

Name: _____

Date: _____ Per: _____

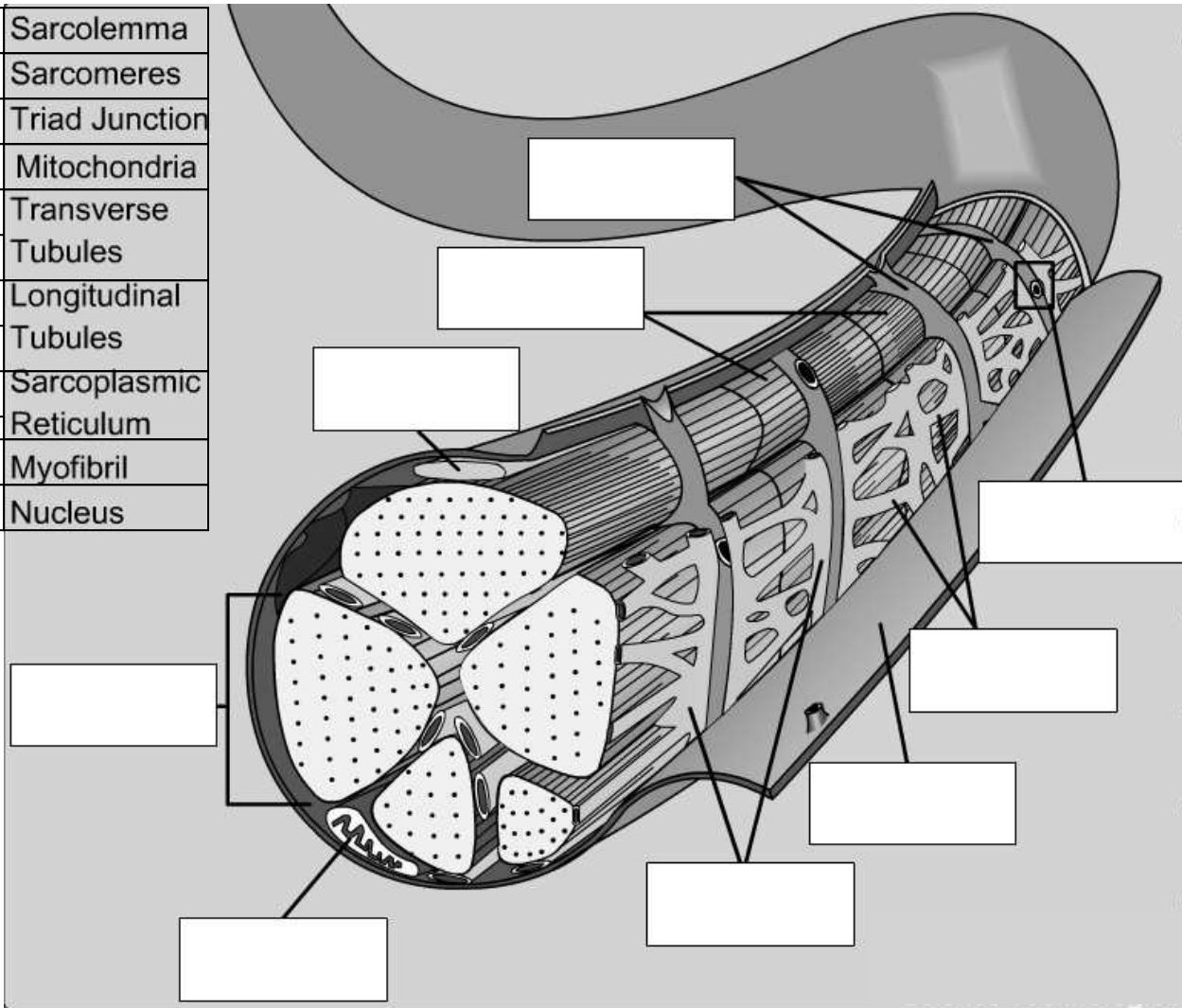
Internet Investigation: Muscle Contraction Worksheet

Type in the following web address, or go to the class webpage and click on the link http://www.brookscole.com/chemistry_d/templates/student_resources/shared_resources/animations/muscles/muscles.html

