

# PHENOMENA, DRIVING QUESTIONS AND SEPUP STORYLINE

## BIOMEDICAL ENGINEERING

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**Unit Issue:** How science, technology, and engineering can be used to design solutions to improve the health and wellness of others.

**Anchoring Phenomenon:** Engineered solutions can improve people’s health and functioning. Examples explored include artificial bones, artificial hands, and artificial heart valves. Students generate and answer questions such as: How can science, technology, and engineering be used to improve people’s health and wellness? How are medical devices designed, tested, and improved?

Investigative Phenomena	Driving Questions	Guiding Questions	Activities	PE	Storyline
Many people have medical conditions.	How can engineering be used to improve the lives of those living with medical conditions?	What tools and strategies can you design to deal with a broken arm? (Activity 2)	2, 3, 4, 5, 7	MS-ETS1.1 MS-ETS1-2 MS-ETS1.3	Solving problems is something that we do every day. One of the most common processes used to find solutions to problems is known as engineering.  One type of engineering, biomedical engineering, focuses on engineering devices or processes to help those with medical conditions.  Biomedical engineers engage in a multi-step non-linear iterative process that makes use of scientific knowledge and technology in order to find solutions that meet the needs (criteria) of the medically afflicted within certain limits (constraints).  Once solutions to biomedical problems are engineered, engineers often look for ways to optimize their solutions. Common examples of optimization are: making a device cheaper, stronger, or better at specific functions.
		How has the development of artificial body parts changed lives? (Activity 3)			
		How can you design a prototype of an artificial bone that is strong yet light and flexible? (Activity 4)			
		How can you design a heart valve prototype out of common materials? (Activity 5)			
		Can you design an energy bar to meet the needs of people with specific medical conditions? (Activity 7)			

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### BIOMEDICAL ENGINEERING (continued)

Investigative Phenomena	Driving Questions	Guiding Questions	Activities	PE	Storyline
<p>Scientists and engineers use technologies. Technologies are often developed by engineers and scientists.</p>	<p>How do new technologies get developed?</p>	<p>What approaches can be used to solve a problem? (Activity 1)</p> <p>How can you design a prototype of an artificial bone that is strong yet light and flexible? (Activity 4)</p> <p>How can you design a heart valve prototype out of common materials? (Activity 5)</p> <p>How are science, engineering, and technology related? (Activity 6)</p> <p>How does the structure of an arm or wing affect its function? (Activity 8)</p> <p>How can you make a mechanical grabber that can pick up and move an object? (Activity 9)</p>	<p>1, 4, 5, 6, 8, 9</p>	<p>MS-ETS1-1 MS-ETS1-2 MS-ETS1-3 MS-ETS1-4</p>	<p>Solving problems is something that we do every day. One of the most common processes used to find solutions to problems is known as engineering.</p> <p>One type of engineering, biomedical engineering, focuses on engineering devices or processes to help those with medical conditions.</p> <p>Biomedical engineers engage in a multi- step non-linear iterative process that makes use of scientific knowledge and technology in order to find solutions that meet the needs (criteria) of the medically afflicted within certain limits (constraints).</p> <p>Once solutions to biomedical problems are engineered, engineers often look for ways to optimize their solutions. Common examples of optimization are: making a device cheaper, stronger, or better at specific functions.</p>