Unit 2 - Support and Movement (Life Science)

Content Area: **Science**
Course(s): **Anatomy & Physiology**
Time Period:
Length: **14 Days - Grade 11-12**
Status: **Published**

Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

ANATOMY AND PHYSIOLOGY, GRADE 11-12

UNIT 2 - SUPPORT AND MOVEMENT

Belleville Board of Education

102 Passaic Avenue

Belleville, NJ 07109

Prepared by: MR. VINCENT A. ORREI

Dr. Richard Tomko, Ph.D., M.J., Superintendent of Schools

Ms. LucyAnn Demikoff, Director of Curriculum and Instruction K-12

Ms. Nicole Shanklin, Director of Elementary Education K-8, ESL Coordinator K-12

Mr. George Droste, Director of Secondary Education

Board Approved: September 23, 2019

Unit Overview

This unit encompasses three human body systems: the skeletal, muscular, and integumentary systems, all of which are responsible for support and movement.

The skeletal system has two critical jobs, support and protection. This unit will have students explore the basic structure of a bone, the different categories of bone, and the function of individual bones. Students will be introduced to the bones that make up each of the two divisions of the skeletal system, the axial and the appendicular. The unit will also include the structure and function of the different joints in the body, such as: fibrous joints, cartilaginous joints, synovial joints, and more. The unit will conclude with an explanation of the developmental changes that the skeletal system goes through from birth to old age.

The section on the muscular system will first focus on the main function of the system, which is to provide for movement of the body and its parts, maintain posture, generate heat, and stabilize joints. Next, students will dive into the microscopic structure and function by examining the structural differences between and among the three types of muscle tissue, and they will learn about the sliding filament theory. Students will also investigate where the energy comes from to power muscle contraction. The section will focus on the different types of movements that are accomplished by the muscles, such as: flexion, extension, abduction, adduction, rotation, and circumduction. The section will conclude with a tutorial for the different categories of skeletal muscle and the naming of each muscle in the body.

The integumentary system contains the largest organ in the body, the skin. Students will explore the different epithelial membranes and discuss the structure and function of each. The section will also include the structure and function of the appendages of the skin, such as: cutaneous glands, hair, hair follicles, and nails. The unit will conclude with an explanation of the different categories of burns and skin cancers as well as effective treatments for each.

Enduring Understanding

After completing this unit, students will be able to understand the following:

- The function of bone is related to both the organization and the structure of bone.
- Bones vary by form and location depending on their function.
- Bone joints vary by structure based on the movement allowed.
- The structure and connection of muscle to the bone determines movement.
- There is a process for muscle contraction.
- There are 3 types of muscle tissue and the type is related to their function
- The skin has a unique structure comprised of the four membranes, each playing a critical role in the function of the layers of skin.
- Skin has an important role in maintaining the body's homeostasis (temp, salt, etc)
- The healing of a wound is a process with specific steps.

Essential Questions

What is the role of skin, bone and muscle in maintaining homeostasis in the body?

How do skin, bone and muscle provide structure that is needed to maintain the body's functions?

How does behavior influence skin, bone and muscles and influence their effectiveness?

What is the purpose of the integumentary system?

What structures are found in the integumentary system? How do they work?

What are various diseases associated with the integumentary system?

What are functions of the skeletal system?

How are bones formed and maintained?

What diseases are associated with the skeletal system?

Why is the muscular system important?

How do muscles contract?

What diseases are associated with the muscular system?

