Anatomy & Physiology
Muscular System
Worksheet

1. What are the three categories of muscle tissue?
   a)  
   b)  
   c)  

2. The smallest functional unit of a muscle fiber is called a __________________________.

3. What are the four characteristics of muscle?
   a)  
   b)  
   c)  
   d)  

4. The thin myofilaments are called __________________________.

5. How are the two proteins, Troponin & Tropomyosin, capable of preventing the contractile process?

6. What mineral is needed for the active site on actin to be exposed?

7. The thick myofilaments are called __________________________.

8. The ability of the muscle to respond to stimuli form a nervous impulse is called __________________________.

9. All the muscle fibers controlled by a single motor neuron constitute a __________________________.

10. Which myofilament contains the crossbridges or heads?

11. During contraction, what happens to each of the following parts of the sarcomere? (Do they move closer, disappear, stay the same, etc.) (refer to your book on p187)
   a)  Z lines –  
   b)  M line –  
   c)  I band –  
   d)  H zone –  
   e)  A band –  

12. What two bands of the sarcomere do we “see” as the striations in skeletal muscle?

13. The chemical that is secreted by the neuron at the neuromuscular junction that stimulates muscle contraction is called ______________________ ________________.

14. Which myofilament remains stationary during contraction? Which myofilament slides over the other during contraction?

15. The Calcium needed for muscle contraction is stored in what part of the muscle fiber?

16. List the three phases of a muscle twitch in order
   a)  
   b)  
   c)  

17. When the muscle is stimulated until the relaxation phase is completely eliminated, the muscle is said to be in a state of complete __________________________.

18. The aerobic method of generating ATP from glucose is called the __________________________
    __________________________.
19. What is the by-product of the anaerobic breakdown of glucose?

20. After the first few seconds of muscle exertion, the ATP will be used up. What chemical binds to ADP to immediately produce more ATP?


22. How many molecules of ATP is made during each of the following processes?
   a) Glycolysis –
   b) Lactic Acid Fermentation –
   c) Kreb’s Cycle –

23. The state of constant muscle contraction by a few muscle fibers at all times is known as ____________.

24. What two proteins cover the active site on actin? _____________________ & _____________________

25. The outermost covering of a muscle is called the ____________________________, while the connective tissue covering of the fascicles is called ____________________________. The connective tissue that surrounds each muscle fiber is known as the ____________________________.

26. Muscles are usually attached at both ends to bones. The end that is attached to a bone that does not move is known as the ____________________________ and the end that is attached to the bone that is moved during contraction is called the ____________________________.

27. The largest and strongest tendon in the body is the ____________________________. (Hint: it is the only tendon that we’ve mentioned in class.)

28. What are the five functions of the muscular system?
   a) 
   b) 
   c) 
   d) 
   e) 

29. The specialized part of the sarcolemma that is at the site of the neuromuscular junction is called the ____________________________

30. Draw a graph that shows the three phases of a muscle twitch. The three phases are: Latent period, Contractile phase, and Relaxation phase. Be sure to label them on the graph.

31. A muscle contraction that results in the shortening of the muscle is called an ____________________________ contraction.

32. The physiological inability to contract usually due to a lack of ATP is called ____________________________.
33. For each of the following statements, tell if they are a 1<sup>st</sup> class, 2<sup>nd</sup> class, or 3<sup>rd</sup> class lever.
   a) The load is located between the fulcrum and effort – 1<sup>st</sup> class lever –
   b) AKA a Power Lever –
   c) The fulcrum is at one end while the load is at the other end – 3<sup>rd</sup> class lever –
   d) AKA a Speed Lever –
   e) Ex: the gastrocnemius –
   f) The fulcrum is located between the load and the effort – 2<sup>nd</sup> class lever –
   g) Found in most insects –
   h) Ex: the biceps brachii –

34. For each of the following descriptions, tell what disorder is being described.
   a) Lockjaw –
   b) Viral disorder that destroys neurons –
   c) Pulled muscle –
   d) Bacteria found in poor canned foods –
   e) Droopy eyelids –

