**Subject area/course**: Science/Biology - Anatomy and Physiology

**Grade level/band**: High School

**Task source**: New Hampshire Task Bank; Author: Meghan Petruzzi

**Musculoskeletal System**

**STUDENT INSTRUCTIONS**

1. **Task context**:

Essential Questions: How do sliding filaments in muscles (contracting and relaxing) cause a movement, and what is the connection to the concept of stretching?

Learning Goals: The purpose and objective of this assignment is to investigate in depth the musculoskeletal system; sliding filament theory, the names of the bones/muscles, their features, and the connections of bones at joints, and how bones interact with the muscles. Be sure to address these in your work.

Your Task: Sports coaches, athletes, personal trainers, physical therapist and professionals from other related fields are often required to assess which specific muscles, bones and joints are required for particular movements. For this project you will be allowed to work with either the whole skeletal system, or to focus more on individual units. For example you may choose to focus on specific joints, or an overall movement like throwing a ball. Then you will analyze the muscle contractions/relaxations that cause the movement by pulling on bone features. You will use various media to interpret, question, and express knowledge, information, ideas, feelings, and reasoning to create understanding of the musculoskeletal system.

1. **Final product**:

**Summative Performance Assessment**- Musculoskeletal System- The Art of Movement

**Task Requirements:**

In a team of two or three, you will investigate the interactions of bones and muscles to produce movement using both text and online resources. You will generate data that you will use later on in the task.

As a group, you will chose a movement to investigate. You will document the movement through a series of pictures. You will then analyze the muscle contractions/relaxations that cause the movement by pulling on bone features while applying the sliding filament theory.

The summative product will be an individual project where you will describe your movement, how the muscle contracts, its attachment to bones, and how bones allow for movement. You will also support your responses with your research.

* Conduct movement with pictures as data (group work). In a teams of two or three, students investigate the interactions of bones and muscles to produce movement by taking pictures of the phases of motion.
* Utilizing the information from your research and your group photos, describe which muscles are contracting/relaxing to cause the movement and how they change during the movement, incorporating the concept of sliding filament theory and joints. (group work)
* Peer Review (group work). Students will use peer review with another groups’ analysis and then discuss with that group for clarification.
* Poster Report with application (individual work). Describe your movement, how the muscle contracts, its attachment to bones, and how bones allow for movement. You will also support your responses with your research.

**PART 1: Research Question: How do muscles and bones interact to produce movement?** Develop some background: Tell us what you know and how you learned it.

Skeletal System:

1. Describe the fundamental features of bones.
2. How do bones connect to allow movement?
3. How do the labs we did thus far connect to this project?

Muscular System:

1. Identify the fundamental units of muscle and describe how these units function.
2. How do muscles cause movement?

**PART 2: Movement Design**

* Decide upon a movement that incorporates many of the muscles and bones of the body. Take pictures of phases of the movement.
* Analyze the phases of movement to determine which muscles are contracting on which bones to cause the movement.

**PART 3: Peer Review**

Peer Review Protocol:

* Read the rough draft of the movement analysis of another group.
* When you have read that section please describe the movement as you have understood it. Discuss the movement with the group for clarification.
* Your attitude toward the work and the writer must remain constructive and supportive of the ongoing improvement of the report.

**PART 4:**

Individually create a poster incorporating the pictures of movement to illustrate how bones and muscles interact to create the movement photographed. Be sure to use your research to support your organization and content of the poster. Reference the rubric as you create the poster to make sure that all the requirements for the competency are met.

**Additional Information**

1. **Knowledge and skills you will need to demonstrate on this task:**

You will demonstrate knowledge of the musculoskeletal system; sliding filament theory, the names of the bones/muscles, their features, and the connections of bones at joints, and how bones interact with the muscles.

*Competencies:*

* *Musculoskeletal Competency*: Be able to describe the structure and function of the fundamental units that make up the musculoskeletal system on the micro and macro level.
* *Musculoskeletal Competency:* Be able to explain how stability and change to create movement.

1. **Materials needed:**

* Cameras and or smart phone
* Computers with imaging software
* Printer access
* Internet access
* Poster supplies
* Current Human Anatomy and Physiology textbook
* Musculoskeletal System Graphic Organizer

1. **Time requirements:**

You will have approximately 5 class periods to complete. Your teacher will provide additional details.

1. **Scoring:**

Your work will be scored using the Musculoskeletal System rubric. You should make sure you are familiar with the language that describes the expectations for proficient performance.