Exit Skills

Upon completion of this unit, students should have achieved the following exit skills:

- Investigate the skeletal system by:
- Classifying, comparing the structure of, and giving examples of each type of body membrane.
- Describing the structure and function of the epidermis and dermis.
- Listing and describing each accessory organ of the skin.
- Listing and discussing the three primary functions of the integumentary system.
- Classifying burns and describing how to estimate the extent of a burn injury.
-
- Investigate the integumentary system and body membranes by:
- Explaining how bones are formed, how they grow, and how they are remodeled.
- Discussing the microscopic structure of bone and cartilage, including the identification of specific cell types and structural features.
- Identifying the major anatomical structures found in a typical long bone and discussing bone formation and growth.
- Listing and discussing the generalized functions of the skeletal system.
- Identifying the two major subdivisions of the skeleton and listing the bones found in each area.
- Listing and comparing the major types of joints in the body and giving examples of each.
-
- Investigate the muscular system by:
- Listing, locating in the body, and comparing the structure and function of the three major types of muscle tissue.
- Discussing the microscopic structure of a skeletal muscle sarcomere and motor unit.
- Explaining how a muscle is stimulated and comparing the major types of skeletal muscle contractions.
- Naming, identifying on a model or diagram, and giving the function of the major muscles of the body.
- Listing and explaining the most common types of movement produced by skeletal muscles.

New Jersey Student Learning Standards (NJSLS-S)

NextGen Science Standards

SCI.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
SCI.HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
SCI.HS-LS1-6	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
SCI.HS-LS1-7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
SCI.HS-LS1-4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
9-12.HS-LS1-5.2.1	Use a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-LS1-2.2.1	Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-LS1-7.2.1	Use a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-LS1-4.2.1	Use a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-LS1-3.3.1	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
9-12.HS-LS1-4.4.1	Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions— including energy, matter, and information flows—within and between systems at different scales.
9-12.HS-LS1-2.4.1	Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions— including energy, matter, and information flows—within and between systems at different scales.
9-12.HS-LS1-6.5.1	Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.
9-12.HS-LS1-7.5.1	Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.
9-12.HS-LS1-5.5.1	Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.
9-12.HS-LS1-6.6.1	Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations,

	peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
9-12.HS-LS1-3.7.1	Feedback (negative or positive) can stabilize or destabilize a system.
9-12.HS-LS1-2.LS1.A.1	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
9-12.HS-LS1-3.LS1.A.1	Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.
9-12.HS-LS1-4.LS1.B.1	In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.
9-12.HS-LS1-7.LS1.C.1	As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.
9-12.HS-LS1-6.LS1.C.1	The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.
9-12.HS-LS1-5.LS1.C.1	The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.
9-12.HS-LS1-6.LS1.C.2	As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.
9-12.HS-LS1-7.LS1.C.2	As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.

Interdisciplinary Connections

MA.S-ID.A	Summarize, represent, and interpret data on a single count or measurement variable
MA.S-ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables
LA.RST.11-12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.RST.11-12.2	Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
MA.S-IC.A	Understand and evaluate random processes underlying statistical experiments
LA.RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LA.RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-

