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Name (PRINT) _____ Student _____

For each question, please fill in the appropriate circle on your scantron that BEST answers the question. The questions are worth 2 points each.

- C 1. In a forest, hawks feed on robins. Robins in turn feed on preying mantids. The mantids feed on grasshoppers. The grasshoppers in turn feed on plants. How many trophic levels are present? A) 3 B) 4 C) 5 D) 6 E) 7
- C 2. A self-perpetuating wave of depolarization along an axon: A) the resting potential. B) synaptic transmission. C) action potential. D) repolarization. E) academic potential.
- B 3. The measured growth rate (little r) for a *Paramecium* population (a small protozoan organism that lives in ponds) per capita per day is about 2; for a human population, the growth rate is about 0.0003. This suggests that the *Paramecium* population can undergo exponential growth, but humans cannot (because r is less than 1 for humans and greater than 1 for the *Paramecium*). A) True B) False
- C 4. Resource partitioning is best described by which of the following statements? A) the competitively superior species drive the other species to extinction. B) Two species can coevolve and share the same realized niche. C) Slight variations in niche (or partitioning a niche into two realized niches) allow closely related species to coexist. D) A climax community occurs when no other niches are available. E) Species diversity is maintained by the impacts of a moderate amount of disturbance.
- D 5. Certain plant species, such as soybeans and peanuts, have bacteria associated with nodules on their roots. The bacteria receive nutrients from the plant roots, and the bacteria fix atmospheric and soil nitrogen into a form that the plants can absorb. This is an example of: A) parasitism. B) commensalism. C) competition. D) mutualism.
- D 6. In nerve cells which show a continuous conductance of a action potential traveling down the entire length of the axon, which of the following is not present? A) mitochondria. B) potassium. C) a synapse. D) a myelin sheath. E) a dendrite.
- B 7. Which of the following groups has / have a rigid exoskeleton? A) annelids. B) insects. C) cnidarians. D) vertebrates. E) two of the above have rigid exoskeletons.
- C 8. Which of the following produces testosterone? A) sperm cells. B) hypothalamus. C) interstitial cells. D) anterior pituitary. E) seminiferous tubules.
- D 9. Epinephrine (= adrenaline) is secreted by the _____ in response to stress. A) pineal gland. B) anterior pituitary. C) thyroid. D) adrenal medulla. E) pancreas.
- E 10. One function of the corpus luteum is to: A) nourish and protect the ovum. B) produce prolactin in the alveoli. C) produce progesterone and estrogen. D) convert into an ovum-producing follicle upon proper hormonal stimulation. E) stimulate ovulation.
- E 11. Which hormone exerts an antagonistic action to PTH (parathyroid hormone)? A) thyroxin. B) epinephrine. C) growth hormone. D) glucagon. E) calcitonin.
- B 12. You were thirsty, and you drank an entire 3 liter bottle of cola. Afterwards, the ADH levels would _____ in your blood. A) increase. B) decrease.
- B 13. Growth hormone (GH) is secreted by the: A) adrenal cortex. B) anterior pituitary. C) thyroid. D) adrenal medulla. E) pancreas.

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14. Which of the following is secreted by the posterior pituitary? A) antidiuretic hormone (ADH).
B) Adrenocorticotrophic hormone (ACTH). C) oxytocin. D) growth hormone (GH) E) two of the above answers are correct.

15. Once leaving the testes, sperm are stored in and mature in the _____.
A) epididymis. B) vas deferens. C) prostate. D) oviduct. E) seminiferous tubules.

16. The sentence "Two species that have exactly the same requirements cannot coexist indefinitely in the same niche" refers to the: A) competitive exclusion principle. B) cosmopolitan species rule. C) relative abundance of all species on earth. D) keystone competition principle. E) lack of animal species on earth.

17. In an ecosystem, the organisms that capture electromagnetic radiation and store this captured energy by synthesizing organic compounds from inorganic substances are called A) decomposers B) primary consumers C) secondary consumers D) heterotrophs E) autotrophs.

