**COMPUTATIONAL THINKING LAB**

**Week 2**

1. Make the students get familiarized with a word processor (initial 1 hour). They can e asked to type down whatever they learn about the word processor, whatever they wrote down in the notebook. Instructions may e given about how to keep files organized, proper naming of files etc.
2. Ask the students to describe an object that is used everyday. They imagine that the object has just been invented and has to describe the object.
   1. The students should think about and list the attributes of the object that are needed to describe and define the object
   2. Students should then list the behaviours of the object.
      1. The functions / uses of the object
      2. What are the needs fulfilled by the object
      3. The physical attributes and characteristics of the object (components or parts, shape or materials, general dimensions, connections between parts
   3. There are some specifications to describe all of the attributes and functions of the object:
      1. Use clear clear, non-technical language, to describe the object’s function, the need it fulfills and its attributes.
      2. Your description must be specific enough so that someone who has never seen the object could visualize it, understand how it works, and appreciate the benefits it provides.
      3. Describe the object using at least 150 words and listing a minimum of 6 attributes. Keep in mind that attributes should involve all of your senses. (e.g. Is it smooth? Does it make a noise? Does it have an odour?

O**b**jects that can be considered:

**Binder clip**

**Scissors**

**Measuring tape**

**Stapler**

**Umbrella**

**Scale**

**Key**

**Note**b**ook**

**Television**

**Mo**b**ile phone**

**Knife**

**Spoon**

**Tumbler**

**Pen**

**Printer**

**Mapping to Computer Science: (I have copied the following as such from the website)**

1. **Q1. Consider your object as if you were a computer program. Let’s draw a diagram that shows all of its functions as boxes, and for each function, its** [**inputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge) **(i.e. what is required to use the object in this way?) and** [**outputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge) **(i.e. what is produced when the object is used in this way?).** Now draw the diagram for the colander. Ask, **Are there** [**inputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge) **and** [**outputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge) **that repeat for different functions?**
2. **Q2. Are there functions that are similar and can be combined so that the object can be represented with a more concise program (i.e. fewer steps or boxes)?**
3. **Q3. Think about the physical attributes and characteristics of your object. Organize these so that each is declared as a variable with its proper type** (e.g. ‘color,’ ‘material type,’ ‘height,’ ‘weight’)**. Can some of these attributes and characteristics be arranged into a hierarchy of related attributes and characteristics** (e.g. ‘Material Type’ can indicate weight or color, but weight and color do not indicate material type)**?**
4. **Q4. Have you heard of abstraction? How does abstraction in Computer Science relate to the process of identifying the functions and characteristics as you have done in this exercise?**

Talk through these complex questions as a group, being sure to highlight the answers below. Students can submit their own answers as a formative assessment exit ticket, to which you can add comments to further push their thinking.

1. **A1.** Depends on the object. For the colander, yes: the input of ‘food’ can be used in the functions of ‘washing’ and ‘cooking.’ It is important to recognize that similar [**inputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge) can produce different [**outputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge), and similar [**outputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge) can be produced by different [**inputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge).
2. **A2.** Depends on the object. For the colander, yes: ‘washing’ and ‘separating’ could be combined into the more general function of ‘filtering.’
3. **A3.** Depends on the object. For the colander, yes: ‘Material Type’ (e.g. metal) can indicate weight and/or color (e.g. possibly heavier than plastic or silver), but weight and color do not indicate material type. It is possible that some hierarchies are unique to the object students selected (i.e. a metal and a plastic colander would produce different hierarchies or related attributes and characteristics even though they are both colanders).
4. **A4.** Abstraction means ‘identifying and extracting relevant information to define main idea(s).’ Computer Science uses abstraction to analyze details in order to learn more about a concept as a whole. Analyzing, or abstracting, the details of an object’s specific [**inputs, outputs**](https://docs.google.com/document/d/1NWv45AnHxkjXa1fypQeprVRcArU8WNmAYXml0Bhio74/edit#heading=h.eb1b7wdmkcge), functions, and attributes tells more about the category of the object as a whole.