35. Which of these sarcomere bands or lines narrows when a skeletal muscle contracts? Check the appropriate answers.
   a) ______ H band
   b) ______ A band
   c) ______ I band
   d) _______ M line

Matching
   A. Fatigue
   B. Few motor units
   C. Isometric contraction
   D. Isotonic contraction
   E. Many motor units
   F. Relax
   G. Tetanus
   H. Tone

36. ______ A continuous contraction that shows no evidence of relaxation.
37. ______ A contraction which causes the muscle to shorten and work is done.
38. ______ To accomplish a strong contraction, ______ blank ______ are stimulated at a rapid rate.
39. ______ Occurs when a muscle is stimulated but is not able to respond.
40. ______ A contraction in which the muscle does not shorten, but tension in the muscle keeps on increasing.
41. ______ When a weak but smooth muscle contraction is desired, ______ blank ______ are stimulated at a rapid rate.

42. Correctly relate the story of contraction events in a muscle fiber by numbering each event below.
   - Myosin heads bind to active sites on actin molecules.
   - Myosin heads return to their high-energy shape (cocked), ready for the next working stroke.
   - Calcium ions bind to troponin.
   - Myosin cross bridges detach from actin.
   - ACh is released into the neuromuscular junction.
   - Troponin changes shape exposing the active site.
   - The sarcolemma depolarizes.
   - Myosin heads pull on the thin filaments and slide them toward the sarcomere.
   - The sarcoplasmic reticulum releases calcium ions.
Matching

A. endomysium  D. fiber  G. sarcomere
B. epimysium  E. myofilament  H. tendon
C. fascicle  F. perimysium

43. _____ Connective tissue surrounding a fascicle.
44. _____ Contractile unit of a muscle.
45. _____ A muscle cell.
46. _____ A bundle of muscle cells.
47. _____ Thin connective tissue covering each muscle cell.
48. _____ Actin & myosin containing structure.
49. _____ Cordlike extension of connective tissue beyond the muscle that connects the muscle to a bone.

50. When paying back an oxygen debt
   a) lactic acid is formed  b) lactic acid is converted to pyruvic acid
   c) muscle cells utilize glucose  d) creatin phosphate is converted to creatin

51. The first energy source that is used to regenerate ATP when muscles are extremely active is
   a) fatty acids  b) glucose  c) creatin phosphate  d) pyruvic acid

52. The muscle that is the prime mover in the action at a joint is called the __________________________.

53. The muscle that is most involved in chewing food is the __________________________.

54. The biceps brachi inserts on the __________________________ bone.

55. For each of the following statements, tell if they are concerning Muscular Dystrophy (MD) or Myasthenia Gravis (MS).
   a) First expressed in boys between the ages of 2 & 6. ______
   b) The most common variety is Duchenne’s. ______
   c) Caused by the immune system attacking one’s own motor end plates. ______
   d) Sex-linked disorder that is carried by females. ______
   e) Results in weak arms, neck & chest muscles. ______
   f) Is a neurological disorder that prevents the muscles from working. ______
   g) Is a muscular degeneration that leads to death by the early 20’s. ______

56. Name the four muscles of the rotator cuff
   a)  
   b)  
   c)  
   d)  

57. The main muscle that functions to abduct the arm is the __________________________.

58. The two major muscle used when doing push-ups are
   a)  
   b)  

59. Squeezing a tennis ball would cause the build up of the __________________________ carpi muscles.

60. The muscle that works in opposition to the prime mover is called the __________________________.

61. RICE stands for __________________________ & __________________________.
62. Label the bands, lines, and zones of the Sarcomere.

A) __________________________
B) __________________________
C) __________________________
D) __________________________
E) __________________________
63. Label the parts of the muscle.

A) ______________________
B) ______________________
C) ______________________
D) ______________________
E) ______________________
F) ______________________
G) ______________________