THE UNIVERSITY OF TEXAS AT ARLINGTON

DEPARTMENT OF BIOLOGY

HUMAN PHYSIOLOGY

(Biol 3345)

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FIRST INTRASESSIONAL EXAMINATION

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There are 64 items in this booklet; 60 are multiple choice questions and the remainder are either short essay questions or diagrams to be labeled. Be careful not to overlook any pages in the examination booklet. You have 80 minutes to complete these questions.

During the course of the examination students will remain in their assigned seats. If assistance is needed, the student should raise his/her hand and a proctor will attend the individual needs of that student.

Upon completion of the exam, each student is to remain seated, raise her/his hand, and the exam materials will be collected by a proctor. At no time is the student to leave his/her seat and carry the exam materials to the proctors or other areas of the room.

After collection of exam materials, the student is to immediately, quietly, and promptly leave the Examination Room.

NO EXTRA TIME WILL BE ALLOWED AT THE END OF THE EXAMINING PERIOD FOR ANSWERS TO BE TRANSFERRED TO THE ANSWER SHEET.

GOOD LUCK!

DIRECTIONS: **Each of the numbered items or incomplete statements in this section is followed by answers or completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and write your selection in the left margin beside the question. Each multiple choice question is worth 1.5 points. YOU DO NOT HAVE TO ATTEMPT ALL THE QUESTIONS TO EARN 100 POINTS.**

1. Which of the following is **NOT** considered part of the cell's of cytoplasm?
   A. a ribosome B. the nucleus C. the mitochondria
   D. a microtubules E. fluid between the organelles

2. Which of the following is one of Cannon's "internal secretions"?
   A. hormones B. nutrients C. water
   D. inorganic ions E. none of the above

3. Which group of elements makes up more than 90% of the body's mass?
   A. O, H, Na B. C, Na, K C. O, Ca, H
   D. Ca, C, O E. O, C, H

4. The alpha-helix and pleated sheet are examples of the _____ structure of a protein.
   A. primary B. secondary C. tertiary
   D. quaternary E. pentanary

5. A 5 M solution of 100 ml of glucose contains how many grams of glucose, m.w. 180 daltons?
   A. 180 B. 360 C. 1.0
   D. 6.023×10^{23} E. 90

6. Each of the following is an example of a nonmembranous organelle except one. **Identify the exception.**
   A. lysosome B. cilia C. centriole
   D. ribosome E. cytoskeleton

7. There are trillions of cells in your body. How many primary types of tissue are there?
   A. four B. one hundred C. one
   D. ten E. forty

8. Plasma is to blood as _____ is to cytoplasm.
   A. inclusion B. organelle C. protein
   D. cytosol E. serum

9. Caveolae and clathrin coated pits are both used in:
   A. endocytosis B. exocytosis C. phagocytosis
   D. all of the above E. none of the above

10. An electrically charged particle due to loss of an electron is a(n):
    A. atom B. molecule C. electron
    D. cation E. neutron

11. In osmosis, water always moves toward the ____ solution, that is, toward the solution with the ____ solute concentration.
    A. isotonic ... greater B. hypertonic ... greater C. hypotonic ... lesser
    D. hypotonic ... greater E. hypotonic ... lesser

12. The framework of cilia, flagella, centriole, and the mitotic spindle is formed by:
    A. endoplasmic reticulum B. collagen fibers C. organism
    D. microtubules E. neurofilaments

13. Which of the following is chemically specific?
A. active transport
B. facilitated transport
C. simple diffusion
D. both A and B
E. none of the above

14. What cellular specialization causes fluid to flow over the epithelial surface?
A. centrioles
B. microvilli
C. flagella
D. myofilaments
E. cilia

15. The main component of the cytosol is:
A. proteins
B. sugars
C. salts
D. water
E. A and C only

16. Which body fluid compartment contains higher levels of Na^+, Cl^-, and HCO_3^-?
A. plasma
B. interstitial fluid
C. intracellular fluid
D. A and C
E. A and B

17. The layer of the skin that provides protection against bacteria as well as chemical and mechanical injuries is the:
A. dermis
B. subcutaneous layer
C. epidermis
D. stratum corneum
E. hypodermis

18. Which of the following is a way for solutes in an aqueous solution to move from an area of high solute concentration to an area of low solute concentration?
A. facilitated diffusion
B. osmosis
C. active transport
D. A and B
E. none of these

19. Receptor molecules for chemical signaling are located:
A. in the membrane
B. in the cytosol
C. in the nucleus
D. B and C
E. all of the above

