**Science Lesson Plan: Human Organ Systems, Grade 5**



*In the Doctor’s Study by Julien Ruggles Seavey, 1890*

*(this artwork can be accessed by going to the Museum London website* [*http://museumlondon.ca/*](http://museumlondon.ca/) *and searching for it on the “collections” page*

*– type in the name of the artist)*

KICA Expectations: Technology and Design, Thinking and Inquiry Lesson Developed by Sarah Elminshawi

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| Expectation | **Science: 2.3** Design and build a model to demonstrate how organs or components of body systems in the human body work and interact with other components ***(e.g., build a model that shows how*** ***muscles, bones, and joints in the human body*** ***work together as a system to allow movement*** ***of the arms or legs; build a model to show how the lungs and heart work as a system)*****3.1** Identify major systems in the human body ***(e.g., musculoskeletal system, digestive system,*** ***nervous system, circulatory system)*** and describe their roles and interrelationships**Visual Arts: Fundamental Concepts, Proportion: The relationship of the size and shape of parts of the figure to the whole figure****D1.4 Use a variety of materials, tools, and techniques to determine solutions to design challenges: Sculpture: a human figure** |
| Materials and Resources | Chicken bones, animal skeleton models, vinegar, string, toilet paper tubes, wire, spools, dried macaroni and noodles, plasticine, paper, paper towel, tape, construction board, glue, markers and pencils. Brooklyn Children’s Museum, The Human Body Website: <http://www.brooklynkids.org/attachments/HumanSkeleton_31.pdf>The Human Body: <http://www-03.ibm.com/industries/ca/en/education/k12/lessonplans/thehumanbody1_3.pdf>  |
| Important Terminology | Skeleton, bones, measuring tape, calcium, ball and socket joints, rib cage, scapula, femur, shin, vertebra, skull, cranium, carpal, metacarpal, phalanges, tibia, pelvis, fibula, patella, ulna, humerus |
| Background Knowledge | Students have been learning about the human body and its various systems. In previous lessons, they have been introduced to various diseases and the parts of the body they affect, environmental impact on the human body and the circulatory system. This will be the first introduction to the skeletal system. |
| Minds On! | “What is the purpose of calcium in our bones?” This opening exercise will introduce students to the effect of calcium density in our bones. We will be immersing a chicken bone in a vinegar solution and determining the dissolution of bone density and the effect the vinegar has on the bone. This will segue into our discussion of the effect calcium has on our bones, the human skeleton, and its various parts. |
| Lesson Overview | This lesson will discuss the purpose of calcium in our bones. We will be discussing the human skeleton and the anatomically correct names of its parts. We will begin with an experiment using vinegar solution and chicken bones to determine the effects of vinegar on bone density. We will then move into an overhead projection of the human skeletal anatomy and its various parts. Students will identify the parts of the human skeleton, compare the human skeletal figure to that of different animals, (provided in molds or preserved skeletons) and discuss the why’s and how’s of the differences between structures. Students will then construct and label their own skeletal structures, with consideration to movement, structure, function, and proportion, using a variety of materials provided. Students will present their structures at the end of class. |
| Consolidation | Students will demonstrate knowledge in their summative task of making their own human skeleton. Correct placement of the elements of the skeletal structure and proper terminology will determine the students’ knowledge of the material presented in class. Students will present their model, explain their process and share their knowledge of the various skeletal bones.  |

