1. Start with Ladefoged’s minimal sets for English consonants. These are lists of words that illustrate the main consonant contrasts used in English.

Note how these lists are constructed because you will need to try to come up with such lists for your project language (though in many languages it is very hard to make such large lists!).
Stop consonants

p       pie       pea

k       kye       key

b       by        bee
d       dye       D

g       guy       Gee
Nasal consonants

m  my  me  ram
n  nigh  knee  ran
ŋ  rang
Fricative consonants

\[
\begin{array}{ccc}
\mathbf{f} & \text{fie} & \text{fee} \\
\mathbf{v} & \text{vie} & \text{V} \\
\mathbf{\theta} & \text{thigh} & \\
\mathbf{\partial} & \text{thy} & \text{thee} \\
\mathbf{s} & \text{sigh} & \text{sea} & \text{listen} \\
\mathbf{z} & \text{Z} & \text{mizzen} \\
\mathbf{\varsigma} & \text{shy} & \text{she} & \text{mission} \\
\mathbf{\zeta} & \text{vision} \\
\mathbf{h} & \text{high} & \text{he} \\
\end{array}
\]
Affricate consonants

ʧ  chi(me)  chea(p)
ʤ  ji(ve)   G
Approximant consonants

l    lie    lee
w    why    we
r    rye
j    ye
3. We focus on the activities of the mouth - how the articulators move - as a basis of the systematicity of the English phonetic system.

And this focus on speech pronunciation (or "articulation") results in an analysis that can be presented as a consonant chart of English. The columns of the chart indicate the "place of articulation" of the sound, the rows indicate the "manner of articulation" of the sound, and where symbols appear in pairs within a cell of the table, the symbol on the left is analyzed as voiceless while the symbol on the right is analyzed as voiced.
<table>
<thead>
<tr>
<th>Place of articulation</th>
<th>bilabial</th>
<th>labio-dental</th>
<th>dental</th>
<th>alveolar</th>
<th>palato-alveolar</th>
<th>palatal</th>
<th>velar</th>
</tr>
</thead>
<tbody>
<tr>
<td>nasal (stop)</td>
<td>m</td>
<td></td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td>η</td>
</tr>
<tr>
<td>stop</td>
<td>p b</td>
<td></td>
<td>t d</td>
<td></td>
<td></td>
<td>k g</td>
<td></td>
</tr>
<tr>
<td>fricative</td>
<td>f v θ ð s z ß ñ j z</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(central) approximant</td>
<td>(w)</td>
<td></td>
<td>j</td>
<td></td>
<td></td>
<td>j w</td>
<td></td>
</tr>
<tr>
<td>lateral</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 1.5  The principal parts of the upper surface of the vocal tract.
FIGURE 1.6  The principal parts of the lower surface of the vocal tract.
5. Relating the consonant chart to the articulators.

a. Passive articulator does not move (generally -- the upper lip is an exception), and is generally on the upper surface of the vocal tract.
   • upper lip, upper incisors, alveolar ridge, hard palate, soft palate (velum), uvula, and back pharyngeal wall.

b. Active articulator does move and is generally on the lower surface of the vocal tract.
   • lower lip, tongue tip, tongue blade, tongue body, and tongue root.
c. Because active and passive articulators are not freely combinable (e.g. lower lip cannot touch pharyngeal wall) the places of articulation are generally considered as unitary descriptors despite the fact that we name many of them using a combination of the names of the active and passive articulators involved (e.g. labio-dental).
<table>
<thead>
<tr>
<th>place of articulation</th>
<th>active articulator</th>
<th>passive articulator</th>
</tr>
</thead>
<tbody>
<tr>
<td>bilabial</td>
<td>lower lip</td>
<td>upper lip</td>
</tr>
<tr>
<td>labio-dental</td>
<td>lower lip</td>
<td>teeth (upper incisors)</td>
</tr>
<tr>
<td>interdental</td>
<td>tongue tip</td>
<td>teeth (upper incisors)</td>
</tr>
<tr>
<td>alveolar</td>
<td>tongue blade</td>
<td>alveolar ridge</td>
</tr>
<tr>
<td>palato-alveolar</td>
<td>tongue blade</td>
<td>hard palate</td>
</tr>
<tr>
<td>palatal</td>
<td>tongue front</td>
<td>hard palate</td>
</tr>
<tr>
<td>velar</td>
<td>tongue center</td>
<td>soft palate (velum)</td>
</tr>
<tr>
<td>glottal</td>
<td>vocal folds</td>
<td></td>
</tr>
</tbody>
</table>
d. **Manner of articulation** refers to the degree of constriction and secondary openings by which sounds are made at these places.

- stop, fricative, affricate, nasal, approximant (lateral and glide)
e. **Voicing** refers to whether the vocal folds vibrate (more or less) during the consonant constriction.
6. For example, the alveolar stop articulation found in [t] “tip”, [d] “dip”, or [n] “nip” is like the one captured below in a tracing of one frame from an x-ray movie of a person saying a word with an alveolar stop.