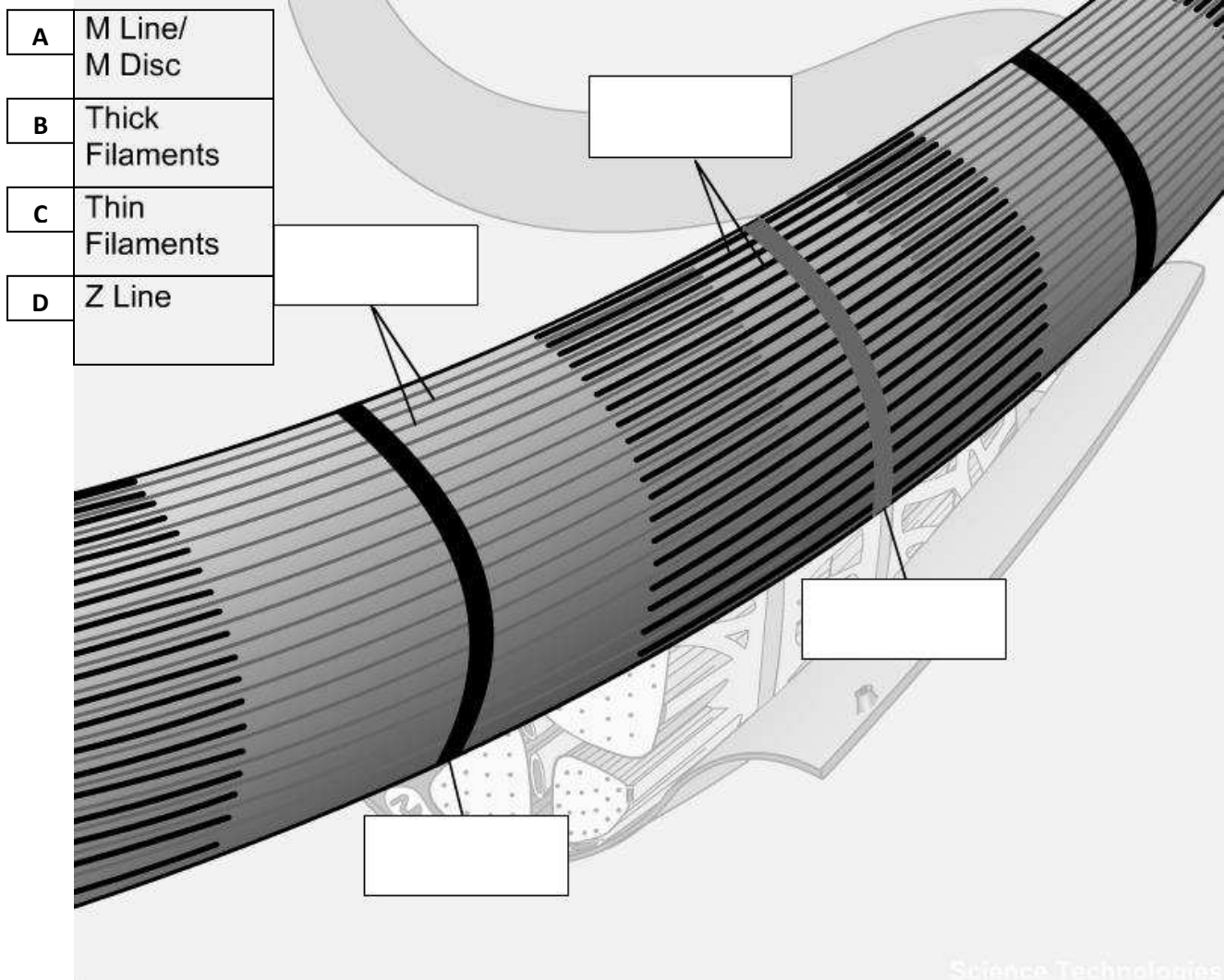
Answer the following questions as you progress through the lesson.

1. A _____ is a single skeletal muscle cell.
2. Muscle fibers are made up of fiber bundles that contain hundreds of _____.
3. Identify the structures of the muscle fiber below by using the words provided. You may write the whole word or just the letter.

