#1-#32 MULTIPLE CHOICE: CHOOSE THE ONE BEST ANSWER & ENTER IT ON THE SCORESHEET

1. Which of the following is NOT one of the four basic tissues:
a) epithelium
b) connective tissue
c) skin
d) muscle
e) nervous tissue

2. Which of the following is BEST stained by hematoxylin:
a) smooth endoplasmic reticulum
b) rough endoplasmic reticulum
c) integral membrane protein
d) Golgi
e) collagen

3. Which of the following have the LOWEST potency:
a) mesenchymal stem cells
b) hematopoietic stem cells
c) chondrogenic progenitor cells
d) cells of the embryoblast
e) pericytes

4. Regarding trophoblasts, which of the following is TRUE:
a) are present in the morula
b) help give rise to the epiblast
c) help give rise to the hypoblast
d) help form the maternal portion of the placenta
e) help form the embryonic portion of the placenta

5. Regarding gastrulation, which of the following is FALSE:
a) generates the hypoblast
b) generates the endoderm
c) generates the ectoderm
d) generates the mesoderm
e) requires ingression

6.Which of the following induces the formation of the floor plate in the developing neural tube:
a) a high concentration of bone morphogenetic protein (BMP)
b) a high concentration of sonic hedgehog (SHH)
c) a low concentation of sonic hedgehog (SHH)
d) an absence of sonic hedgehog (SHH)
e) Lim 1

7. Which of the following are the MOST hydrophobic:
a) fatty acid portions of phospholipids
b) polar head groups of phospholipids
c) peripheral membrane proteins
d) ribosomes
e) nucleic acids

8. Which of the following requires energy:

a) binding of a ligand to a cell surface receptor
b) facilitated diffusion across a membrane
c) active transport across a membrane
d) passive transport across a membrane
e) movement of calcium ions through a gap junction down a concentration gradient

9. Which of the following is NOT a function of the Golgi:

a) protein synthesis
b) protein glycosylation
c) protein sorting
d) sphingolipid synthesis
e) phosphorylation of mannose

10. Where does vesicle 'uncoating' occur:

a) at the donor membrane
b) at the acceptor membrane
c) in the trans-Golgi network (TGN)
d) in the cytoplasm
e) in nuclear pores

11. Where does vesicle fusion occur during secretory exocytosis into the lumen of a salivary gland alveolus:

a) at the basal plasma membrane
b) at the lateral plasma membrane
c) at the apical plasma membrane
d) at the inner nuclear membrane
e) at the outer nuclear membrane

12. Where is cholesterol 'hidden' when it is transported from a donor to an acceptor membrane across an ER junction.

a) inside a TOM complex
b) inside a lipid transfer protein
c) inside a binding complex
d) on the lipid transfer protein receptor located on the donor membrane
e) on the lipid transfer protein receptor located on the acceptor membrane

13. Where does the ß-oxidation-mediated breakdown of fatty acids occur:

a) in the outer mitochondrial membrane
b) in the intermembrane space of the mitochondrion
c) in the inner mitochondrial membrane
d) in the matrix space of the mitochondrion
e) in the peroxisome

Ambiguity

Did not make it clear that it was long chain fatty acid breakdown in the peroxisome we were looking for. Thus, mitochondria, particularly the matrix, was also a possiblity. As a result, all answers were marked correct.

14. When UV-induced DNA damage cannot be corrected within a basal epidermal cell, p53 induces apoptosis via:

a) the intrinsic pathway
b) the extrinsic pathway
c) the G1 to S cell cycle checkpoint
d) mitosis
e) necrosis

15. Which of the following are NOT anchoring junctions:
a) tight junctions
b) zonula adherens
c) desmosomes
d) hemidesmosomes
e) focal contacts

16. In a stratified squamous epithelium, which of the following are linked to keratin filaments:
a) tight junctions
b) zonula adherens
c) desmosomes
d) focal contacts
e) gap junctions

17. Which of the following is part of the ground substance of the ECM:
a) collagen type I
b) collagen type II
c) reticular fibers
d) heparin
e) elastin

18. Which of the following is NOT a characteristic of proteoglycans:
a) mostly protein
b) mostly carbohydrate
c) negatively charged
d) contain GAG's
e) facilitate tissue hydration

19. Which of the following BEST describes the form of an integrin molecule that is tightly bound to laminin:
a) monomer
b) homodimer
c) cis-homodimer
d) low affinity heterodimer
e) high affinity heterodimer

20. Which of the following drives apical constriction in a simple columnar epithelium during morphogenic tube formation:
a) contraction of sarcomeres
b) contraction of microvilli
c) contraction of zonular belts
d) contraction of intermediate filaments
e) beating of cilia

21. Which of the following BEST describes loose connective tissue:
a) few cells, little ground substance, many fibers
b) few cells, abundant ground substance, many fibers
c) many cells, abundant ground substance, many fibers
d) many cells, abundant ground substance, few fibers
e) many cells, little ground substance, few fibers

22. Which of the following are fixed in connective tissue AND derived from hemopoietic stem cells:
a) fibroblasts
b) pericytes
c) adipocytes
d) mast cells
e) plasma cells

