B - Nov 7 SO Practice - Nov 7 Country-wide SO Practice - 11-07-2020

Hello Students,

Today there will be 68 questions, including mostly multiple choices question, with a few fill-in-the-blanks one, and one open question at the end. There is no penalty for wrong answers except when you put down multiple answers for same question. In case of a tie, the final ranking will be determined by the three tie-breaker questions.

1. (1.00 pts) During exercise and in hot weather, which of the following occurs?

- ○ A) Decrease perspiration
- ○ B) Vasoconstriction of skin blood vessels
- ◉ C) Loss of body salt (sodium)
- ○ D) Increase hypothalamus 'heat-promoting center' activities
- ○ E) Increase melanin production

2. (1.00 pts) The muscle of which of the following organ is consider 'voluntary':

- ◉ A) Quadriceps
- ○ B) Heart
- ○ C) Aorta
- ○ D) Urinary bladder
- ○ E) Gallbladder

3. (1.00 pts) If a toddler does not get enough sun light and has a restricted diet that limits dairy intake, which of the following conditions would the child be at risk of developing?

- ◉ A) Osteoarthritis
- ○ B) Eczema
- ○ C) Rickets
- ○ D) Myopathy
- ○ E) Anxiety disorder

4. (1.00 pts)
You were playing in a basketball game and despite surrounded by players from the opposite team, you were able to jump high and successfully 'dunk' the ball into the basket! However, when you landed on the ground, your knee was in the extended position and your right foot/leg did not land on the court correctly. Immediately, you heard a 'pop' sound and the right knee gave out under you. Afterwards you were still able to walk with some help but had the feeling of your knee 'giving out' on you, especially on walking downstairs. A knee x-ray was reported as 'normal'. Which of the following structure is most likely injured?

- ○ A) Meniscus
- ○ B) Tibial bone
- ◉ C) Anterior cruciate ligament
- ○ D) Posterior cruciate ligament
- ○ E) Medial collateral ligament
- ○ F) Lateral collateral ligament

5. (1.00 pts) Dermatomes are:

- A) Connections between skin cells that promote skin integrity
- B) Structures inside skin cells that produce skin pigments
- C) Types of skin infection
- D) Area of skin corresponding to specific sensory spinal nerve roots
- E) Conditions where muscles become weak and atrophic

6. (1.00 pts) Which of the following statement about osteoarthritis is correct?

- A) A hallmark of the disease is chronic inflammation of the joint, leading to joint destruction
- B) Many cases are the result of an underlying autoimmune disease
- C) Joint stiffness often occurs after prolonged activities
- D) It is characterized by breakdown of the articular cartilage
- E) On x-ray, the joint space is usually normal

7. (1.00 pts)
With proper stains and under a microscope, you can seen cells within Stratum Spinosum surrounded by 'spines' , giving them the name of "prickle cells". What is the structure though to be giving this 'spine' appearance?

- A) Keratin
- B) Dendrites
- C) Desmosomes
- D) Melanin
- E) Keratohyalin granules

8. (1.00 pts) Which of the following is true regarding melanocytes?

- A) Melanin is stored in melanosomes inside melanocytes. The more melanosomes being stored inside the melanocytes, the darker the skin
- B) The difference in number of melanocytes result in difference in skin color among people of same race
- C) Melanocytes are mainly found in the layer Stratum lucidum
- D) Melanin helps to increase vitamin D absorption
- E) As we get older, the number of melanocytes reduces

9. (1.00 pts) Albinism is a condition characterised by:

- A) Decrease in number of melanocytes
- B) Often also affects the hair and eyes
- C) Occurring later in life, typically in the 20-40 years of age
- D) Etiology is thought to be related to underlying immune system deficiency
- E) One clinical feature is patchy white discoloration of skin

10. (3.00 pts)

When an electric impulse from the motor neuron arrives at the terminal end of the nerve axon called _____, a neurotransmitter called _____ is released, resulting in second impulse that spread through the surface of a muscle fiber. This impulse travels deep into transverse extensions of the sarcolemma called _____, causing sarcoplastic reticulum to release calcium ions.

neuromuscular junction | acetylcholine | t tubules

11. (1.00 pts) Invented in 1903, Woods lamp (also called Wood's lamp) is still being used in practice of dermatology. Which of the following is true about Woods lamp?

