and B
   E) all of the above

42. Species that sleep a lot tend to
   A) be more active.
   B) have higher body temperatures.
   C) be large.
   D) be less vulnerable to predation when they sleep.
   E) none of the above

43. Harriet Tubman, a conductor on the Underground Railroad, is reported to have suffered from sudden attacks of daytime sleepiness and loss of muscle tone. Historians suspect that she had
   A) sleep apnea
   B) narcolepsy
   C) insomnia
   D) night terrors
   E) an aneurysm

44. An individual with mild prosopagnosia
   A) can recognized a face as a face
   B) is likely to have difficulty recognizing individual faces
   C) suffers from a reduction in retinal cones
   D) A and B
   E) all of the above

45. The hippocampus
   A) is where spatial memories are first formed.
   B) is thought to be essential for processing and consolidating new memories.
   C) plays a critical role in Pavlovian conditioning.
   D) A and B
   E) all of the above

46. Which of the following is true about the Hebbian theory?
   A) It states that synapses are weakened when the pre- and post-synaptic neurons fire synchronously.
   B) It predicted that changes in synaptic efficacy form the basis of memory.
C) It predicted the existence of place cells.
D) It states that memories are diffusely stored in multiple areas of the brain
E) None of the above.

47. The medial temporal lobe is necessary to
   A) form implicit memories for recent events.
   B) store implicit memories for remote events.
   C) **form explicit memories for recent events.**
   D) store explicit memories for remote events.

48. Which of the following task(s) rely on implicit memory?
   A) incomplete picture test
   B) mirror drawing test
   C) Pavlovian conditioning
   D) both A and B
   E) **all of the above**

49. Which of the following is the process by which a short-term memory becomes long term.
   A) priming
   B) reversal
   C) **consolidation**
   D) deconsolidation
   E) multiple traces

50. A semantic memory
   A) **relates to general facts and information.**
   B) is formed without conscious awareness.
   C) is classified as an implicit memory.
   D) both A and B
   E) all of the above