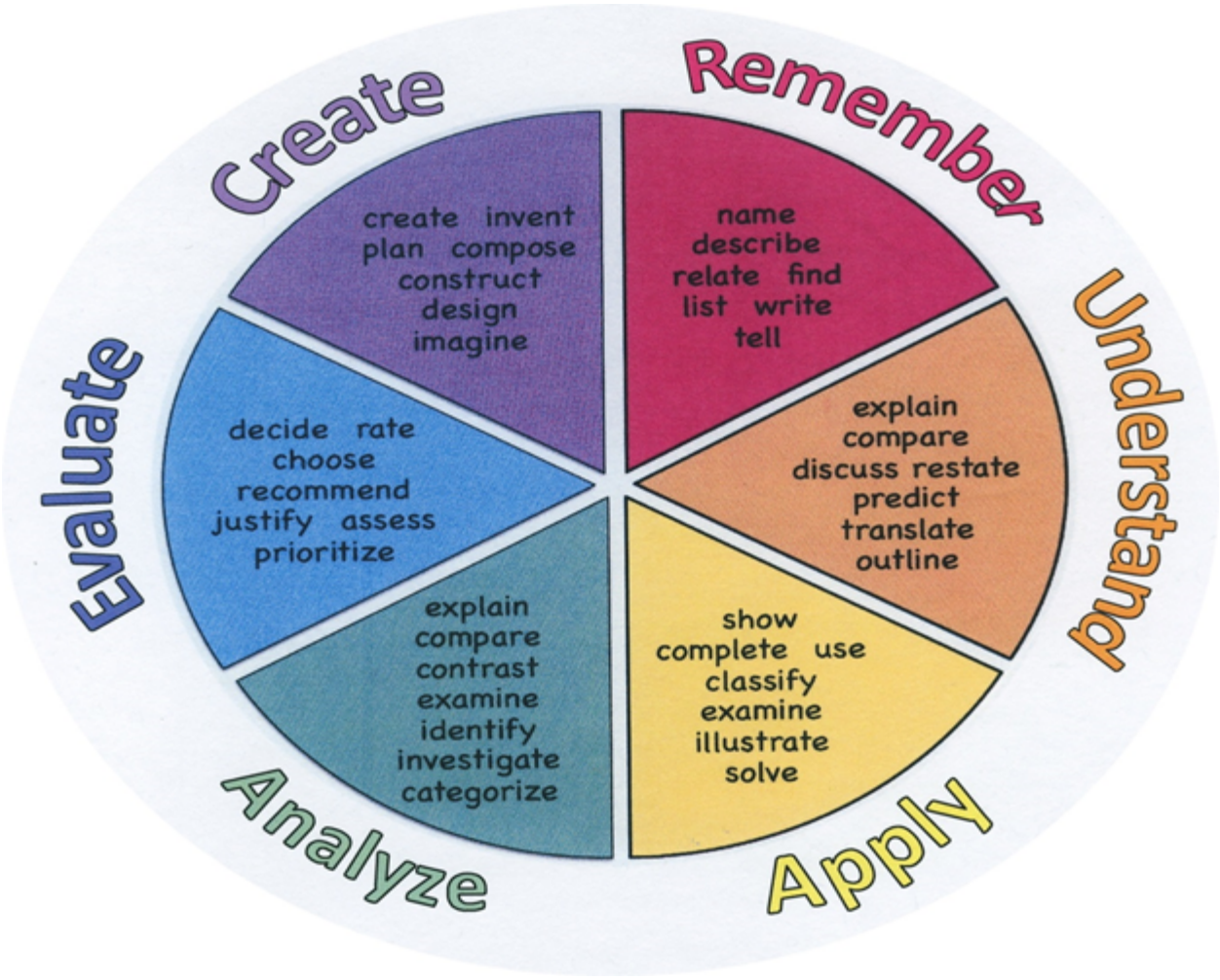
	12 texts and topics.
LA.RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
MA.S-IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
LA.RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LA.RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LA.RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LA.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LA.WHST.11-12.5	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.
LA.WHST.11-12.6	Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.
LA.WHST.11-12.7	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.
HPE.2.1.12.A.1	Analyze the role of personal responsibility in maintaining and enhancing personal, family, community, and global wellness.
HPE.2.1.12.A.2	Debate the social and ethical implications of the availability and use of technology and medical advances to support wellness.
HPE.2.1.12.A.CS1	Developing and maintaining wellness requires ongoing evaluation of factors impacting health and modifying lifestyle behaviors accordingly.
HPE.2.1.12.B.3	Analyze the unique contributions of each nutrient class (fats, carbohydrates, protein, water, vitamins, and minerals) to one's health.
HPE.2.1.12.C.1	Determine diseases and health conditions that may occur during one's lifespan and identify prevention and treatment strategies.
HPE.2.1.12.C.CS1	Personal health is impacted by family, community, national, and international efforts to prevent and control diseases and health conditions.
HPE.2.1.12.D.6	Demonstrate first-aid procedures, including Basic Life Support and automatic external defibrillation, caring for head trauma, bone and joint emergencies, caring for cold and heat injuries, and responding to medical emergencies.
HPE.2.1.12.E.1	Predict the short- and long-term consequences of unresolved conflicts.
HPE.2.1.12.E.CS1	Respect and acceptance for individuals regardless of gender, sexual orientation, disability, ethnicity, socioeconomic background, religion, and/or culture provide a foundation for the prevention and resolution of conflict.
SOC.9-12.1.4.2	Demonstrate effective presentation skills by presenting information in a clear, concise, and well-organized manner taking into consider appropriate use of language for task and audience.