A	Sarcolemma
B	Sarcomeres
C	Triad Junction
D	Mitochondria
E	Transverse Tubules
F	Longitudinal Tubules
G	Sarcoplasmic Reticulum
H	Myofibril
I	Nucleus



4. Match the descriptions with the correct muscle fiber structure. Use the words above, and put the letter on the line next to the matching description. (Not all words will be used)
- _____ i. Composed of a T-tubule, the terminal cisternae, and gaps.
 - _____ ii. Cylindrical structures that carry out contraction
 - _____ iii. Extensions of the sarcolemma that separate the sarcomeres
 - _____ iv. Specialized plasma membrane of the skeletal muscle cell; forms membrane connections between each of the sarcomeres.
 - _____ v. The specialized endoplasmic reticulum of the skeletal muscle cell
 - _____ vi. Units of the myofibrils
5. Identify the parts of the sarcomere below by using the words provided. You may write the whole word or just the letter.



6. Match the descriptions with the correct sarcomere part. Use the words above, and put the letter on the line next to the matching description. (Not all words will be used)
- _____ i. The bands that mark the sarcomere's borders
 - _____ ii. The bands that mark the middle of the sarcomere
 - _____ iii. Under a micrograph, they are the lightest and least dense structures; composed of actin, troponin, tropomyosin
 - _____ iv. Much more dense than thin filaments; composed of myosin

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7. Who were the contributing scientists that discovered how muscle contraction worked?

8. The distance between the ends of the thin filaments was known as _____.

9. The distance between the thick filaments of one sarcomere and the thick filaments of an adjacent sarcomere was known as the _____.

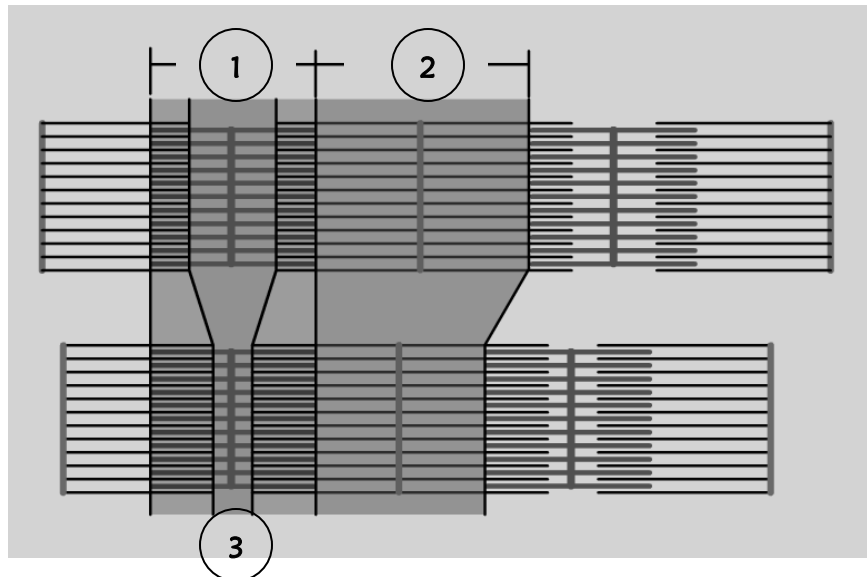
10. The length of the thick filaments was known as the _____.

11. Identify the areas in the following picture below

1 _____

2 _____

3 _____



12. The _____ and _____ shortens, but the _____ does not shorten during muscle contraction.

13. Chemically, muscle contraction is driven by _____ and triggered by the release of _____ from the **sarcoplasmic reticulum**.

14. Ca^{2+} binds to _____ in the thin filaments, exposing the myosin binding sites on actin.

15. The movement where the myosin head pulls the thin filaments inward is called the _____.

16. Place the following events in order by placing a number (1-6):

_____ Power stroke (ADP and P dissociate from myosin).

_____ Thin filament returns to relaxed state

_____ Ca^{2+} binds troponin causing a conformational change of the thin filament

_____ Myosin heads bind to actin

_____ Electrochemical signal causes release of Ca^{2+} from sarcoplasmic reticulum

_____ ATP binds myosin head