- ○ A) It utilizes light in the intra-red wavelength and therefore prolonged use can result in sun burn
- ○ B) It can be used as a treatment for bacterial infections of skin
- ○ C) Under Woods lamp, vitiligo skin appears as dark patches
- ○ D) You should never shine Woods light into the eyes
- ◉ E) Acnes vulgaris appears as orange-red fluorescence under Woods light

12. (1.00 pts) In recent years, some scientists have been focusing on the impact of Human Papillomavirus (HPV) on our health. Which of the following is true about HPV?

- ◉ A) HPV can cause at least 6 types of skin cancer
- ○ B) In most cases, once you contracted HPV, the virus will stay inside your body for the rest of your life
- ○ C) We now have a vaccine to prevent HPV infection but it has minimal effect on preventing HPV related cancer
- ○ D) Even if you have been exposed to HPV, getting a vaccine afterwards would still be beneficial
- ○ E) HPV is one of the causes of onychomycosis

13. (1.00 pts)
Your friend decided to have a tattoo and a few weeks later, he showed you the tattoo site (see picture). Which of the following statement about the condition is FALSE?

- ◉ A) This is the result of uncontrolled proliferation of connective tissue from epidermal layer
- ○ B) The condition is more common in dark skin people
- ○ C) One-third of people with this condition has a first degree relative with the same condition
- ○ D) It is often associated with changes related to the gene AHNAK
- ○ E) Men and women are equally likely to develop this condition

14. (1.00 pts)

Your best friend loves the Harry Potter books and since she knows you study anatomy, she wants to know what causes the black hair in Harry Potter and the red hair in Ron Weasley. Which of the following statement about hair color is FALSE?

- ○ A) Black hair contains a relatively large amount of eumelanin
- ○ B) Red hair contains mostly pheomelanin
- ○ C) Two parents with brown hair can produce a child with blond hair
- ◉ D) Brown hair is the result of mixture of eumelanin and pheomelanin
- ○ E) You need to have two recessive red hair alleles to have red hair

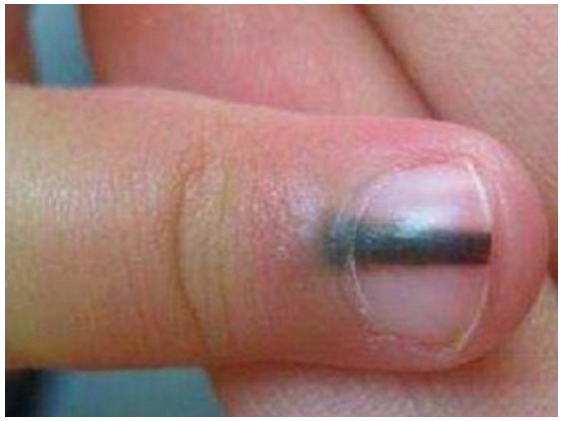
15. (3.00 pts)
Of the five layers of epidermis, the layer _____ contains the 'stem cells' for keratinocytes, the layer _____ contains the most keratohyalin granules, and the layer _____ is absent in thin skin.

stratum basale | stratum granulosum | stratum lucidum

16. (1.00 pts) What is the most likely condition that this previously normal child has?

- ◉ A) Impetigo
- ○ B) Carbuncle
- ○ C) Shingles
- ○ D) Ringworm
- ○ E) Acne

17. (1.00 pts) Your uncle is visiting you on Thanksgiving and when he learns that you are studying anatomy, he shows you his finger and ask you what he should do:



- A) Start wearing gloves when he does work in future to avoid further hand injury and bleeding
- B) See a doctor immediately
- C) Apply an antifungal cream for the next few weeks
- D) Use a strong soap to wash the color off the skin before the chemicals damage the skin
- E) Consider a long course of antibiotics

18. (1.00 pts)
The two pictures below show the same condition manifesting in different ways. This condition is rare in US but common in tropics or subtropics. Which statement regarding this condition is true?