20. A bond in which electrons are completely lost or gained by the atoms involved is referred to as an:
A. ionic bond
B. polar covalent bond
C. nonpolar covalent bond
D. hydrogen bond

21. An antioxidant is:
A. the active ingredient in bleach
B. a compound that absorbs oxygen
C. a molecule that alters free radicals
D. a free radical
E. a vitamin

22. We would expect a cell with an extensive Golgi apparatus to:
A. make a lot of ATP
B. secrete a lot of material
C. move actively
D. store large quantities of food

23. You conduct an experiment on twenty 18-year-old males (subjects) to see how various intensities of exercise influence heart rate. Which of the following is/are considered an **independent** variable?
A. age of subjects
B. sex of subjects
C. intensity of exercise
D. heart rate
E. more than one of these

24. Of the chemical bonding types listed, which is the strongest and usually requires the input of energy to be broken apart?
A. ionic
B. van der Waals forces
C. hydrogen bonds
D. covalent
E. impossible to determine

25. Cell junctions which promote the coordinated activity of cells by physically binding them together into a cell community include all the following **EXCEPT**:

A. tight junctions
B. desmosomes
C. peroxisomes
D. gap junctions

26. Homeostasis is the ability of the body:

A. prevent the external environment from changing
B. prevent the internal environment from changing
C. quickly restore changed conditions to normal
D. ignore external stimuli to remain in a state of rest
E. interact with members of the opposite sex

27. One atom of an element usually has:

A. more protons than electrons
B. equal numbers of protons and electrons
C. more neutrons than electrons
D. the same number of protons, electrons, and neutrons
E. it depends on the element

28. Protein specificity:

A. the activation of a specific protein that is needed to perform a particular function
B. the degree to which a protein is attracted to a ligand
C. the ability of a protein to bind a certain ligand or a group of related ligands
D. the degree to which a protein-ligand complex initiates a response
E. B and C

29. Which of the following is **NOT** a function of membrane proteins?

A. bind to ligands
B. regulate the passage of ions
C. anchor or stabilize the cell membrane
D. act as transport molecules for various solutes
E. produce energy

30. Intermediate filaments:

A. provide the cell with strength
B. stabilize the position of organelles
C. transport materials within the cytoplasm
D. form the neurofilaments in nerve cells
E. All of the above are correct.

31. Exocrine glands:

A. may make either mucous or serous secretions
B. release their secretions into the external environment
C. release their secretions through open tubes, called ducts
D. may work as single cells or as a multicellular organ
E. All of these statements are true.

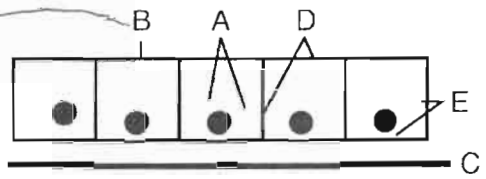
32. Which of the following does **NOT** influence membrane permeability?

A. the size of the diffusing molecule
B. the thickness of the lipid bilayer
C. the lipid solubility of the diffusing
D. the composition of the lipid bilayer

B

33. The law of mass balance states:
   A. total amount of substance X in the body = intake + production - output
   B. if the amount of a substance in the body is to remain equal, any loss must be offset by an equal gain
   C. total amount of substance X in the body = intake - production - output
   D. A and B
   E. B and C

On the row of cells indicated to the right, match A-E to these terms:



34. Apical surface
35. Basal lamina

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36. Hyposmotic solutions:
   A. have higher concentrations of solutes than hyperosmotic solutions
   B. have lower concentrations of solutes than other hyposmotic solutions
   C. have the same concentration of solutes as hyperosmotic solutions
   D. have lower concentrations of solutes than hyperosmotic solutions
   E. None of these are correct.

37. Cells may communicate with one another by/through:
   A. transferring signal molecules to adjacent cells through gap junctions
   B. locally acting chemicals, called paracrines, autocrines, or neuromodulators
   C. long-distance means, which rely on combinations of electrical and chemical signals
   D. A and B
   E. A, B and C

38. Cytokines:
   A. are secreted only by cells of the immune system
   B. can be transported through the blood to a distant site
   C. are the same as hormones
   D. A and B
   E. A, B and C

39. Inositol triphosphate:
   A. is a water-insoluble messenger molecule
   B. binds to the calcium channel of the endoplasmic recticulum
   C. is involved in the release of calcium into the cytosol
   D. B and C
   E. All of the above are correct.

40. Receptor molecules for chemical signaling are located:
   A. in the membrane
   B. in the cytosol
   C. in the nucleus
   D. B and C
   E. All of the above are correct.

