

- Fill out the following statements that are ALWAYS true about lac and trp operons.
 - Because these are negatively controlled systems, a repressor protein is present.
 - Whenever the repressor protein is bound to its binding site on the DNA, gene expression is turned off; therefore, transcription (can/cannot) take place.
1. Fill in the blanks below about the lac operon.
 - Because the lac operon is negative inducible, the lac operon is normally off, but can be turned on.
 - Under normal circumstances, the repressor protein is (bound/not bound) to the DNA. This turns transcription off. When lactose enters the cell, it is converted to allolactose and binds to the repressor protein and then the operator, which allows the repressor protein to (bind to/release) the DNA. This allows transcription to be turned on. When all of the lactose is metabolized in the cell, the repressor protein (binds to/release) the DNA, allowing transcription to be turned off.
 - When glucose levels are high, there is a low concentration of cAMP+CAP complex which (increases/decreases) the level transcription and translation and vice versa.
 2. Fill in the blanks below about the trp operon.
 - Because the trp operon is negative repressible, the trp operon is normally on, but can be turned off.
 - Under normal circumstances, the repressor protein is (bound/not bound) to the DNA. This causes transcription to be turned on. When tryptophan, a(n) (inducer/corepressor) is present in the cell, it binds to the repressor protein and creates the active repressor which (binds to/releases) the DNA. This allows transcription to be turned off. When all of the tryptophan is used in the cell, the repressor protein (binds to/releases) the DNA, allowing transcription to be turned on.
 3. Explain the conditions needed for attenuation to occur. What regions of the mRNA pair when attenuation does NOT occur?

Attenuation is the premature termination of transcription before the transcription reaches the structural genes.

High levels of tryptophan causes need for attenuation to occur. A hairpin loop between sequence 1+2 and 3+4 (attenuation structure) terminates transcription.

A hairpin loop between sequence 2+3 (antiterminator structure) prevents attenuation.