- A) It is an autoimmune disease
- B) It is not contagious
- C) A course of steroid would usually cure the condition
- D) When left untreated, it is often fatal
- E) It can also cause painless ulcers of the skin
- F)

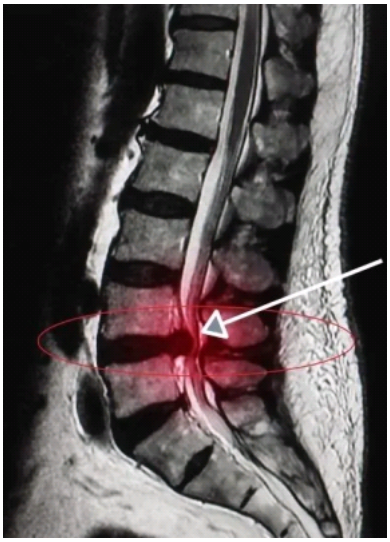
19. (1.00 pts) Which of the following statements is TRUE about apocrine glands of the skin?

- A) They empty the secretions directly over skin via skin pores
- B) They can also be found in ear canal
- C) They secrete an oily substance that is bactericidal
- D) There are approximately 3 million of this gland found over an adult's skin
- E) One of the function of the gland is temperature regulation

20. (1.00 pts) Which of the following is FALSE about Merkel's disks?

- A) They are found densely at finger tips
- B) Primarily found in glabrous skin
- C) Similar to Meissner's corpuscles, they are responsible for light touch
- D) They consist of slow-adapting, unencapsulated nerve endings
- E) Thy are located deep in the dermis

21. (1.00 pts)
The image below is a MRI scan of the lumbar-sacral spine of a man who complained of low back pain and numbness of his right leg. The arrow points the the abnormality. what is thi condition?



- A) Cancer of the vertebra
- B) Osteoarthritis
- C) Fracture of spine
- D) Poliomyelitis
- E) Herniated disc

22. (1.00 pts) Which of the following is TRUE about Marjolin's ulcer?

- A) It is a form of skin cancer
- B) It should be treated promptly with antibiotics
- C) The ulcer usually develops within a few weeks to months of a skin injury
- D) It is usually very painful but often heals well with topical medications

23. (1.00 pts)
When visiting your aunt, you notice that your young cousin, who is in first grade, is scratching his hand and body. He told you that his mom has put some 'steroid' cream over the area but it didn't seem to help. In fact, he thinks the itchyness has worsened. You are considered the medical detective of your family so you take out a magnifying glass and see the skin changes in the pictures. What is the most likely diagnosis?

- A) Eczema
- B) Molluscum contagiosum
- C) Norwegian scabies
- D) Impetigo
- E) Tinea corporis

24. (1.00 pts) Which of the following statement about sarcomere is correct?

- A) It is the basic functional unit of muscle consists of filaments between two M lines
- B) A bands are bisected by the H zone
- C) Under the microscope, the I bands are the darker color striations, compared to A bands
- D) During muscle contractions, distance between z-lines remains unchanged
- E) Width of A band increases during muscle contraction

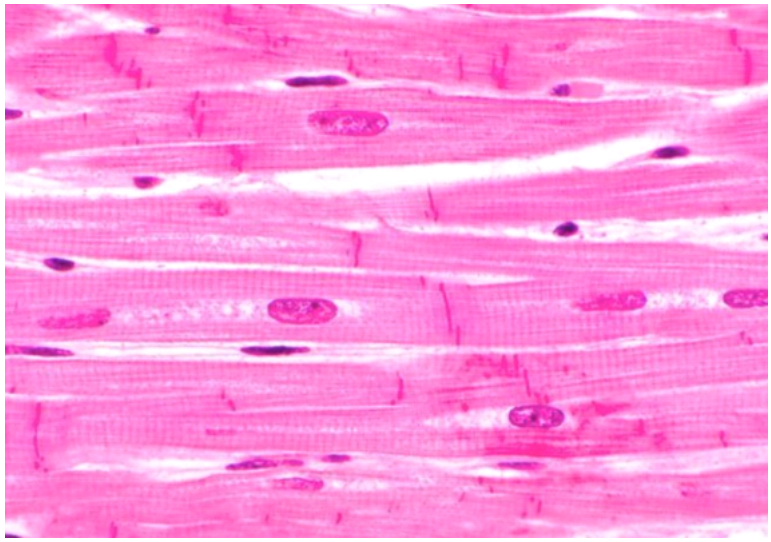
25. (1.00 pts) Which of the following is NOT a typical change in our skin when we get old?

- A) Epidermis becomes thinner
- B) Increase in elastic tissue
- C) Bruise more easily
- D) Produces less sweat
- E) Slower wound healing

26. (1.00 pts) What is endomysium?