18. Which of the following would occur if global warming occurs? A) shorelines would move inland due to rising sea levels. B) the polar ice caps and glaciers would increase in size. ~~C) the air temperature over the ocean would decrease.~~ D) all plants worldwide would decrease their productivity. ~~E) the geographical ranges of northern hemisphere species would shift towards the equator.~~

19. If rainfall had a pH of 6.5, could this be called acid rain?
~~A) Yes, because it is a pH of less than 7.~~
B) No, because no rain is acidic.
 C) No, because the normal pH of rain has a more acidic pH of 5.6.
D) No, because acid rain by definition must be a pH of less than 1.
E) No, acid rain must have a pH of 14 or higher.

20. An aesthetic justification for biological diversity is A) that we need to maintain the normal functioning of the ecosystem. B) to maintain ecotourism. C) to provide additional sources of medicines and food. D) because all species have a right to exist. E) the importance of the beauty and wonder of the organisms of an ecosystem.

21. Which of the following materials does not cycle in an ecosystem?
A) water. B) energy. C) carbon. D) phosphorus. E) all of the above materials cycle in an ecosystem.

22. In a farm field, there were 2 hawks, 1 snake, 365 field mice, 65 insect eating songbirds, 50,000 grasshoppers and 250,000 individual plants. This represents a pyramid of:
 A) numbers. B) Giza. C) productivity (energy). D) biomass.

23. You take a drug that inhibits the production and release of calcitonin. Where does the drug exert its effect?
 A) thyroid. B) kidneys. C) in adrenal gland. D) pancreas. E) anterior pituitary.

24. Salivary glands secrete into small ducts that lead to the surface of the skin lining your oral cavity. This means that the salivary glands are: A) endocrine glands. B) allomone glands. C) exocrine glands. D) murine glands. E) mesocrine glands.

25. An omnivore consumes: A) only plant material. B) detritus. C) animals only. D) animal material, but the omnivore can also produce its own food by photosynthesis. E) both plants and animals.

26. The increase in the amount of toxic pesticides as you go up the food chain is called: A) intoxication. B) biomagnification. C) trophic enrichment. D) bioaccumulation. E) pesticide concentration.

27. You were proscribed a medication (drug) that mimics the effects of glucagon. Which of the following effects would occur? A) your metabolic rate would increase. B) your kidneys would conserve more Ca ions, thus less Ca ions would be lost in urine. C) ~~the bronchioles in your lungs would be dilated.~~ D) body cells would be stimulated to undergo mitosis. **(E)** your blood glucose levels would rise.

28. In human females, the structure that separates the uterus from the vagina, is called the: A) oviduct or Fallopian tube. B) epididymus. C) clitoris. D) labia majora. **(E)** cervix.

29. In human males, the secretion of LH is inhibited by high levels of this hormone or hormones. A) oxytocin. ~~B) prolactin.~~ C) GnRH. D) ~~estrogen and progesterone.~~ **(E)** the androgen testosterone.

30. The hypothalamus controls the release of hormones by the anterior pituitary by means of: **(A)** releasing hormones and inhibiting hormones. B) secondary messengers. C) prostaglandins. D) antibodies. E) direct nervous stimulation.

31. During labor, the posterior pituitary releases ____, which helps to stimulate the uterine muscles to contract. A) aldosterone. B) progesterone. **(C)** oxytocin. D) estrogen. E) testosterone.

32. Cortisol is secreted by the ____ in response to stress. A) pineal gland. B) anterior pituitary. **(C)** adrenal cortex. D) adrenal medulla. E) pancreas.

33. Muscle myofibrils are composed primarily of: **(A)** actin and myosin. B) mucus. C) ATP and ADP. D) troponin. E) 'twinkies'.

34. The action potential in the muscle causes the sarcoplasmic reticulum to release: A) ~~Na⁺.~~ **(B)** K⁺. C) Cl⁻. D) oxygen. E) Ca⁺².

