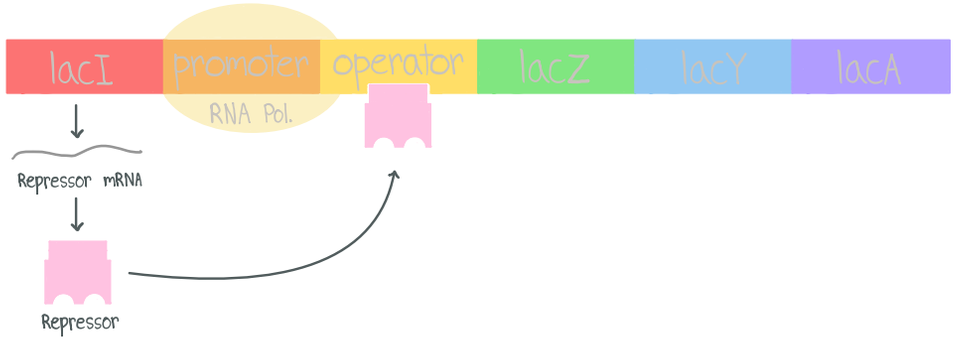
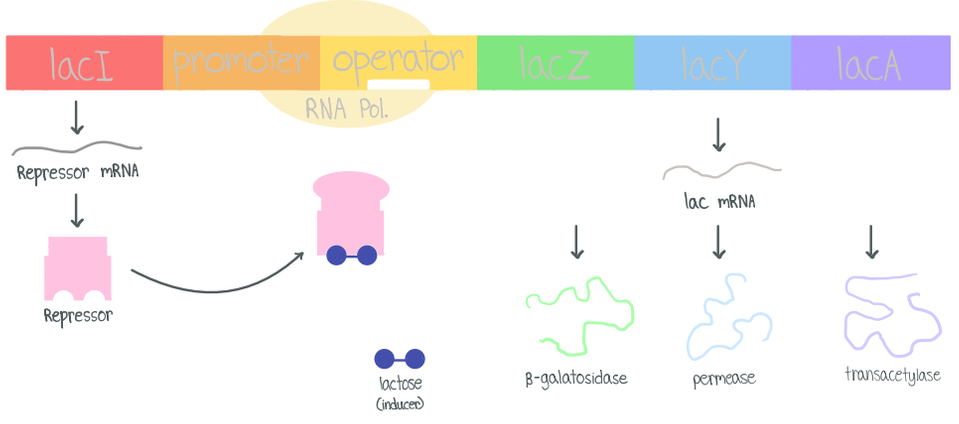
1) E.coli lac operon in the absence of lactose



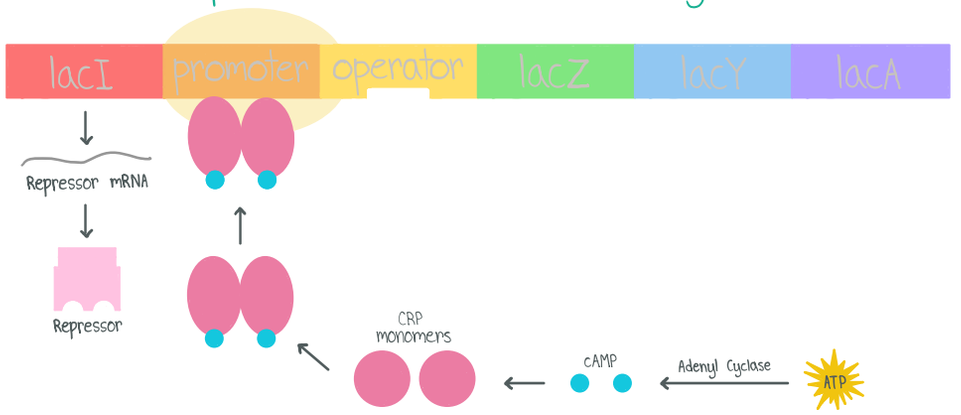
- Without lactose the repressor binds to the operator, preventing RNA polymerase from transcribing the operon, therefore not allowing gene expression to occur.

2) E.coli lac operon in the presence of lactose



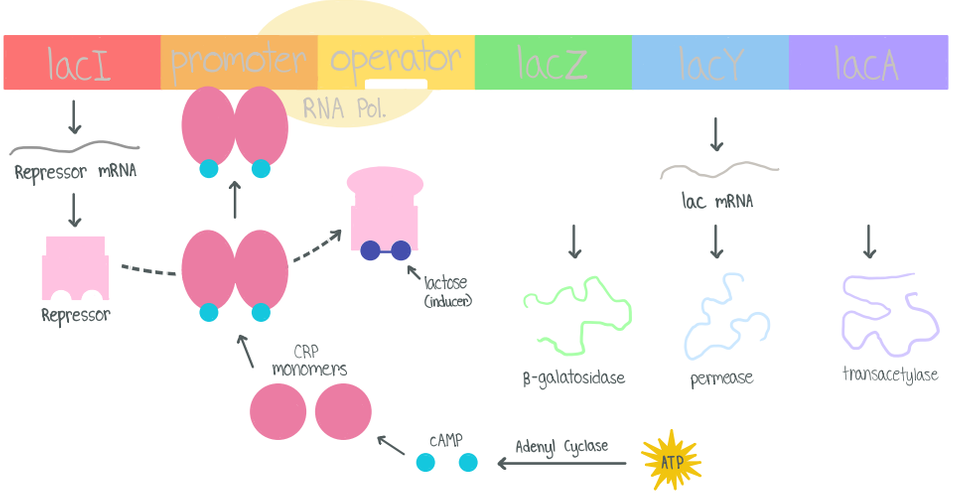
- With lactose present, it binds to the repressor causing a conformational change so that it can no longer bind to the operator. The promoter is now accessible and RNA polymerase can begin transcription, therefore allowing gene expression to occur.

3) E.coli lac operon in the absence of glucose



- With glucose absent, there is high availability of adenyl cyclase (which converts ATP to cAMP). cAMP binds to CRP (cAMP receptor protein) which then allows CRP to bind to the promoter. Doing so enhances RNA polymerase activity for expression of lac structural genes.

4) E.coli lac operon in the absence of glucose & presence of lactose



- With glucose absent cAMP binds to CRP (cAMP receptor protein) which then allows CRP to bind to the promoter. Doing so enhances RNA polymerase activity for expression of lac structural genes. Lactose present, binds to the repressor so that it can no bind to the operator. With this occurring, RNA polymerase can begin transcription, therefore allowing gene expression to occur.