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|  What Will You Teach? |
| **Human Organ Systems, Grade 5: The Human Skeleton**Students will learn the purpose of calcium in our bones and experiment with the variation of bone density through immersing a chicken bone in vinegar solution. Students will learn the human skeleton and the anatomically correct names for its summative parts. Students will be able to draw and label the human skeleton and present their drawings to the class. |
| **Materials and/or Resources:**Chicken bones, animal skeleton models, vinegar, photographs of each student, photocopied and enlarged, 8.5” x 11” or 11” x 17”. The larger the image, the easier it is for students to draw their skeleton on. Tracing paper, pencils and erasers, posters of the human skeletal figure. The Human Body: <http://www-03.ibm.com/industries/ca/en/education/k12/lessonplans/thehumanbody1_3.pdf> Brooklyn Children’s Museum, The Human Body Website:<http://www.brooklynkids.org/attachments/HumanSkeleton_31.pdf> |
| Important Terminology / Word Wall: |
| How Will You Teach This? | Assessment for learning |
| **Minds On!** ***“What is the purpose of calcium in our bones?”*** This opening exercise will introduce students to the effect of calcium density in our bones. We will be immersing a chicken bone in a vinegar solution and determining the dissolution of bone density and the effect the vinegar has on the bone. This will segue into our discussion of the human skeleton and its various parts. | **Diagnostic***:* Students have been learning about the human body and its various systems. They have been introduced to various diseases and the parts of the body they affect, environmental impact on the human body and the circulatory system. This will be the first introduction to the skeletal system. |
| **Lesson Overview** * Students will be introduced to the human skeleton through the **Mind’s On** experiment and will be asked the guiding question: ***“What is the purpose of calcium in our bones?”***
* Students will conduct this experiment by immersing a cooked chicken bone in vinegar solution and documenting the affects the vinegar has on the bone’s density. This will provide visual support for the purpose of calcium in our bones and open the discussion of the human skeleton and its various parts
* Students will be introduced to the human skeleton and its various parts via Smart Board
* We will identify the anatomical structure of the skeleton and its proper names while discussing shape and function. Guiding questions will lead our discussion, such as, ***“Why is this bone shaped like this, how does it affect the way we move, why do you think that is?”*** etc.
* We will measure our own bodies and consider proportional elements that inform the movement and structure of the human skeleton. These proportions will inform the students drawing of their own skeletons in the following exercise
* We will discuss the differences between skeletal structure and the purposes they serve, such as the shape and movement of bones in both structures. Guiding questions will include: ***“Why are our hands shaped like this? How does it help the way we move?”*** etc. We can ask various questions about the shapes of our bodies and how they help us move.
* Students will begin the assignment of drawing their own skeleton over top of their own image.
* Provide the students with the enlarged photocopies of their body with a layer of tracing paper over top of the image. You may choose to photograph their entire body, or from just the torso and up. You can modify/simplify this assignment by choosing only one part of the body, such as hands or feet, or you may extend this into a fun exercise of having the students draw the skeletal figure of a cartoon character.
* There should be diagrams around the room and handouts given to the students to refer to during the drawing of their skeleton. This can be a challenging exercise so it is better if students have their own diagram to refer to.
* Each student should label his or her skeleton. Keep labeling requirements age appropriate by simplifying the body parts they must identify.
* Once drawings are complete, students will present their work to the class, discussing their process and identifying the various parts of the skeletal figure using anatomically correct terminology.
 | **Formative:** Students are demonstrating critical thinking skills in determining the form and function of the human skeleton. They will use H.O.T.S in determining how these differences enhance and affect the way we use our bodies. They will be learning anatomically correct language for our various skeletal parts, and will provide theories for why they believe that the vinegar solution changed the density of the chicken bone, and what role calcium plays in the structure of our bones. Students will also demonstrate critical thinking skills in the drawing and labeling of their skeletons. |
| Consolidation Students will present their drawings to the class, sharing their process and the challenges that they faced. They will identify the skeletal parts in anatomically correct terminology. They will be prompted to answer the guiding questions: *“What did I learn from performing this exercise, what was difficult about this exercise, what am I still unsure of, and what would I do differently if I did this project again?”*  There will be time for discussion of what we have learned from this exercise and to clarify elements of the concept that they may still be unsure of. The drawing they have created will serve as a creative study tool in following classes. Students will develop not only their knowledge of the human body, but also their ability to present to their peers and provide rationale for their projects and assignments, as well as demonstrating their understanding of the fundamental concepts taught in this lesson. | **Summative*:*** *Students will demonstrate knowledge of the human skeletal structure through the drawing and labeling of their skeleton and through visual and oral presentation. Students will develop knowledge through class discussions and peer evaluation of their presentations. Students demonstrate rationale in explaining their work to their peers, and self-assessment opportunities are present in their own critical reflection of their work, as well as from feedback from the teacher and their peers.* |