

Big Idea: Engineering – Still under construction will be completed before Quarter 4

Inquiry Questions

Science:

- How do humans make changes to their environment in order to survive and be comfortable?

Technology:

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Engineering:

Mathematics:

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Social Studies:

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Content Area Grade Level Standards

Science

3-5.E.1: Identify a simple problem with the design of an object that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost. (Science Handbook, Module 1 Wrap Up & supplemental resources) {Science Handbook p. 354-355, p. 19, p 7}

3-5.E.2: Construct and compare multiple plausible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (Science Handbook, Leveled Reader & Supplemental Resources) {Science Handbook p. 354-355, p. 19, p 7} {Leveled Reader – Mixtures & Solutions}

3-5.E.3: Construct and perform fair investigations in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (Science Handbook and Supplemental Resources) {Science Handbook p. 354-355, p. 11-12}

Technology

2.F A subsystem is a system that operates as a part of another system.

2.G When parts of a system are missing, it may not work as planned.

2.H Resources are the things needed to get a job done, such as tools and machines, materials, information, energy, people, capital, and time.

2.K Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.

7.B People have made tools to provide food, to make clothing, and to protect themselves.

Engineering

6.B Because people's needs and wants change, new technologies are developed, and old ones are improved to meet those changes.

8.C The design process is a purposeful method of planning practical solutions to problems.

8.D Requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on the design.

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9.C The engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), making the item, evaluating it, and presenting the results.

9.D When designing an object, it is important to be creative and consider all ideas.

9.E Models are used to communicate and test design ideas and processes.

10.C Troubleshooting is a way of finding out why something does not work so that it can be fixed.

10.D Invention and innovation are creative ways to turn ideas into real things.

10.E The process of experimentation, which is common in science, can also be used to solve technological problems.

11.D Identify and collect information about everyday problems that can be solved by technology, and generate ideas and requirements for solving a problem.

11.E The process of designing involves presenting some possible solutions in visual form and then selecting the best solution(s) from many.

11.F Test and evaluate the solutions for the design problem.

11.G Improve the design solutions.

12.D Follow step-by-step directions to assemble a product.

12.E Select and safely use tools, products, and systems for specific tasks.

14.E Technological advances have made it possible to create new devices, to repair or replace certain parts of the body, and to provide a means for mobility.

Mathematics

5.MD.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

5.G.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.

5.G.4. Classify two-dimensional figures in a hierarchy based on properties.

Social Studies

5.1.9 Analyze the causes of the American Revolution as outlined in the Declaration of Independence.

5.1.14 Explain why the United States Constitution was created in 1787 and how it established a stronger union among the original 13 states by making it the supreme law of the land. Identify people who were involved in its development.

5.2.1 Summarize the principles and purposes of government as stated in the Preamble to the United States Constitution.

5.2.3 Give examples of how the British colonies in America developed forms of representative government, self-government and democratic practices.

5.2.4 Identify and explain key ideas about government as noted in the Declaration of Independence, Articles of Confederation, Northwest Ordinance, United States Constitution and the Bill of Rights.

ELA**Reading: Informational Text**

CCSS.ELA-Literacy.RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-Literacy.RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS.ELA-Literacy.RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

CCSS.ELA-Literacy.RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.

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CCSS.ELA-Literacy.RI.4.5 Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

CCSS.ELA-Literacy.RI.4.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

CCSS.ELA-Literacy.RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

CCSS.ELA-Literacy.RI.4.8 Explain how an author uses reasons and evidence to support particular points in a text.

CCSS.ELA-Literacy.RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

CCSS.ELA-Literacy.RI.4.10 By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

WRITING

CCSS.ELA-Literacy.W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- W.4.2a Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.
- W.4.2b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
- W.4.2c Link ideas within categories of information using words and phrases (e.g., *another, for example, also, because*).
- W.4.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.
- W.4.2e Provide a concluding statement or section related to the information or explanation presented.

CCSS.ELA-Literacy.W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.

CCSS.ELA-Literacy.W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

CCSS.ELA-Literacy.W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-Literacy.W.4.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences

Science Process Standards

Science Process Standards**Nature of Science**

- Make predictions and formulate testable questions
- Design a fair test.
- Plan and carry out investigations—often over a period of several lessons—as a class, in small groups or independently.
- Perform investigations using appropriate tools and technologies that will extend the senses.
- Use measurement skills and apply appropriate units when collecting data.
- Test predictions with multiple trials.
- Keep accurate records in a notebook during investigations and communicate findings to others using graphs, charts, maps and models through oral and written reports.
- Identify simple patterns in data and propose explanations to account for the patterns.
- Compare the results of an investigation with the prediction.

Design Process

- Identify a need or problem to be solved.
- Brainstorm potential solutions.
- Document the design throughout the entire design process.
- Select a solution to the need or problem.
- Select the most appropriate materials to develop a solution that will meet the need.
- Create the solution through a prototype.
- Test and evaluate how well the solution meets the goal.
- Evaluate and test the design using measurement.
- Present evidence by using mathematical representations (e.g. graphs, data tables)
- Communicate the solution (including evidence using mathematical representations (graphs, data tables), drawings or prototypes.
- Communicate how to improve the solution.

Standards for Mathematical Practice

Mathematical Practices

- MP.1. Make sense of problems and persevere in solving them.
- MP.2. Reason abstractly and quantitatively.
- MP. 3 Construct viable arguments and critique the reasoning of others.
- MP.4. Model with mathematics.
- MP.5. Use appropriate tools strategically.
- MP.6. Attend to precision.
- MP.7 Look for and make use of structure.
- MP. 8 Look for and express regularity in repeated reasoning.

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Plan of Work

Common Misconceptions

Building parts that work together is a simple task.

Suggested Activities

- Students create a prototype that mimics a part of the human body that can complete a simple task.
- Students build a model of a skeletal system.
- Students create a prototype government in their class to solve specific problems.
- Dissect owl pellets to compare the skeletal system of a rodent to other skeletal systems.
- Find machines that were built mimicking the human design.

Suggested Vocabulary

Musculoskeletal, System, Joints, Muscles, Tendons, Ligaments

Resources

Have a physical therapist bring a prosthetic to share
Medtropolis.com/virtual-body
www.inerbody.com

Assessment

Type of Assessment

Example

Observation

Oral Questioning

Students bring in, share and answer questions about machines that mimic the human design.

Exit Slip

Journal

Students journal their experiences with the experiment. They document their designs.

Graphic Organizers

Self-Assessment

Writing Prompt

Students create a declaration or preamble describing their prototype government.

Presentation

Electronic media

Students use the virtual body website to build a skeletal system.

Think Pair Share

Whiteboards

Experiment/projects

Students create a prototype that mimics a part of the human body that can complete a simple task.

Quiz

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