- A) The plasma membrane of the muscle cell
- B) The thread like structures that run alone the length of a muscle fiber
- C) The connective tissue layer that surrounds an individual muscle fiber
- D) The cytoplasm of a muscle cell
- E) The layer of fibrous tissue surrounding a muscle

27. (1.00 pts) The muscle shown in the picture has the following feature except:



- A) It is a type of involuntary muscle
- B) It has specialize nerve conducting system for coordination of contraction
- C) It has abundant sarcoplasmic reticulum with two terminal cisterns in the triads
- D) Consists of long branching cells with single nuclei
- E) Intercalated discs can be found

28. (1.00 pts) Most muscles are attached to bone(s), either directly or indirectly. Which of the following about muscle attachment is FALSE?

- A) The point where a muscle attaches to the stationary or less moveable bone is called 'insertion'
- B) The epimysium fuses with the periosteum in direct insertion
- C) In indirect attachment, the epimysium becomes part of the tendon
- D) Aponeurosis is a sheet of fibrous tissue that allows a flat muscle to have a wide area of attachment to bone(s)

29. (1.00 pts) Which of the following is TRUE about smooth muscle cells?

- A) Actin and myosin filaments are arranged in a regular repetitive pattern inside the cells
- B) Contraction is voluntary
- C) Compared to skeletal and cardiac muscle, contractions are faster and shorter in duration
- D) The cells have little ability to regenerate or proliferate
- E) Contraction of myosin and actin is a sodium (Na) dependent process

30. (1.00 pts) Which of the following is NOT a function of smooth muscle?

- A) Peristalsis
- B) Regulation of blood flow to different organs
- C) Changes the size of iris (pupil) of the eye
- D) Osmosis
- E) Micturition

31. (1.00 pts) Which of the following occurs in the musculoskeletal system with aging?

- ○ A) The intervertebral space becomes wider
- ○ B) The spinal curvature becomes less pronounced
- ◉ C) Synovial fluid becomes more viscous
- ○ D) Synovial membrane becomes more lax and more elastic
- ○ E) Elder people tend to walk with narrower leg stances for better balance

32. (1.00 pts) Which of the following action best describe the movement of elbow joint?

- ○ A) Circumduction
- ◉ B) Flexion and extension
- ○ C) Abduction and adduction
- ○ D) Internal rotation and external rotation
- ○ E) Eversion and inversion

33. (1.00 pts) Smooth muscles differ from skeletal and cardiac muscle in that they _____:

- ○ A) lack myofibrils
- ○ B) usually under voluntary control
- ○ C) do not have myosin
- ○ D) do not have actin
- ◉ E) do not have troponin

34. (1.00 pts) The axial skeleton consists of the following bones except:

- ◉ A) Clavicle
- ○ B) Facial bone
- ○ C) Hyoid bone
- ○ D) Vertebrae
- ○ E) Ribs

35. (1.00 pts) Hyaline cartilage _____

- ○ A) forms the intervertebral disks
- ○ B) forms part of the external ear
- ○ C) is composed of small amount of matrix and abundant amount of fibrous elements
- ○ D) is strong and rigid
- ◉ E) connects the ribs to the sternum

36. (1.00 pts) Which of the following is an example of *synarthrosis*?

- ◉ A) Skull suture

- B) Sternocostal joint
- C) Elbow joint
- D) Intervertebral joint
- E) Glenohumeral joint

37. (1.00 pts)
With the COVID pandemic, You and your friend decided to go on a camping trip. The two of you went to a local supermarket and bought some home made canned food. You went or with the trip and with the exception of some mosquito bites, you had a great time that night and even finished all the food. The next evening, your friend complained of double vision and difficulties in swallowing. He also complained of muscle weakness that over the next few hours, spread from the face to the upper body. Soon he started to have difficulties in breathing.

Which of the following is TRUE about this condition?

- A) It is caused by a toxin that attacks the neuromuscular junction
- B) The spores of this disease can survive boiling in water for several hours
- C) The toxin is usually destroyed during cooking/boiling
- D) It can be transmitted from person-to-person
- E) In US, most cases occur in adults

38. (1.00 pts) Which of the following is TRUE about Marfan syndrome?

