Pre-STEM Activity: Vocabulary/Definitions

aortic valve: The valve between the left ventricle and the aorta, normally with three leaflets.
circulatory system: An organ system that passes nutrients, gases, hormones and blood cells to and from cells in the body to fight diseases and help stabilize body temperature and pH to maintain homeostasis.
heart valve : A one-way valve that allow blood to flow through it in one direction. Four valves are present in mammalian hearts. They open and close depending on different pressures on each side of them.
mitral valve: The valve between the left atrium and left ventricle, with two leaflets. Also known as the bicuspid valve because it is the only valve in the human heart with just two flaps.
pulmonary valve: The valve between the right ventricle and the pulmonary artery, with three cusps or leaflets.
tricuspid valve: The valve between the right atrium and right ventricle, normally with three leaflets and three papillary muscles.
valve: Any device for halting or controlling the flow of a liquid, gas or other material through a passage, pipe, inlet, outlet, etc.

Pre-STEM Activity: Brainstorming & Questioning

Group Brainstorm: As a class, brainstorm about one-way valves. What are they? What should they do? Where are they used? Is there anywhere that occur naturally? If we had to create one, what are some ideas?
Write all the student responses on the board. Remind students that during brainstorming there are no bad ideas and wild ideas are encouraged.

Questioning: Students will go through the engineering design process stages of brainstorming, designing, building, testing and redesign. This is a good time to walk around to groups and ask questions. If some students seem like they are not involved, direct some of the questions to them in order to gauge whether or not they are following along and working with their groups.

Post-STEM Reflection:

Ask students to respond to the following questions:

- What materials did you choose? Why?
- How does your valve allow marbles through in one direction and stop them in the other direction?
- What decisions did you make that might be similar to those made by biomedical engineers?
- What is the best aspect of this design?
- What improvements would you make to this design?
- How did you incorporate what you learned from testing into your next design iteration?