**The Power of Exercise**

**Subject area/course**: Science, Introduction to Human Anatomy and Physiology

**Grade level/band:** 11–12

**STUDENT PROMPT SECTION**

1. **Task context**:

Many individuals in this country are concerned with losing weight and developing a healthier lifestyle. During every commercial break on television, the public is bombarded with advertisements for diet pills, weight loss surgeries, and exercise equipment or DVDs. The key to achieving the goal of weight loss, however, lies in adopting a healthy diet and an exercise regime. Cutting one's calorie intake can promote weight loss, but consuming an inadequate number of calories can be counterproductive. Exercise, the other essential component for weight loss, requires an ample supply of energy.

Imagine that you are applying for a job as a personal trainer for a national health club chain. To be a successful candidate for employment, you must display an understanding of the muscular system and the importance of exercise in both weight loss and strengthening muscles. The health club chain is requiring an original paper as part of your application materials.

For the first part of the task:

* Study the anatomy and physiology of a typical skeletal muscle fiber
* Research the sliding filament theory
* Determine the role of Adenosine Triphosphate (ATP) and calcium ions in operating the sliding filament.
* Explore how the sliding filaments operate to generate contraction of an entire muscle.
* Explore the roles of the digestive and cardiovascular systems in supplying the necessary resources to allow for muscle contraction.

For the second part of this task:

* Choose one of the following basic exercises: abdominal crunches, squats, or calf raises.
* Identify at least three specific skeletal muscles involved in executing the exercise you selected and ascertain how the muscles work together to achieve the desired outcome.
* Investigate how repetition of this exercise might affect the structure and function of these muscles over time.
* Due to the extensive interrelatedness that exists within the human body, explore how changes in these muscles might result in changes in the function of other body systems.
1. **The task**:

After reading informational texts from multiple authoritative print and digital sources, write a 3- to 4-page paper that explains the basic anatomy and physiology of a typical skeletal muscle fiber and how skeletal muscles contract. Include specifics regarding the basic exercise you selected. Be sure to include all of the pertinent information from your research. What conclusions or implications can you draw about the interdependent nature of human body systems? Address your paper to a national health club chain as a part of your application packet.

Your paper should:

* + Demonstrate the basic anatomy of a muscle, the physiology of a muscle contract, names of specific muscles used in a specific exercise, and how the digestive and circulatory system relate to the muscle system
* Support your conclusions using evidence from each source.
* Address the credibility and origin of sources in view of your research topic.
* Identify any gaps or unanswered questions.
* Use content-specific vocabulary and attend to precision.
* Include in-text citations and a Works Cited page using CSE (Council of Science Editors) style or MLA or another format of your instructor’s choice.
1. **Materials/resources:**

Utilize informational texts, such as an Anatomy and Physiology textbook, as well as scientific journals. You may also explore Internet materials, but do not rely solely on web sites for your information.

1. **Time requirements:**

This task will take approximately two weeks to complete. Your teacher will provide additional details regarding deadlines and due dates.