23. Regarding exocrine glands, which of the following is FALSE:
a) serous alveoli bind eosin
b) mucous alveoli secrete proteoglycans
c) connective tissue stroma is derived from mesoderm
d) simple glands never have branching ducts
e) compound glands always have serous and mucous alveoli

24. When comparing bone and cartilage, which of the following is FALSE:
a) both are highly vascularized
b) both are mesodermally-derived
c) both have fibers in their extracellular matrix
d) both have differentiated cells located in lacunar spaces
e) both can have progenitor cells located in an outer connective tissue covering

25. The territorial matrix of hyaline cartilage, which binds hematoxylin, is rich in:
a) lamin
b) elastin
c) proteoglycan
d) rough ER
e) calcium

26. Which of the following BEST describes an osteoblast:
a) only present in compact bone
b) breaks down hydroxyapatite
c) deposits osteoid
d) is a bone stem cell
e) increases blood calcium levels when active

27. Which of the following is NOT striated:
a) skeletal muscle cells
b) cardiac muscle cells
c) smooth muscle cells
d) collagen type I fibers in dense regular connective tissue
e) collagen type I fibers in dense irregular connective tissue

28. Which of the following BEST describes what happens when a skeletal myofiber contracts:
a) sarcomeres shorten
b) thick filaments shorten
c) thin filaments shorten
d) troponin binds ATP
e) tropomyosin binds calcium

29. Which of the following are NOT found in cardiac muscle myofibers:
a) adherens junctions
b) gap junctions
c) t-tubules
d) dense bodies
e) intercalated discs

30. Regarding the nervous system, which of the following is FALSE:
a) preganglionic sympathetic motor neurons originate in the thoracic segments of the spinal cord
b) somatic motor neurons originate in the ventral portion of the spinal cord
c) autonomic motor neurons initiate voluntary contraction of skeletal muscle cells
d) sensory nerves carry afferent information from the periphery to the central nervous system
e) grey matter in the central nervous system contains neuronal cell bodies

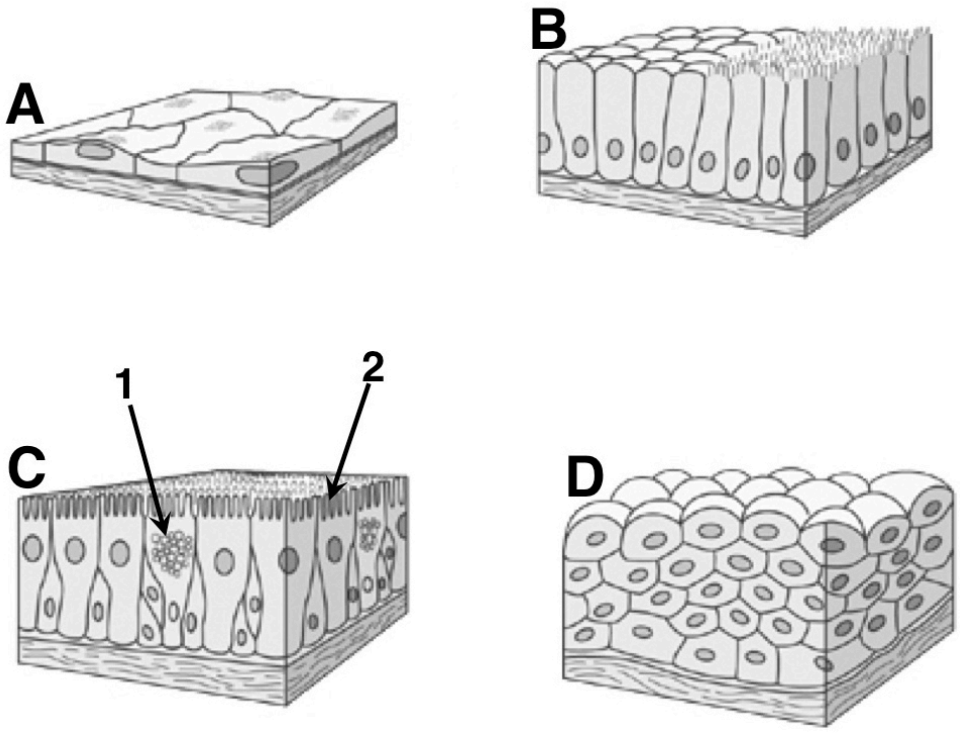
31. Regarding neurons, which of the following is CORRECT:
a) dendrites contain nucleoli
b) dendrites conduct impulses away from the cell body
c) cell bodies have no synapses
d) axons contain microtubules
e) axons conduct impulses towards the cell body

32. Which of the following initiates the fusion of neurotransmitter-containing vesicles with the plasma membrane at the pre-synaptic axon terminal:
a) rough endoplasmic reticulum
b) smooth endoplasmic reticulum
c) microtubular motor proteins
d) SNARE proteins
e) botox

