

8b.1 What is a System?

Story Extension for This Lesson:

Sam and Alex are travelling on the Great Lakes, which is a large, natural freshwater system (the largest in the world). Before they start exploring the system, they will need to understand “**What is a system.**”

Grade: 8

Strand: Systems in Action

Big Ideas:

- Systems are designed to accomplish tasks. (Overall expectations 1, 2 and 3)
- All systems include an input and an output. (Overall expectations 2 and 3)

Overall Expectations:

2. investigate a working system and the ways in which components of the system contribute to its desired function

Specific Expectations:

2.6 use appropriate science and technology vocabulary, including mechanical advantage, input, output, friction, gravity, forces, and efficiency, in oral and written communication
3.1 identify various types of systems
3.2 identify the purpose, inputs, and outputs of various systems

Inquiry Skills:

Observing, Comparing, Contrasting, Classifying

Instructions:

Part 1:

Divide the class into several small groups. Give each group a few Dollar Store-type simple toys, preferably ones that use energy in some way (e.g. wind up or solar powered). Have students look for similarities and differences between the different toys, and then record their thinking. If students have not already done so, introduce the idea that each toy represents a simple system with an input (in this case, energy), a process, and an output.

Part 2:

Have students read page one of the BBC's **Bitesize** website's excellent introduction to working with systems. Review the concepts of input, process, and output. Then, have students go back to the toys they were examining, and determine what the input,

process, and output are, as well as whether each toy is an "open" or "closed" system (simple toys are open systems: input triggers process, which then controls output).

Part 3:

Have students think back to Grade 5, when they studied human body systems. Have them draw a simple flow diagram, with the word 'Body' in the middle. What are some of the inputs for our body, and what are some of the outputs? See the attached example. As an extension, you may discuss what some of the processes are, such as respiration and digestion.

NOTE: Later on, you can come back to the Human Body as a System (in the activity entitled **What is a Closed-Loop System?**) and talk about the concept of homeostasis: our bodies constantly monitor inputs and outputs using feedback, and sometimes alter processes in order to try and maintain certain levels (e.g. not too hot or cold, not too thirsty, not too hungry or full).

Materials List:

- thrift store toys or other simple mechanisms

Assessment Strategy:

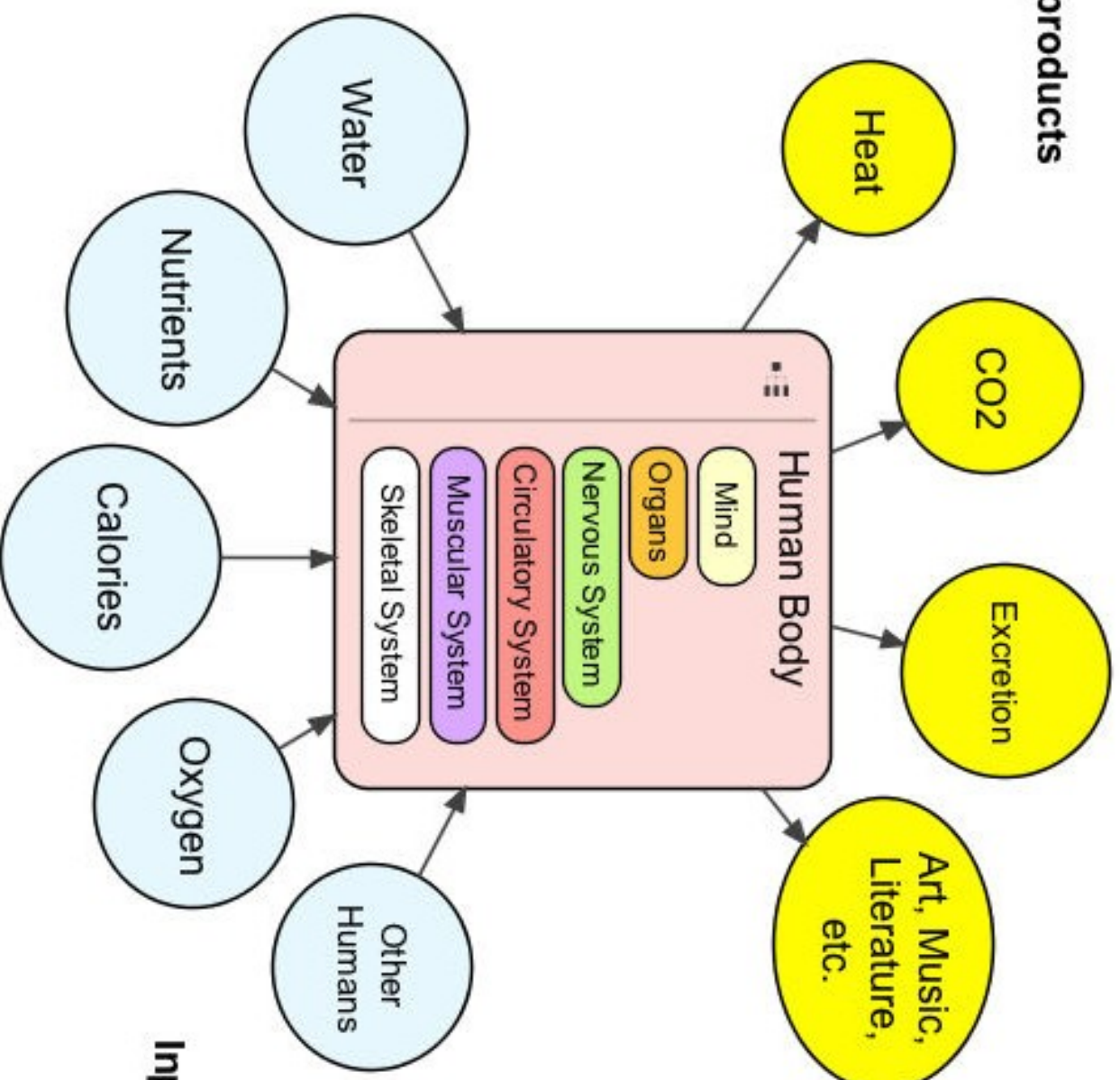
As a simple performance task to uncover student understanding, have students choose a simple open-loop system and map out its inputs, processes, and outputs. For a simple example (making tea) to share and dissect with your class, see:

- <http://www.technologystudent.com/designpro/system1.htm>

Handouts:

- Human Systems

Outputs i.e. products



Inputs i.e. needs

