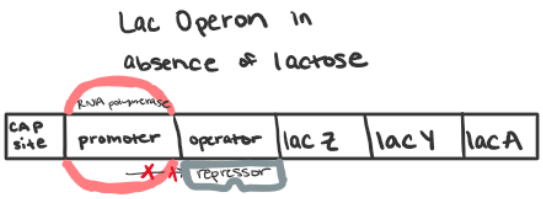
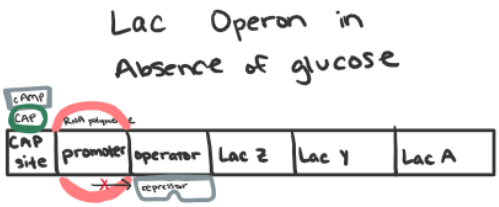
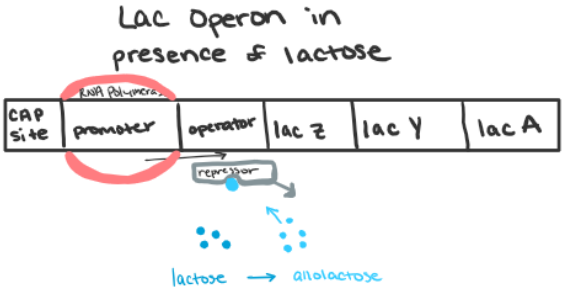
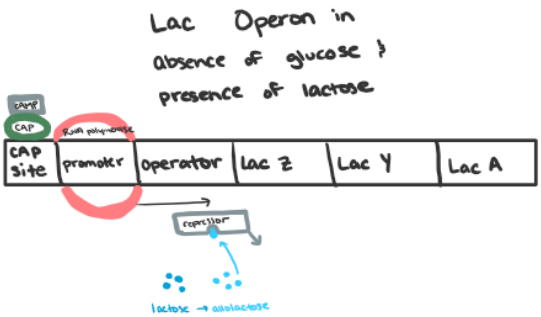
Emily Old

Lac Operon









Lac Operon in the Absence of Lactose: When lactose is absent, the repressor remains bound to the operator, preventing transcription by RNA polymerase.

Lac Operon in the Presence of Lactose: The lactose is rearranged into allolactose which binds to the repressor which allows it to detach from the operator. The RNA polymerase can now move along the operon and transcribe the genes since the repressor is no longer present on the operator.

Lac Operon in the Absence of Glucose: With glucose absent, the levels of cAMP are increased which ensures that CAP is active and binds to the CAP site. CAP aids the RNA polymerase in binding to the promoter.

Lac Operon in the Absence of Glucose and Presence of Lactose: The lactose is rearranged into allolactose which then binds to the repressor which releases the repressor from the operator. This release of the repressor allows the RNA polymerase to transcribe along the operon. Since glucose is absent, cAMP levels are increased, and CAP is active which binds to the CAP site. The CAP allows for high transcription because it aids the RNA polymerase in binding to the promoter.

This gene expression in the Escherichia coli lac operon is regulated in transcription to ensure that all materials are used efficiently. In the presence of certain molecules, for example lactose, the RNA polymerase will transcribe the structural genes but if there is no lactose then the genes will not be transcribed. This allows the body to conserve resources if the molecule is not present to be broken down in this catabolic operon.