41. When a catecholamine or peptide hormone binds to receptors on the surface of a cell:
   A. the cell membrane becomes less permeable
   B. a second messenger appears in the cytoplasm
   C. the cell becomes inactive
   D. the hormone is transported to the nucleus where it alters the activity of DNA
   E. None of the above are correct.

42. The internal skeleton of a cell is composed of:
   A. microtubules, intermediate filaments, and microfilaments
   B. microtubules and intermediate filaments
   C. microfilaments
   D. microtubules, microfilaments, and centrioles
   E. microtubules

43. Phospholipid molecules in a membrane are arranged with their ____ on the exterior and their ____ on the interior.
   A. hydrophobic heads ... hydrophilic tails
   B. hydrophilic heads ... hydrophobic tails
   C. nonpolar heads ... polar tails
   D. hydrophobic tails ... hydrophilic heads
   E. hydrophilic tails ... hydrophobic heads

Match each with its function (Next three (3) questions):
   A. smooth endoplasmic reticulum
   B. lysosome
   C. Golgi apparatus
   D. ribosomes
   E. transport vesicles

44. Lipids manufactured here A

45. Sac of enzymes that digest things B

46. How proteins and other substances get from endoplasmic reticulum to Golgi apparatus E

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47. What is the role of a "second messenger" in hormone action?
   A. signals a cell to secrete hormone
   B. it informs a gland as to whether it's hormones are having an effect
   C. it relays a hormone's message inside a target cell
   D. it stops hormone action when it is no longer needed
   E. it carries a hormone while it is in blood

48. Which of the following is a difference between active transport (AT) and facilitated diffusion (FD)?
   A. AT involves transport proteins, and FD does not
   B. FD requires energy from ATP, and AT does not
   C. FD involves transport proteins, and AT does not
   D. AT requires energy from ATP, and FD does not

49. Which of the following is **NOT** a known function of the cytoskeleton?
   A. to maintain a critical limit on cells size
   B. to provide mechanical support to the cell
   C. to maintain the characteristic shape of the cell
   D. to hold mitochondria and organelles in place

A

50. In what way does the interior surface of the cell membrane of a resting (non-conducting) neuron differ from the external environment? The interior is:
   - A. negatively charged and contains less sodium
   - B. positively charged and contains less sodium
   - C. positively charged and contains more sodium
   - D. negatively charged and contains more sodium

51. You are designing an experiment to determine if caffeine consumption decreases the time it takes a person to react to a stimulus. Which of the following (if any) would be a testable hypothesis for your experiment?
   - A. The more coffee a person drinks, the more his/her reaction time is affected.
   - B. The higher the caffeine consumption, the faster a person reacts to a given stimulus.
   - C. The more caffeine consumed by a student, the higher the urine output is.
   - D. Coffee drinkers make better lovers.
   - E. None of the above are testable hypotheses.

52. **Saturation** occurs when:
   - A. molecules are moved by the use of vesicles
   - B. the energy required to move molecules results from a high energy bond
   - C. a group of carrier proteins is operating at its maximum rate
   - D. a preference of a carrier protein for a substance is demonstrated based on the differing affinities of the carrier for the substrates
   - E. a carrier molecule has the ability to transport only one molecule or a group of closely related molecules

53. Some important generalizations about homeostatic control systems include:
   - A. it is possible for everything to be maintained relatively constant
   - B. complete constancy of any given feature is maintained
   - C. stability is achieved by controlling the output only
   - D. all of the above
   - E. a change in the variable being regulated brings about responses which tend to push the variable in a direction opposite the original change

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Match each with its function (Questions 54 to 55):

- A. diffusion, dialysis
- B. phagocytosis
- C. receptor-mediated
- D. endocytosis
- E. both B and D

54. engulfment processes that require ATP

55. uses a clathrin coated vesicle ("pit")

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56. Osmotic pressure inside a cell:
   - A. is identical to the hydrostatic pressure built up inside the cell
   - B. is proportional to the intracellular concentration of all solute particles
   - C. is inversely proportional to the absolute temperature
   - D. is one of the "forces" governing the movement of water across the cell membrane
   - E. Only B and D are correct

57. Which of the following statements is **FALSE**?
   A. Only a few living cells of the body of the body are in direct contact with the external environment
   B. Homeostasis is an important process in the body
   C. Communication of a cell to the outside world occurs across the cell membrane
   D. Teleological study of human physiology is an important approach to studying physiology
   E. Most cell to cell communication uses chemicals