9-12.HS-PS2-6	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

Learning Objectives

Identify the subdivisions of the skeleton, axial and appendicular, and identify the bones of each subdivision.
Explain the three functions of the skeletal system.
Name and explain the four main classifications of bones and be able to categorize each bone in the body to one of the four categories.
Identify the main anatomical regions on a long bone and describe each region's purpose.
Describe the process of bone formation in the fetus and summarize the events of bone remodeling throughout life.
Name and describe the various types of fractures.
Compare and contrast a fetal skeleton with an adult skeleton.
Describe the structure of the spine and explain the three most common abnormal curvatures (scoliosis, lordosis, and kyphosis).
Explain the differences between a male and a female skeleton.
Describe the similarities and differences in the structure and function of the three types of muscle tissue and indicate where they are found in the body.
Define and explain the role of the following parts of the muscular system: endomysium, perimysium, epimysium, tendon, and aponeurosis.
Describe the microscopic structure of skeletal muscle and explain the role of actin and myosin- containing myofilaments.
Explain how an action potential is initiated in a muscle cell and describe the events of muscle cell contraction.
Explain how the following apply to skeletal muscle: graded response, tetanus, isotonic/isometric contractions, and muscle tone.
Describe the three ways in which ATP is regenerated during muscle activity.
Explain possible causes for muscle fatigue and explain the cause of oxygen debt.
Define and explain the following terms in regard to muscles: origin, insertion, prime mover, antagonist, synergist, and fixator.
Demonstrate and identify the different types of body movements.
Explain some of the criteria used in the naming of muscles.
Name and locate the major muscles of the human body and state their action.
Explain how aging and disease affect the muscular system.
Identify the different membrane types (cutaneous, mucous, serous, and synovial), give their location in the human body, and describe their tissue composition.
Identify the important functions of the integumentary system and explain how it accomplishes these functions.
Identify (on a model) and describe the functions of the following skin structures: epidermis, dermis (papillary and reticular layers), hair and hair follicle, sebaceous gland, and sweat gland.
Name and describe the characteristics of each layer in the epidermis.
Explain the function of melanin in the skin and describe how skin color is genetically determined.
Differentiate between the three levels of burns.
Summarize the characteristics of the three main types of skin cancer: basal cell carcinoma, squamous cell carcinoma, and melanoma.
Explain how aging and disease can affect the integumentary system.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			
	Extrapolate	Subtract			
	Generalize				
	Predict				



Suggested Activities & Best Practices

- Bone identification worksheet
- Bone fractures and joints worksheet
- Crash Course videos with questions
- Assemble a skeleton lab
- Bone dissection lab
- Joint investigation lab
- Skeletal development activity-matching the skeleton to the right age
- Body ratios and proportions lab
- Bone identification quiz
- Muscle cell structure and function worksheet
- Muscle coloring and identification worksheet
- Muscle tissue lab-identify and draw the three types of muscle tissue
- Muscle function lab-test muscle fatigue through various conditions while holding a heavy book
- Muscle identification webquest
- Muscle movement worksheet
- Muscle tissue quiz
- Muscle identification and function test
- Membrane/skin worksheet packet

- Integument lab activity-investigation into accessory structures (hair, nails, and sweat glands)
- Skin disease diagnosis lab-case studies presented
- Burn and skin cancer identification worksheet
- Unit test

Assessment Evidence - Checking for Understanding (CFU)

Google Classroom Assignment (Formative)

QUIA Quiz (Summative)

Pear Deck (Alternate)

Lab Reports (Alternate)

Common, Department Quarterly Benchmarks (Benchmark)

Oncourse Assessment Tools (Formative)

Unit Test/Quiz (Summative)