35. The part of the cerebrum that is involved in skeletal muscle control is the: A) parietal lobe. B) temporal lobe. C) frontal lobe. ~~D) occipital lobe.~~ E) hypothalamus.

36. Motor nerves send signals from ____ to _____. A) distributor; engine block. B) brain; sensory receptors. **(C)** brain; muscles. D) sensory receptors; brain. ~~E) brain; muscles.~~

37. A motor unit contains: ~~A) muscle fibers only.~~ ~~B) nerve cell fibers only.~~ **(C)** several muscle fibers and one nerve fiber. D) several nerve fibers and one muscle fiber. E) several nerve fibers and several muscle fibers.

38. Why is cholinesterase important? A) it produces acetylcholine neurotransmitter in the presynaptic cell. **(B)** it breaks down the acetylcholine neurotransmitter in the synapse. C) it breaks down choline into amino acids. D) it reacts with estrogen receptors. E) it inactivates estrogen receptors in the postsynaptic cell.

39. What is the situation regarding the concentrations of electrical charges on the inside of the axon's plasma membrane during the resting potential phase? **(A)** more negative inside than outside. B) more positive inside compared to outside. C) There is no difference in electrical charges inside and outside.

40. The resting potential of a particular nerve cell (cell A) is -70 mV (millivolts). Inputs from two other nerve cells cause the potential in cell A to become less negative inside than outside (-60 mV). This means with additional stimulation that cell A is: **(A)** more likely to generate an action potential. B) less likely to generate an action potential.

41. The change in the potential of cell A (in question 40) from -70 mV to -60 mV is called _____. **(A)** depolarization. B) an action potential. C) repolarization. D) hyperpolarization. E) impossible, the potentials of cells do not change.

42. When the population is at carrying capacity: A) birth rate is greater than death rate
B) ~~birth rate is less than the death rate~~ C) birth rate equals twice the death rate
D) ~~the death rates is twice the birthrate~~ E) the death rate and birth rate are equal

43. In a population exhibiting logistic growth, the change in numbers per unit time (dN/dt): A) increases as the population size approaches N . B) increases as the population size approaches K . C) increases and then decreases as the population size approaches r . D) increases up to $K/2$ and then decreases as the population size approaches K .

44. If the current rate of increase was 3%, then the doubling time ($DT = 70/r$) for the entire world's human population would be _____ years. A) 0.04 B) 210 C) 35 D) 23.3 E) 70 $\frac{70}{r} = 3$ $3 \sqrt[23]{70}$

45. The maximum growth rate of a population under ideal conditions is called its: A) biotic potential.
B) environmental resistance. C) carrying capacity. D) demographic transition. E) maximum population size.

46. Consider the following food chain: grass \rightarrow grasshopper \rightarrow mouse \rightarrow hawk. How much energy stored in the herbivore would be passed to the tertiary consumer (top carnivore)?
A) 12.5% B) 10% C) 1% D) 0.1% E) 0.01%
 10% 1% 0.1%

47. In general, steroid hormones produce their effects by: A) ~~combining with receptors located on the surface of plasma membranes.~~ B) activating the formation of adenylate cyclase. C) causing cyclic AMP to be produced.
D) moving to the nucleus. E) all of the above answers are correct.

48. In most animals, after oogenesis is complete, _____ functional gametes is/are produced by _____.
A) 4; mitosis. B) 4; meiosis. C) 2; meiosis. D) 1; meiosis. E) 1; mitosis.

49. PTH stimulates _____ to break down bone and increase Ca^{++} levels in blood.
A) ~~islets of Langerhans.~~ B) ~~osteoblasts.~~ C) ~~lymphocytes.~~ D) osteoclasts. E) ~~motor nerves.~~

50. The physical location where an organism lives is called its:
A) developmental history. B) habitat. C) community. D) primary production. E) niche.