End of Multiple Choice Questions; Proceed to Short Answer Questions

#33-#40 SHORT ANSWERS: WRITE THE CORRECT ANSWER DIRECTLY ON THE EXAM

Fig 01: Epithelia



33. In Fig 1, which lettered epithelium is pseudostratified:

(write the letter) ***C***

34. In Fig 1, which lettered epithelium contains cells that do NOT have hemidesmosomes:

(write the letter) ***D***

35. From a polarity point of view, what is the directionality of the secretory machinery in the cell labelled #1 in Fig. 1:

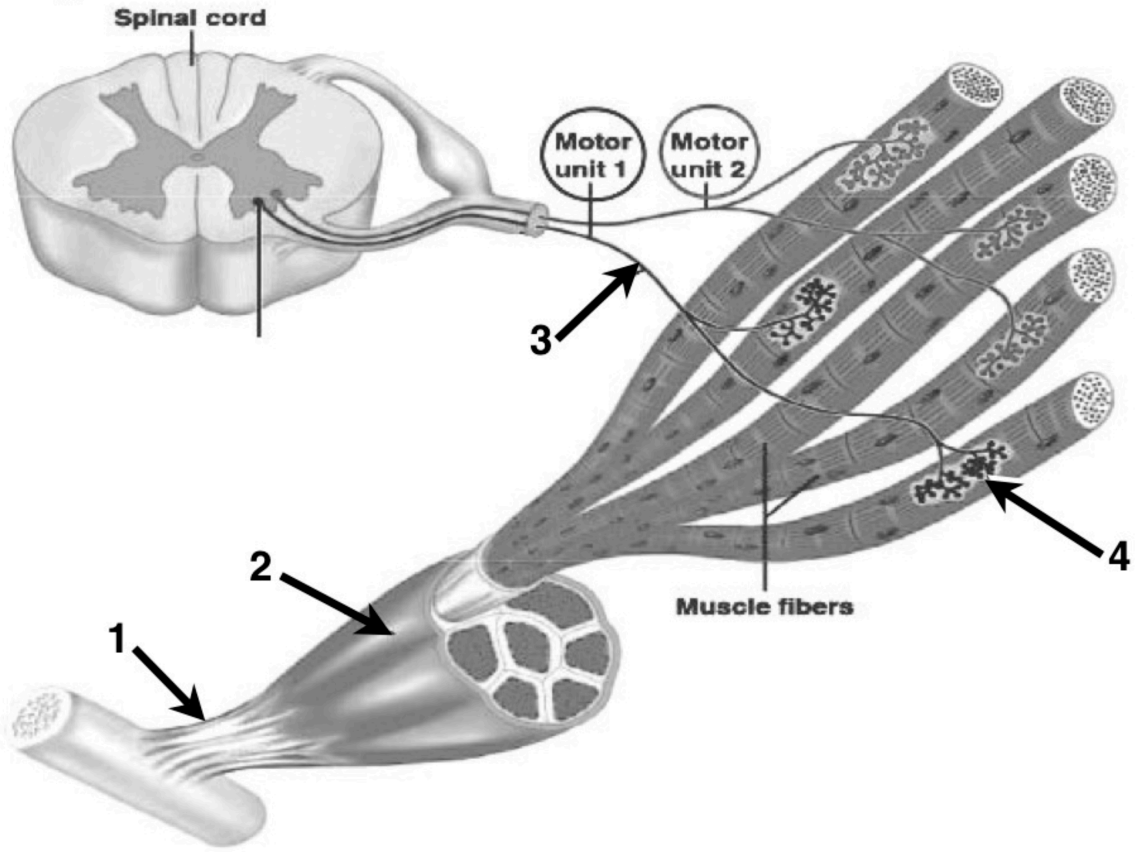
(write polarized direction of secretion) ***Apical*** ***(OK - basal to apical; NOT - basal alone or upwards)***

36. In Fig 1, what is the name of the cellular specializations labelled #2 if they contain bundles of actin filaments in their cores:

(write the name of the specializations) ***Microvilli*** ***(NOT - cilia)***

End of questions from Fig 1; Proceed to Fig 2

Fig 2: Skeletal Muscle Motor Unit



37. In Fig 2, what is the name of the major ECM fiber found in structure #1, which consists of a type of connective tissue that connects skeletal muscle to bone:

(name the ECM fiber type) ***Collagen*** ***(OK - Collagen Type I; NOT - any other Collagen Type)***

38. In Fig 2, what is the name of the connective tissue covering that is structure #2 (note: it surrounds the entire muscle):

(name the specific muscle covering) ***Epimysium*** ***(OK - sloppy spelling; NOT - endomysium or perimysium)***

39. In Fig 2, what portion of the motor neuron is represented by structure #3:

(name the portion of the neuron) ***Axon*** ***(NOT - Dendrite or Ganglion; latter not present in skeletal muscle/somatic motor unit; only found in autonomics to smooth muscle)***

40. What does Botox inhibit when an action potential arrives at structure #4 in Fig 2:

(what is inhibited) ***Secretion/release of neurotransmitter or acetylcholine***
(OK- SNAREs at pre-synaptic membrane; NOT- ACh uptake or Ca^{2+} release which are not part of Action Potenial arriving at motor endplate)