- A) 75% of cases are caused by de novo mutations (no family history)
- B) Results in disproportional decrease in linear bone growth, resulting in short statue
- C) People with this condition often has problems with vision
- D) It may result in early atherosclerosis
- E) It is a disorder of cartilage

39. (1.00 pts) The condition shown in the picture is characterized by _____

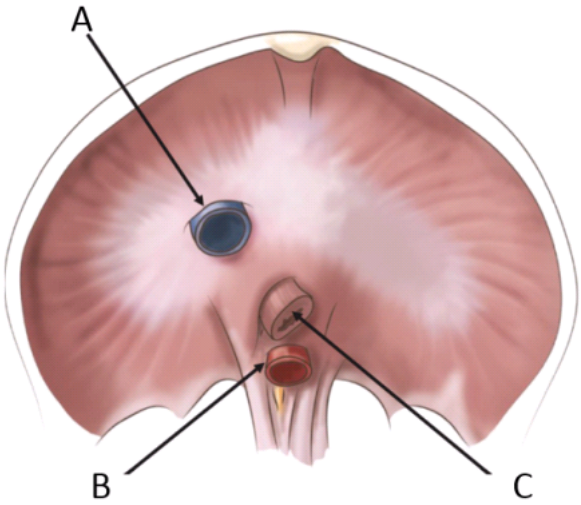
- A) Relatively preserved torso length
- B) Mental retardation
- C) Autosomal recessive inheritance
- D) 20% of cases are spontaneous mutation

- ○ E) Normal life expectancy

40. (1.00 pts) Which regard to the muscle Pectoralis major: _____

- ○ A) It is used to control the movements of the forearm
- ○ B) It is found beneath the Rectus abdominis
- ◉ C) Injury of the muscle can occurs during weight lifting
- ○ D) It functions as humerus abductor and external rotator
- ○ E) The origin of the muscle is at the greater tubercle of humerus

41. (3.00 pts) Below is a picture of the diaphragm. Name the structure A. _____ B. _____, and C. _____



Inferior vena cava | Aorta | Esophagus

42. (1.00 pts) Which of the following terms apply to muscle contraction in which the muscle length does not change?

- ◉ A) Isometric
- ○ B) Isotonic
- ○ C) Eccentric
- ○ D) Concentric

43. (1.00 pts) Which of the following muscle provides tightness of the cheeks during chewing, and assists the tongue to keep food to the middle of the oral cavity?

(Mark **ALL** correct answers)

- ☐ A) Orbicularis oris
- ☐ B) Zygomaticus major
- ☐ C) Masseter
- ☐ D) Frontalis
- ☑ E) Buccinator

44. (1.00 pts) In rhabdomyolysis, _____

- (●) A) the level of creatine kinase is elevated
- ( ) B) cardiac dysfunction is common
- ( ) C) the most common cause is from bacterial toxins damaging muscles
- ( ) D) one unique feature is the presence of hemoglobin in urine
- ( ) E) one of the important treatment is to limit fluid intake to minimize strain on the cardiovascular system

45. (1.00 pts) According to the Salter-Harris fracture classification system, the x-ray shows which type of fracture?

- ( ) A) Type I
- (●) B) Type II
- ( ) C) Type III
- ( ) D) Type IV
- ( ) E) Type V

46. (1.00 pts) Which of the following is NOT considered a protective element of the skin?

- ( ) A) Keratin
- ( ) B) Melanin
- ( ) C) Granular secretions
- (●) D) Erector pili
- ( ) E) Langerhans' cells

47. (1.00 pts) Which of the following is a biarticular muscle? Hint: it means the muscle crosses two joints.

- (●) A) Rectus femoris
- ( ) B) Deltoid
- ( ) C) Transverse abdominis
- ( ) D) Diaphragm

E) Zygomaticus major

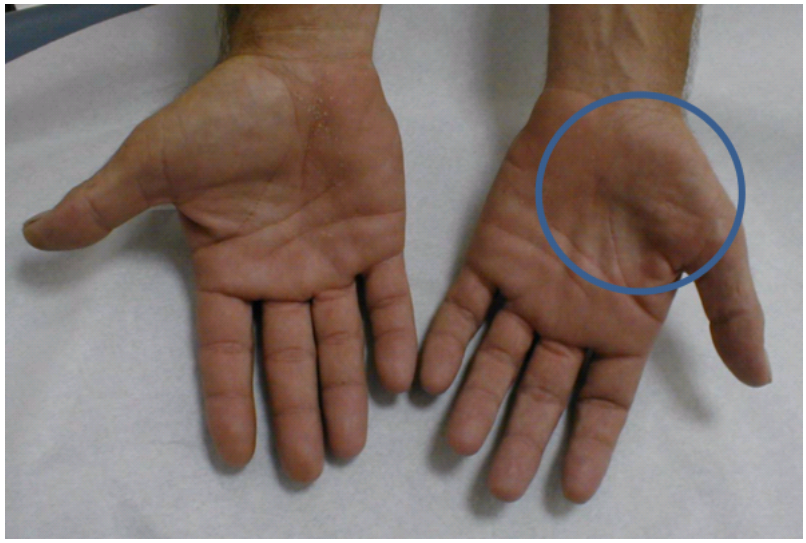
48. (1.00 pts) Which of the following type of muscle fibers is best suitable for maintaining posture and performing isometric contractions?

