OPERON REVIEW NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Use your pool noodle operon to demonstrate the following then draw a picture below.
What happens to transcription at the lac operon when glucose levels are low and lactose levels is present and why? Include: RNA polymerase, repressors, and any other molecules needed to show how it works.

*lac OPERON*

 GENE TURNED ON

What happens to transcription at the lac operon when glucose levels are high and lactose is absent and why? Be sure to include: RNA polymerase, repressors and any other molecules needed to show the following:

 GENE TURNED OFF

Most of the time this operon is turned **ON OFF** (Circle one)

The *lac* operon is a **REPRESSIBLE INDUCIBLE** OPERON (Circle one)

When this operon is “turned on“ the repressor is **ACTIVE INACTIVE** (Circle one)

When this operon is “turned off“ the repressor is **ACTIVE INACTIVE** (Circle one)

When lactose is attached to the repressor, the repressor is **ACTIVE INACTIVE** (Circle one)

The regulation of this operon is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ control.

  **positive negative**

Inducible operons are most commonly associated with enzymes that function in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pathways. **catabolic anabolic**

Explain what happens to transcription at the lac operon and when lactose is present and WHY.

Use your pool noodle operon to demonstrate the following then draw a picture below.
Show & Tell to explain what happens to transcription at the *trp* operon when tryptophan levels are low.
Be sure to include: RNA polymerase, repressors, and any other molecules needed to show how this works.

*trp OPERON*

 GENE TURNED ON

Show & Tell to explain what happens to transcription at the *trp* operon when tryptophan levels are high.
Be sure to include: RNA polymerase, repressors and any other molecules needed to show the following:

 GENE TURNED OFF

Most of the time this operon is turned **ON OFF** (Circle one)

The *trp* operon is a **REPRESSIBLE INDUCIBLE** OPERON (Circle one)

When this operon is “turned on“ the repressor is **ACTIVE INACTIVE** (Circle one)

When this operon is “turned off“ the repressor is **ACTIVE INACTIVE** (Circle one)

Draw a picture of the repressor when it is **ACTIVE**:

When tryptophan is attached to the repressor, the repressor is **ACTIVE INACTIVE** (Circle one)

The regulation of this operon is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ control.

  **positive negative**

Repressible operons are most commonly associated with enzymes that function in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pathways. **catabolic anabolic**

EXPLAIN what happens to transcription at the *trp* operon when tryptophan is absent and why.

PICK AN OPERON: The operon I picked is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The operon you chose is similar to which of these operons? ***lac trp***(Circle one)

The operon you chose is **inducible repressible** (Circle one)

In a cell the repressor for your assigned operon is usually in the **active inactive** form. (Circle one)
 and the gene is turned **OFF ON** (Circle one)

DRAW PICTURES TO SHOW HOW YOUR ASSIGNED OPERON WORKS:

 TURNED ON

 TURNED OFF

DRAW YOUR OPERON ON A WHITE BOARD AND EXPLAIN TO THE CLASS HOW YOUR ASSIGNED OPERON WORKS.
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are the advantages of having genes organized into operons in prokaryotes?

How are structural genes different from regulatory genes?

How is the arrangement of genes different in eukaryotes vs prokaryotes?

COMPARE AND CONTRAST REPRESSIBLE AND INDUCIBLE OPERONS.
Fill in the chart to organize what you know about the *lac* and *trp* operons.

|  |  |  |
| --- | --- | --- |
|  Operon | *lac* | *trp* |
| Involved in regulating**anabolic** or **catabolic** pathways? |  |  |
| What structural genes are included in each operon? What does each produce? | GenesFunction | GenesFunction |
| This gene is usually**TURNED ON TURNED OFF** |  |  |
| The operon is **inducible** or **repressible** |  |  |
| Type of CONTROL **POSITIVE NEGATIVE** |  |  |
| The repressor is produced in an  **active** or **inactive** form |  |  |
| What conditions are necessary for the repressor protein to become ACTIVE? |  |  |

Regulatory sequence on an operon where RNA polymerase binds = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Regulatory sequence on an operon where the repressor binds = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chart modified from worksheet adapted by David Knuffke from worksheet/Pearson Education, Inc. © 2005**