"Do Now/Exit Ticket" Activity (Formative)

- Admit Tickets
- Blank diagrams
- Compare & Contrast
- Crash Course Video Questions
- Define
- Describe
- Diagram Quizzes
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Illustration
- Journals
- KWL Chart

- Lab- Skeletal Articulation
- Lab-Muscle Fatigue
- Multimedia Reports
- Outline
- Presentation- Pathology of Bone, Muscle, Skin
- Quarterly Benchmarks
- Self- assessments
- Study Guide
- Surveys
- Teacher Observation Checklist
- Unit review/Test prep
- Unit tests
- Web-Based Assessments
- WebQuests

Primary Resources & Materials

Textbook: *Biology*, Miller and Levine

Chromebook: Online access to textbook and digital resources from *Biology,* Miller and Levine

Ancillary Resources

YouTube videos - Crash Course/Anatomy and Physiology series with associated question worksheets

Human torso models

Diagram packages

Compound light microscopes

Selection of prepared slides showing properties of tissue types

Muscle Fatigure Lab Kit

Full-scale skeleton model

Disarticulated skeleton

Model of skin

Technology Infusion

Student-issued Chromebooks

Interactive digital content available through Pearson EasyBridge

YouTube videos for lesson enhancement and differentiation

Google Classroom

Google Suite

Prezi

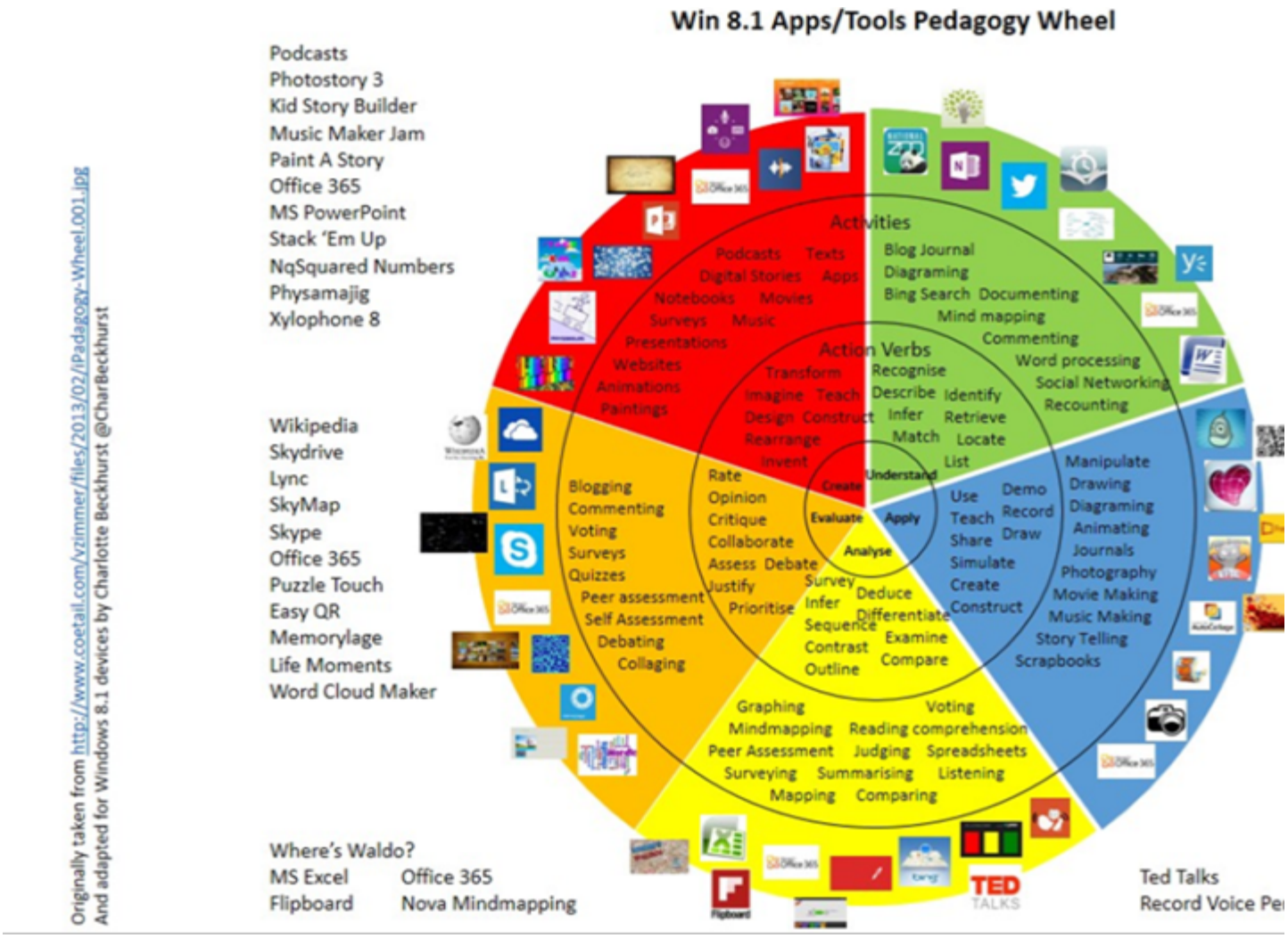
Subscription to Defined STEM website

Use MS Word, Excel, PowerPoint, OneNote

Smart TV

WIreless HDMI

Multimedia projector



Alignment to 21st Century Skills & Technology

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going

	beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP10.1	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.
CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.

TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.

21st Century Skills/Interdisciplinary Themes

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

21st Century Skills

- Health Literacy

Differentiation

Unit-specific exemplars:

1) Manipulatives will be used to help understand skeletal articulation.

2) Problem-based learning is exemplified by emplyimg case studies in skeletal and muscle pathologies.

3) Flexible grouping will be made available for students to choose with whom they would like to complete pathology project.

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments

- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Study guides
- Teacher reads assessments allowed
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Small group setting

Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Leveled rubrics
- Multiple intelligence options
- Multiple texts
- Project-based learning
- Problem-based learning

