CONCEPT: THE LAC OPERON

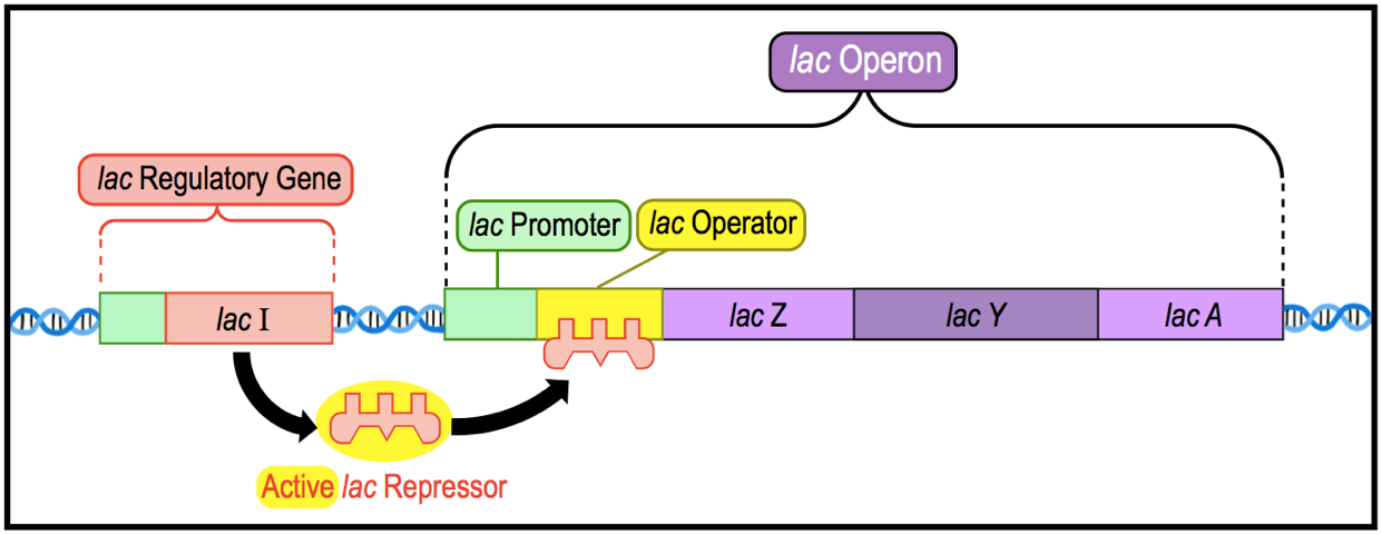
- _____ **Operon**: *inducible operon* with ____ genes encoding enzymes that metabolize lactose for energy:

  1) ***lac***____ 2) ***lac***____ 3) ***lac***____

  - □ Transcription & translation *require a lot of energy*, so cells only want to express lac operon genes when needed.

- The **active** *repressor protein* (_____) normally *represses* transcription when bound to *lac* _____.
  - □ Only in the presence of _____ (*& the absence of glucose*) is the lac operon transcribed.

EXAMPLE: The Lac Operon in E. coli contains a single promoter & 3 genes required for lactose metabolism.



PRACTICE: The protein that binds to the operator of the *lac* operon to prevent transcription is encoded by which gene?

a) *lac*I.
b) *lac*Y.
c) *lac*A.
d) *lac*Z.

PRACTICE: The *lac* operon is a(n) _____ operon that is typically _____.

a) inducible; induced.
b) repressible; repressed.
c) inducible; repressed.
d) repressed; inducible.