A) Fast oxidative fibers
B) Slow oxidative fibers
C) Fast glycolytic fibers
D) Slow glycolytic fibers

49. (1.00 pts) Which of the following is TRUE regarding Golgi organ

A) It is most commonly found within muscle, among different muscle fibers
B) It is a type of norcireceptor
C) It responses to changes in muscle tension
D) It's main function is to provide positive feedback during muscle relaxation
E) It is the main sensory organ for proprioception

50. (1.00 pts) The condition shown in the picture (focus on the changes within the blue circle):



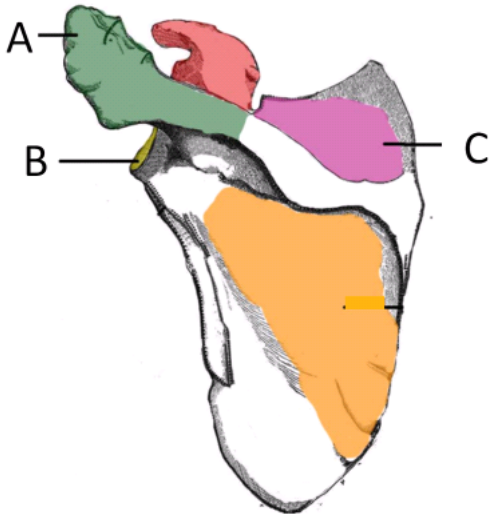
A) Occurs more common in male than female
B) Most cases present before the age of 40 years old
C) Is due to compression of median nerve
D) Most cases requires surgical correction
E) Commonly affects all five digits
F)

51. (1.00 pts) Which of the following is NOT a function of cartilage?

A) Increases durability of articular joints
B) Provides structural support of certain soft tissues

- ○ C) Involves in the formation and growth of long bones
- ◉ D) Provides blood supple to bones and nearby soft tissues

52. (3.00 pts) Name the structure; A. _____ B. _____ C. _____



Acromion | Glenoid fossa | Supraspinatus fossa

53. (1.00 pts) Which of the following structure is NOT present in thoracic vertebrae?

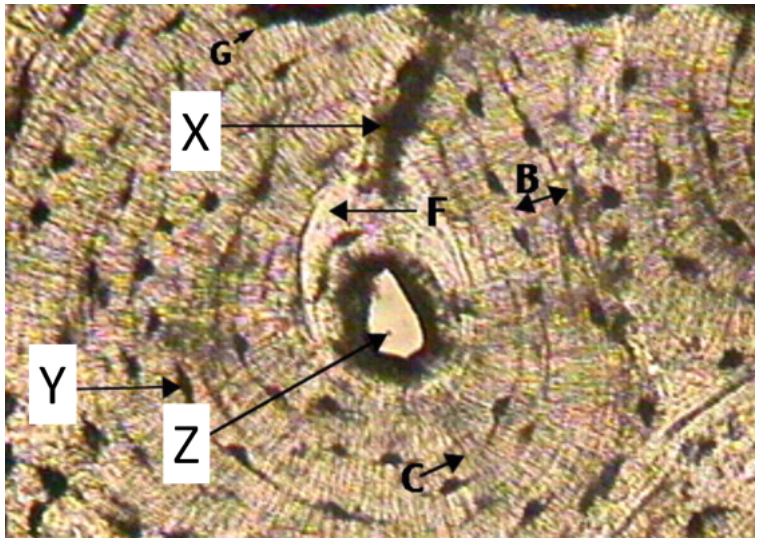
- ◉ A) Transverse foramen
- ○ B) Superior costal facet
- ○ C) Spinous process
- ○ D) Intervertebral foramen
- ○ E) Spinous process

54. (1.00 pts) Gomphosis is a type of joint found:

- ○ A) Between radius and ulnar
- ○ B) Between vertebrae
- ◉ C) Tooth and mandible/maxilla
- ○ D) Pubic synthesis
- ○ E) Knee joint

55. (3.00 pts) In this photograph of compact bone, name the structures labelled: X _____; Y _____; Z _____

(Ignore the other labels!)



