

# DNA WORKSHOP: LEGO PRINTMAKING

# OVERVIEW

**OUTPUT 1: Visualizing a complete gene**

**OUTPUT 2: How fast can you replicate DNA?**

**OUTPUT 3: Nature vs Nuture**

# STEP 1: VISUALIZING A COMPLETE GENE

**Gene:** a unit of heredity that determines some characteristic of the offspring

**DNA:** a molecule that contains genetic information, double helix, made of the nucleotides A,G,C,T

**RNA:** genetic information that is translated from DNA, single-stranded, can leave the nucleus, tells how to make proteins

**DNA → RNA → PROTEIN → TRAIT**

**RNA Polymerase:** an enzyme that changes DNA into RNA, reads one side of the double helix

**Codon:** three nucleotide sequences that correspond to an amino acid

**Amino Acids:** the building blocks of proteins

# TAS2R38 GENE

The TAS2R38 gene is located on chromosome 7, and codes for a protein that senses a particular bitter compound.

There are 3 well-researched nucleotide variations that are tied to the expression of the gene. A change in a nucleotide changes the protein. Of course, there are hundreds of possible variations.

# WHAT IS YOUR GENOTYPE?

If you taste bitterness, you have the Dominant trait! That means you probably have the CCG genotype.

If you do not taste bitterness, you have the recessive trait! That means you probably have the GTA genotype.

# PRINTING THE GENE

1. Select your guide and set up your station.
2. Put the first color's dots in the plate.
3. Add paint to the dots.
4. Put your paper in the registration system.
5. Apply pressure.
6. Remove paper.
7. Clean the plate, and remove the dots.
8. Move on the next color.



**STEP 2:**  
**HOW FAST CAN YOU  
REPLICATE DNA?**

**DNA Replication:** a process that duplicates DNA, involves unzipping the strand and adding the complementary base pairs

**DNA Polymerase:** an enzyme that creates new DNA, can add 50 nucleotides in 1 second

**MiRNA:** short RNA sequences that regulate gene expression, cell differentiation, hsa-miR-182-5p

# PRINTING THE MiRNA

1. Follow the same printing steps as output one.
2. Four people will print at the same time, trying to print as fast and as accurately as they can, while I time you.
3. Don't be scared! The worse these prints are, the better! It just makes DNA polymerase seem cooler!

# **STEP 3:** **NATURE VS NUTURE**

**Nature vs Nurture:** a long-standing debate in psychology and biology about whether human traits and behaviors are primarily determined by genetics or by environmental influences

DNA will never be able to determine who a person is. There are countless moments, relationships, and factors that lead to us. Viewing genetics as the main determining factor is historically dangerous and should be avoided.

# PRINTING YOUR PLATE

1. Create a grid that expresses your personality or your creativity!
2. Follow the same printing steps as before.
3. Use whatever shapes and colors you would like to fill out your plate. Just try to keep it abstract- no letters or symbols.

**THANK YOU!**