How to solve phonological problems

1) **Read carefully** what you have to do in the exercise
- 'determine *whether* segments *are* phonemes or allophones'
- 'determine *which* segment(s) *is*(are) *phoneme*(s)'

All this implies that you have to account for the **distribution and write the rule**(s) allowing to derive allophone(s) from phoneme(s).
2) If you need to find out if the sounds in question are phonemes, look for **minimal pairs**.
3) It is always useful to **organise data**, if it is not yet organised (put in Column 1 all words with segment 1, and in Column 2 all words with segment 2):

Example: consider [h] and [ʔ] and determine whether they contrast, or whether they are allophones of one phoneme.

a) kahon	'box'	d) ʔari	'property'
b) hariʔ	'king'	e) kaʔon	'to fetch'
c) ʔumagos	'to flow'	f) humagos	'to paint'

You organize data:

a) kahon	e) kaʔon
f) humagos	c) ʔumagos
b) hariʔ	d) ʔari

It turns out that a) and e) form a minimal pair, as well as f) and c). The pair b-d is a near minimal pair.

If there are no minimal pairs in data, carefully compare words in Column 1 with words in Column2. Then the words within each column.

Example:
Korean
[s ʃ z] are in complementary distribution and form one phoneme. State the distribution.

satan	division	ʃeke	world	tʃaŋza	business
sæk	colour	ʃekɯm	taxes	inza	greetings
sæ	new	ʃesuʃil	washroom	inzwetʃa	publisher
sosəl	novel	ʃihap	game	paŋzək	cushion
su	number	ʃiktaŋ	dining room	jəŋzutʃɯŋ	receipt
sul	wine	ʃilsu	mistake	ɯmziktʃəm	restaurant
susul	operation	ʃinpu	bride	phuŋzok	custom

Here, we have three segments, therefore we regrouped the data in three columns. In the first one we gathered words with [s], in the second words with [ʃ], and in the third words with [z].

- what **types of sounds** occur immediately next to the sound in question (word boundary (#), consonants, vowels)? Make a chart.

	#___	___#	C___	___C	V___	___V	V___V	___G
s	+					+	+	
ʃ	+					+	+	
z			+			+		+

Note1: since we deal with consonants, the chance of their appearance between two other consonants is too small. The same is for vowels: V___V is not a probable context.
Note2: Contexts C___, etc. can combine with word boundaries: C___#, V___#, #___C, #___V.
Note3: C___C overlaps with C___ and ___C; V___V overlaps with V___ and ___V.

The same chart shows that [z] is the only one to occur after a consonant, and it doesn't show between two vowels. Hypothesis1: '[z] is motivated by the preceding consonantal context'. If we look at the consonants before [z] in column3, every time it happens to be a nasal one.

As for the rest, this chart shows a lot of **overlaps,** in particular as far as the occurrence of [s] and [ʃ] is concerned. And this does not help because it suggests that the sounds are in *contrastive distribution*, and that we deal with three separate phonemes, whereas we ALREADY know that all three consonants form one phoneme. We need to look further.

Now we need to look closely at [s] and [ʃ]. They both occur before a vowel and intervocalically. So, *every time, there is a vowel after them*. Hypothesis2: it's a vowel quality that motivates change. The vowels that follow [s]: [a, æ, ə, o, u]. The vowels that follow [ʃ] are [e, i]:

	___a	___æ	___ə	___o	___u	___e	___i
s	+	+	+	+	+		
ʃ						+	+

According to vocalic context, [s] and [ʃ], are in **complementary distribution**.

If we compare the distribution of all three sounds, [s] has the widest distribution: it occurs before 5 vowels, while [ʃ] occurs before 2 vowels, and [z] appears only after a nasal consonant. Therefore, our phoneme is /s/, and the other two are its allophones.

We can first state the distribution in general symbols:

/s/ → {[ʃ], [z]} / {__ {e, i}, [+cons, +nas]___}

Now, we have to state the same but using the **features**…

Note: if there are vowels involved in the process, we need to make a *chart of the vocalic system* of the language in question and determine which *features* characterise it.

General hints concerning the environment that can trigger the change:

- **position in the word** (word initial segment, word final, C__, __V, etc.)
- **quality of the immediate segments** (high vowels, voiced consonants, etc.)
  - if a *consonant* is subject to a change, look if it regularly occurs in a consonant cluster. If yes, big chance that another consonant affects it. So look at the consonant quality.
  - If a consonant regularly occurs before a vowel, look at the vowel quality.
  - if a *vowels* changes, look at other vowels first, then if it doesn't help at the consonants.
- **position in a syllable** (Onset, Nucleus, Coda): languages have constraints as for the possible syllable structure and as for what's allowed to be in a Nucleus, Coda and Onset.
- **position regarding stress** (especially for vowels)

For a Non-Linear Representation:

It is not always possible to give a *general* non-linear representation. So, you need to take a *concrete* example from the data and illustrate what happens.

I. Represent:

a) the segment that undergoes the change

b) the segment that triggers the change

Note: you focus only on the node/ features involved in the process (zoom in), e.g. only Place node, Laryngeal node, Manner node, feature [back], etc.

II. In the segment that undergoes change find the feature that changes, **delink** it.
In the other segment find the feature that triggers the change, **spread** this feature.
Note: sometimes there is just spreading without delinking or the opposite.

III. Verify if the set of new features gives the combination supported by the data.