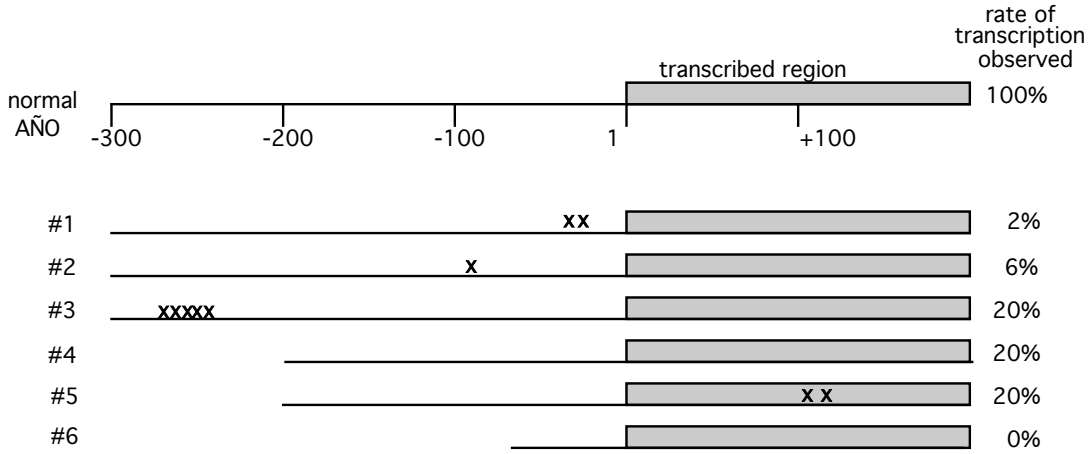
BC 378 **Problem Set #3**

Arabidopsis thaliana can normally grow quickly and complete its life cycle in less than two months. Plants homozygous for the *año* mutation, however, grow very slowly and take a whole year to mature. In order to learn more about the *AÑO* gene and its function, you have made a series of deletion and substitution mutations in the *AÑO* gene and have tested these altered versions for their ability to be transcribed. The constructs made are shown below. Each **x**



indicates that a single nucleotide has been altered to another one at that location.

After placing each of these gene constructs into transgenic plants and measuring the rate of transcription (shown above) it is time to interpret what the results mean.

1. What general type of regulatory element is likely to be present near –90? Explain.

It must be a critically important promoter element. A 1 nt change drastically reduced transcription and deletion of this element completely eliminates transcription.

2. What type of regulatory element is likely to be present between –200 and –300? Explain.

It must be an enhancer element. Even if this element is very badly mutated or completely deleted, the gene can still be transcribed reasonably well.

3. Why do you think that construct #1 had such a low level of transcription?

The TATA box (which is essential for transcription) has been ruined in this construct.

4. You have observed that transgenic plants containing construct #4 have 6 times as much *AÑO* mRNA as do transgenic plants containing construct #5. What is the most reasonable explanation for this result?

The mutations introduced into construct #5 have resulted in decreased mRNA stability. (Perhaps an RNA stability determinant has been ruined by the mutations.)