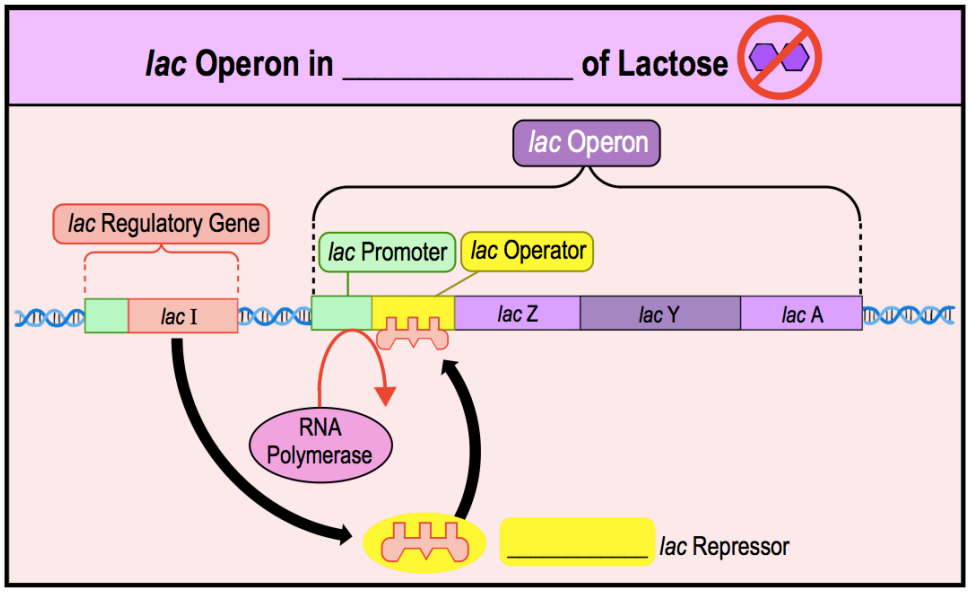
CONCEPT: THE LAC OPERON

In the Absence of Lactose

●When **lactose** is not available to metabolize, _____ *represses* the expression of genes in the *lac* operon.

□ **LacI** binds to the *lac* operator & blocks *RNA polymerase* from initiating _____.

EXAMPLE: In Absence of Lactose, LacI is Active & Blocks Transcription.



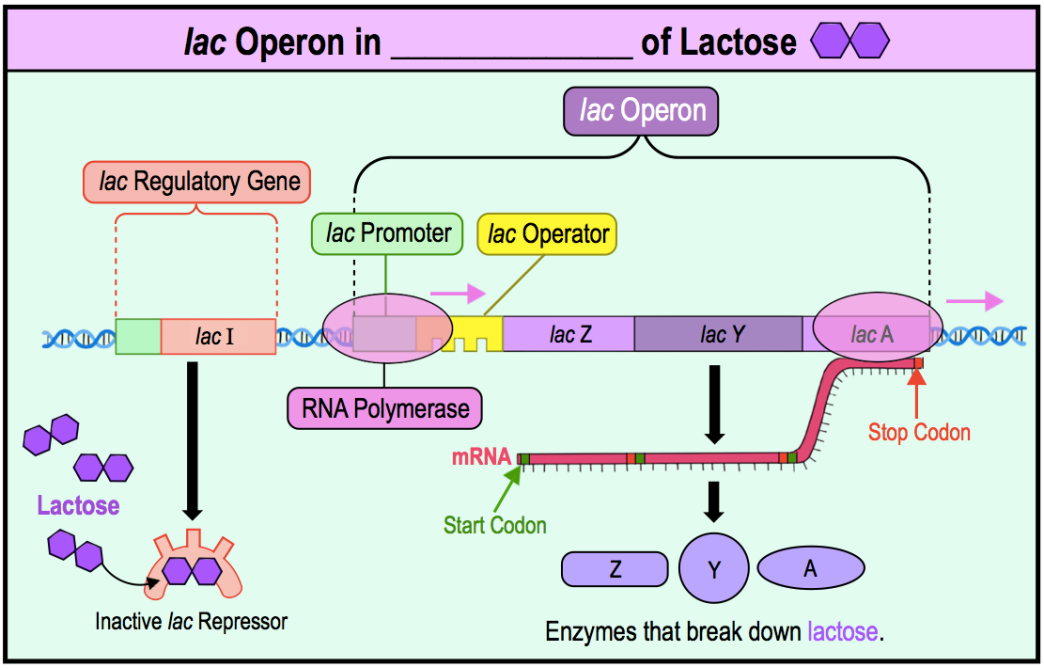
In the Presence of Lactose

●When **lactose** is readily available to metabolize, it acts as an _____ *molecule* in the *lac* operon.

□ A derivative of lactose binds & _____ *LacI* so it *cannot* bind to the *operator*.

□ Allows *RNA polymerase* to initiate transcription of the *lac* operon.

EXAMPLE: In Presence of Lactose, LacI is Inactive, Allowing for Lac Operon Transcription.



CONCEPT: THE LAC OPERON

PRACTICE: In the *lac* operon, which of the following functions does the lactose molecule serve:

a) It is the corepressor molecule.

b) It is the repressor molecule.

c) It is the inducer molecule.

d) It serves no function in regulating the *lac* operon.

PRACTICE: If *E. coli* bacteria are grown in the presence of lactose:

a) The repressor will bind the operator allowing transcription of the lac operon genes.

b) The repressor will not bind the operator preventing transcription of the lac operon genes.

c) The repressor will not bind the operator allowing transcription of the lac operon genes.

d) The repressor will bind the operator preventing transcription of the lac operon genes.