

CURRICULUM NAME Unit Movement and Support-

Movement is one of the necessary life functions. This unit illustrates the importance of the skeletal and muscular systems to body support and movement. It also deals with the interrelation of these two systems.

Overarching Essential Questions	Overarching Enduring Understandings
<ul style="list-style-type: none"> ● How is the skeletal system much more than the bones that support our body and what are the responsibilities of this system? ● How is muscular system more than a group of muscles that are be responsible for movement of the body? ● How do the skeletal and muscular systems work together to support and move the human body? 	<ul style="list-style-type: none"> ● The skeletal system provides an internal framework for the body, protects organs, and anchors the skeletal muscles so that the muscle contractions cause movement. ● The muscular system provides for movement of the body and its parts, maintains posture, generates heat, and stabilizes joints. ● The two systems are directly related in structure and function to each other.
Student Learning Objectives	
<i>What students should be able to do after instruction.</i>	<i>Evidence Statements</i>
Identify and reconstruct the bones of the skeletal system one area at a time relating these different bones with the jobs they do for the body to further understand the importance of structure and function to the skeletal system.	HS-LS-1-2
Compare and contrast bones on a microscopic level. Observe and explain that the characteristics of bone is related to the structures that we see on this microscopic level.	HS-LS-1-2 HS-LS-1-3
Compare and contrast the different types of joints that connect the bones and explain that the type of joint impacts the mobility of the human body and the job the bones joined will do.	HS-LS-1-2 HS-LS-1-3
Organize the tissues of the skeletal muscle from smallest to largest explaining to demonstrate understanding of muscle organization.	HS-LS-1-2 HS-LS-1-3

Describe the structure and function of a neuromuscular junction and the importance of these junctions for proper muscular functioning.	HS-LS-1-2
How are skeletal muscles named and how do the locations, shapes, and actions of these muscles coordinate the workings of both the skeletal and muscular systems.	HS-LS-1-2

The Student Learning Objectives above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<ul style="list-style-type: none"> Examine microscopic bone tissue Bone study and practicals Microscopic study of skeletal muscle tissue Study the model of a neuromuscular junction Model study of a skeletal muscle Cow bone dissection Chicken wing dissection Cat dissection 	<ul style="list-style-type: none"> LS1.A: Structure and Function All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions 	<ul style="list-style-type: none"> Cause and Effect - Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8) Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4),(MSLS1-5) Scale, Proportion, and Quantity Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

Embedded English Language Arts/Literacy and Mathematics

English Language Arts/Literacy –

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-1),(HS-LS1-6)

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS1-6) WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HSL1-3)

Mathematics –

MP.4 Model with mathematics. (HS LS1-4)

HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. (HS LS1-4)

Three-Dimensional Teaching and Learning

This unit deals with the multiple systems that work together to support and move the body.

The DCI's and CC's SEP's allow us to intensify our investigation of these systems by studying them using different tools and from different perspectives. We are investigating the movement and support of the body on a microscopic level all the way to the movements of the entire organism.

Prior Learning

- Biochemistry
- Cytology
- Microscope technique
- Previous units taught in this course

● **Part A:**

Concepts

Formative Assessment

<ul style="list-style-type: none"> Compare and contrast the structures of bones microscopically and macroscopically to increase understanding of how they are interrelated in the skeletal system. 	<p><i>Students who understand the concepts are able to:</i></p> <p><i>Discuss the chemical components of boney tissue and how it is related to the structure and the strength of the bone.</i></p> <p><i>Diagram an osteon of a compact bone explaining how the components of the osteon are related to the health of the bone itself.</i></p> <p><i>Differentiate between compact and spongy bone in a cow bone</i></p> <p><i>Identify the components of a long bone explaining the functions of these components to the health of the human.</i></p> <p><i>Take bone practical using skeleton of the human body one body section at a time.</i></p>
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Part B:	
Concepts	Formative Assessment
<ul style="list-style-type: none"> Investigate the structure and function of skeletal muscle from a microscopic to a macroscopic level to increase understanding of how it supports the body and helps us with movement. 	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"> Diagram a sarcomere to increase understanding of how a muscle cell moves. Identify the structures of a muscle cell and relate the muscle cell (fiber) to the workings of an entire muscle. Compare and contrast the structures of a neuromuscular junction to increase understanding of the workings of a muscle cell.

Part C:	
Concepts	Formative Assessment
<ul style="list-style-type: none"> How do the skeletal and muscular systems work together to support and move the human body? 	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"> Sketch the attachments of muscles to bones to increase understanding of the different types of body movements. Demonstrate the different body movements with students own bodies (for example adduction of the arm). Compare and contrast the different names of muscles that depend on their sizes, directions, locations, shape, action and number of origins interrelating the structures of the skeletal and muscular systems

- Investigate the fact that muscle without bone and bone without muscle neither support nor move the human body.

Modifications: *Teachers identify the modifications that they will use in the unit. The unneeded modifications can then be deleted from the list. (See NGSS Appendix D)*

- Reinforcement packet
- One on one conferencing
- 504s and IEPs will be consulted and followed.
- Case managers will be brought in to maximize learning.
- Videos for reinforcement to maximize learning for ELL students
- Concept Maps and quizzes evaluate topics as the unit progresses

Leveraging English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

Precis of articles will be done by students.
Text and additional writings will be assigned to students.
Read and comprehend complex laboratory instructions.
Write formal lab reports

Mathematics

Collect individual data
Collect Class data
Calculate % error
Graph individual and class data

Samples of Open Education Resources for this unit:

Bozeman Videos
Quia testing
Google Classroom

Online flashcards of structures.

Anatomy lab simulator <http://kobiljak.msu.edu/CAI/ANT551/index.html>

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Appendix

Differentiation	
Enrichment	<ul style="list-style-type: none">● Utilize collaborative media tools● Provide differentiated feedback● Opportunities for reflection● Encourage student voice and input● Model close reading● Distinguish long term and short term goals
Intervention & Modification	<ul style="list-style-type: none">● Utilize “skeleton notes” where some required information is already filled in for the student● Provide access to a variety of tools for responses● Provide opportunities to build familiarity and to practice with multiple media tools● Leveled text and activities that adapt as students build skills● Provide multiple means of action and expression● Consider learning styles and interests● Provide differentiated mentors● Graphic organizers

ELLs	<ul style="list-style-type: none">● Pre-teach new vocabulary and meaning of symbols● Embed glossaries or definitions● Provide translations● Connect new vocabulary to background knowledge● Provide flash cards● Incorporate as many learning senses as possible● Portray structure, relationships, and associations through concept webs● Graphic organizers
21st Century Skills	
<ul style="list-style-type: none">● Creativity● Innovation● Critical Thinking● Problem Solving● Communication● Collaboration	
Integrating Technology	
<ul style="list-style-type: none">● Chromebooks● Internet research● Online programs● Virtual collaboration and projects● Presentations using presentation hardware and software	