58. Lipids _____.
   A. form essential structural components of cells
   B. include steroids, eicosanoids and cholesterol
   C. found in the blood in certain levels or proportions help to promote artery disease
   D. may be liquids or solids at room temperature
   E. All of the above

59. Active neurons require large amounts of ATP for _____.
   A. synthesis of neurotransmitters
   B. axoplasmic flow
   C. the activity of the sodium-potassium pump
   D. recycling neurotransmitters
   E. all of the above

60. Plasma membrane proteins:
   A. Are present in equimolar concentration with the lipids of the membrane
   B. Are found exclusively on the outer extracellular or inner (cytoplasmic) surface of the membrane
   C. Determine the transmembrane movement of hydrophobic substances
   D. May span the membrane and also move laterally within the membrane
   E. Are separated from the cytoplasm by the rough endoplasmic reticulum lumen

Short Answer Questions

Please answer these questions briefly. Label diagrams correctly, with lines pointing to the proper structures. Partial credit will be given where appropriate. Write legibly!!

You can use the back of the last page to continue any question. Number them, please!!

Use the table and graph below to answer the following questions.

Heart rates (bpm) of *Sprague-Dawley* rats after administration of various concentrations of epinephrine.

	Heart Rates		
Epinephrine (mg)	Animal 1	Animal 2	Animal 3
50	48	62	55
100	58	67	63
150	67	70	79
200	80	85	93
150	67	70	79

Table 1-1

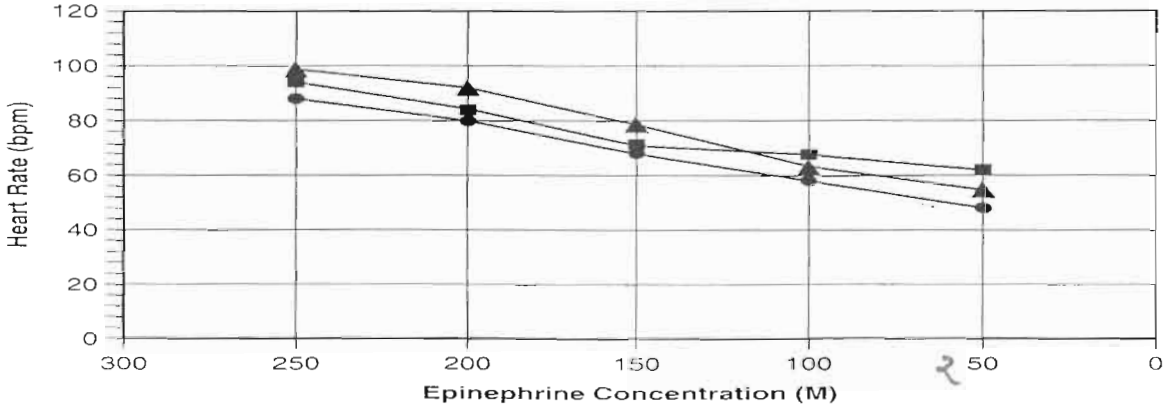

Figure 1-1

61. List all of the errors in Figure 1-1 above. (5 points)

62. What is a **nocebo** effect? (5 points)

p. 16 (20) (1)

a nocebo ~~effect~~ occurs if an investivator give a subject a placebo and tells the subject that it can harm their body. ~~Despite~~ Although, placebo is an inactive substance, it ~~cause harm the subs~~ harm the subject as the investivator has predicted.

63. Name two ways the selectivity of a channel is determined. (5 points)

0

- specific ligand
- specific receptor

64. Complete the following table. (5 points)

(1)

	Peptide hormone	Steroid hormone	Amine hormone
Synthesis & Storage	Made in advance		
Release from parent cell	oxytocin	Simple diffusion	Simple diffusion
Transported in blood	Dissolved in plasma		Bound to carrier protein
Location of receptor	cell membrane	Cytoplasm, nucleus	membrane, cytoplasm, nucleus
General target response	Modification of existing protein	Induction of new protein synthesis	
Example			

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Cell physiology

1-3

Blind Study - is an experiment that the subject doesn't know about the experiment.

No also effect - is an effect that ~~asia involved~~ involved letting the subjects know about the

Crossover study - use

Retrospective study - ~~Study from history~~ data
Study from historical data.

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(1)

Quiz 2

1) simple epithelial tissue
2) stratified "epithelial tissue"
3) columnar " "
4) squamous " "

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0.6

1) a) The substance can be actively transported across the cell membrane by using ATP.
* using carrier protein (also)