Volkmann's canal | Lacuna | Harversian canal

56. (1.00 pts) What structure passes through the foramen ovale of the skull?

- A) Olfactory nerve
- B) Carotid artery
- C) Optic nerve
- D) Mandibular nerve
- E) Middle meningeal artery

57. (1.00 pts) Which of the following is NOT part of intramembranous ossification?

- A) Ossification center appears in a fibrous connective tissue membrane
- B) Production of osteoid around capillaries
- C) Formation of spongy bone
- D) Calcification of osteoid, trapping osteoblasts
- E) Formation of a bone collar of compact bone

58. (1.00 pts) Without the red bone marrow, we would not be able to:

- A) Produce new red blood cells
- B) Have enough fat storage
- C) Repair fractures
- D) Store calcium
- E) Attach to muscles

59. (1.00 pts) Where can you find Sharpey's fibers?

- A) Between periosteum and bone

- B) Inside the Haversian canals
- C) Integrated within the tissue inside the trabecular bone
- D) Between lamella layers of osteon
- E) Lining of bone marrow and compact bone

60. (1.00 pts) Which of the following is FALSE regarding Paget's disease of the bone?

- A) It is caused by slowing down of bone remodeling
- B) Occurs more often in male
- C) Headache and hearing loss can occur
- D) Commonest bones affected include pelvis, skull, and spine
- E) Many people with this disease may be asymptomatic
- F)

61. (1.00 pts) The type of joint that carpo-metacarpal joints of the thumb is:

- A) Gliding joint
- B) Hinge joint
- C) Pivot joint
- D) Saddle joint
- E) Ball and socket joint
- F)

62. (1.00 pts) Which of the following motion is an example of eversion?

- A) Movement away from the midline of body
- B) Turning around an axis
- C) Moving palm downward
- D) Deceasing the angle between two bones
- E) Turning the sole of the foot outward
- F)

63. (1.00 pts) Why do you 'shiver' when you are cold?

- A) To prevent muscle paralysis from cold temperature
- B) To increase elasticity of muscle
- C) To maintain muscle contractility
- D) To generate heat
- E) Because you are scare!
- F)

64. (1.00 pts) Which is the largest and strongest tarsal bone?

- A) Talus
- B) Cuboid
- C) Navicular
- D) Middle Cuneiform
- E) Calcaneus
- F)

65. (1.00 pts) Which of the following is an example of pivot joint?

- A) Between the vertebrae
- B) Between the humerus and scapula
- C) Between the rib and sternum
- D) Between the phalanges
- E) Between the radius and ulnar
- F)

66. (1.00 pts) The function of epidermal ridges on the fingers is to:

- A) Reduce water loss
- B) Increase friction of epidermal surface
- C) Prevent skin infection
- D) Increase sensation
- E) Produce vitamin D
- F)

67. (1.00 pts) Apoptosis refers to:

- A) The process of 'natural' cell death
- B) The part of inflammation where white blood cells engulf bacteria
- C) A form of cell injury resulting in premature cell death by autolysis
- D) Part of the coagulation process in wound healing
- E) The process of vasodilation of vascular cells
- F)

68. (5.00 pts)
Explain what histologic difference accounts for the lack of striations in smooth muscle cells, compared to skeletal muscle cells. How does this lack of striations translate to functional differences between smooth muscle cells and skeletal muscle cells?

Expected Answer: Instead of Z discs (which helps to organize the thin and thick filaments to a repetitive pattern of striations), the thin filaments of smooth muscle cells are attached to dense bodies that are not lined up at regular intervals. Rather, the dense bodies are attached to a network of intermediate filaments throughout the sarcoplasm. This arrangement causes the entire muscle fiber to contract in a manner whereby the ends are pulled toward the center, causing the midsection to bulge in a corkscrew motion. This also means the strength produced by smooth muscle is weaker, as there less myofibrils within each cell and cells are not contracting simultaneously in the same direction