Lo-Prep Differentiations

- Choice of books or activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Varied supplemental materials

Special Education Learning (IEP's & 504's)

Unit-specific exemplars:

1) Preview of content, concepts and vocabulary will be used by assigning online modules from Miller/Levine Biology Online.

2) Research project will be modified to shorten the amount of research to be completed.

3) Students will be provided with a study guide to help prepare for unit test.

- printed copy of board work/notes provided
- additional time for skill mastery
- behavior management plan
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multi-sensory presentation
- multiple test sessions
- preferential seating
- preview of content, concepts, and vocabulary
- Provide modifications as dictated in the student's IEP/504 plan
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

English Language Learning (ELL)

Unit-specific exemplars:

1) Teacher presentations will be modified to limit the non-essential information presented.

2) ELL students will be paired with flent bilingual students to provide tutoring and assistance during class.

3) Unit tests will be worded in simple terms, will be offered as open-book, and may be completed with assistance from ELL faculty.

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

At Risk

Unit-specific exemplars:

1) Alternative videos (Crash Couse) may be assigned to support student understanding of topics with visual assitance.

2) Students may demonstrate knowledge of unit (summative assesment) by creating a visual presentation in the form of a model, poster, or other appropriate form.

3) Written tests may be performed open-book or with notes to assist in success.

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to

reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.

- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

Unit-specific exemplars:

1) Students may create their own human skeleton model to increasethe depth of knowledge..

2) Advanced case studies will be offered to challenge gifted students.

3) Students will be urged to utilize college-level reading materials to increase the depth of knowledge.

- Above grade level placement option for qualified students
- Advanced problem-solving
- Allow students to work at a faster pace
- Cluster grouping
- Complete activities aligned with above grade level text using Benchmark results
- Create a blog or social media page about their unit
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Multi-disciplinary unit and/or project
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge

Sample Lesson