DIY Air Force Activities:

Gummy Genetics

WOW DIY
WIZARDS of WRIGHT

Materials:

- large bag of gummy bears
- scissors or exacto knife
  *** Adult assistance may be required! ***
- paper
- index cards (you can also cut paper down to this size!)
- pen, pencil, or marker
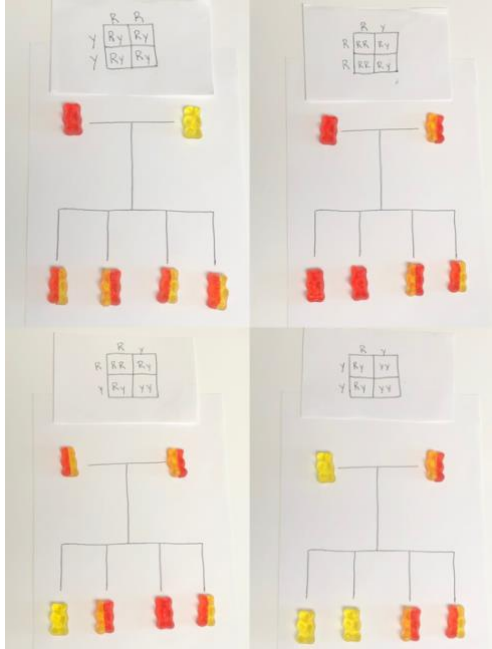
In our DNA Extraction DIY we talked about how DNA holds all of our genetic information. That long string of DNA contains a series of codes that determine our physical traits. These traits or features, like our eye or hair color, are passed to us by our parents. The characteristics we inherit are carried in the genes found in the **chromosomes** of our cells. **Genetics** is the study of these building blocks and how they make you the unique person you are!

Each parent contributes half of a gene, called an **allele**. A **genotype** is the combination of the two alleles that each person carries. The gene that is observed is called the **phenotype**! Some alleles are **dominant**, or stronger, (like brown eyes) and will always be expressed or shown. Others are **recessive**, or weaker, (like blue eyes) and will only be observed when both alleles are the same.
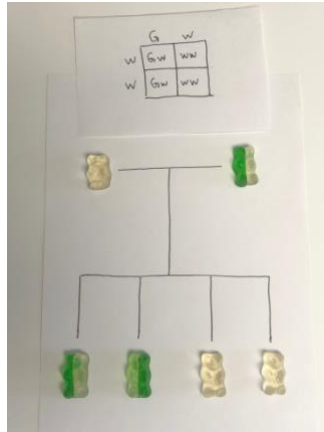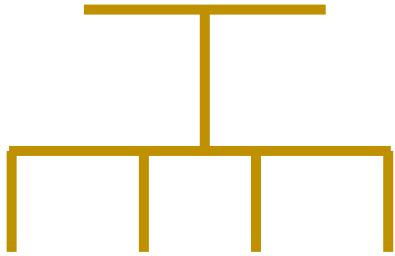
The history of genetics is rich and fascinating. A scientist named **Gregor Mendel** (considered to be the father of modern genetics) devised a way to figure out the possible gene combinations and make predictions about the resulting offspring. This technique is called a Punnett square, and is a lot simpler than you might think! He did his experiments with peas, but you will do yours with delicious gummy bears! Follow the instructions below to build a family tree!

1. Separate your gummy bears by color. Do some research to decide what traits (characteristics) you want each bear to represent. In the examples shown, red and yellow were selected for eye color. Red (R) was dominant, and meant brown eyes, and yellow (y) was the recessive gene for blue eyes. Green and white represented the bear's fur color. Green (G) was for brown fur and white (w) was for white fur! The dominant allele is capitalized and the recessive one is a lowercase letter.
2. Keep some of your bears whole (~3-4) and cut others into halves and quarters using scissors or an exacto knife. *****Be careful not to cut yourself, younger students should ask an adult for assistance!*****
3. Draw a family tree on your paper or use the one provided on the back. Build the parent bears you wish to explore. Begin simply by just exploring a single trait.
4. Now it's time to do a Punnett square! The diagram on the back will help you! On your notecards, draw a square, and then draw two lines to break that square into 4 boxes. Along the top write the alleles for 1 "parent," then along the side write the alleles for the other "parent." For example, an all red bear (representing brown eyes) is RR, and an all yellow bear (representing blue eyes) is yy. Complete your Punnett square and then build the offspring to create your family tree! Make a Punnett square and tree for each possible combination then try other traits! The image on the left will help!

Air Force Associations:

The Air Force Medical Genetics Center at Keesler Air Force Base in Biloxi, Mississippi is the only laboratory of its kind in the Defense Department. It houses genetics labs that focus on providing clinical and laboratory diagnostics services in support of the department of Defense worldwide. The key to finding a vaccine or effective treatment for a virus often lies in the virus's genetic code. Researchers here work hard to sequence the genome, and use that to develop effective preventative and treatment measures.

https://www.af.mil/News/Article-Display/Article/2182911/air-force-genetics-laboratory-dha-collaborate-to-further-sequence-sars-cov-2-co/

WIZARDS of WRIGHT
LEADERS IN STEM EDUCATION

|	G	w
w	Gw	ww
w	Gw	ww

To fill in the boxes, match the letter in each column and row! You can use the family trees on this page or draw your own! What traits will you investigate? Take notes on the process as well as the results! Don't forget to use a capital letter for the dominant allele and a lower case letter is for the recessive! The world of genetics is vast! To learn more, search for information on the bold underlined words these pages, as well as the **Human Genome Project**!
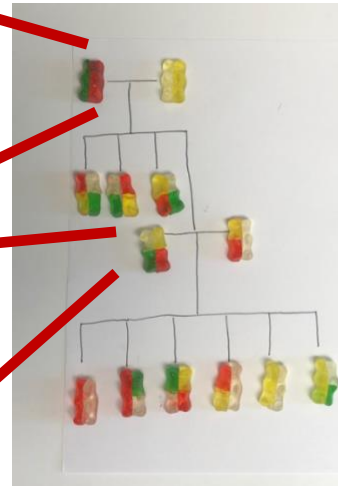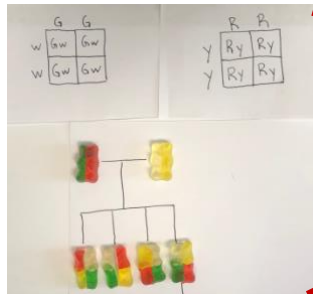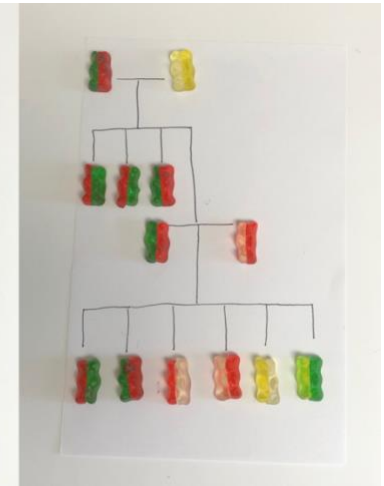
Genotype   **Phenotype**
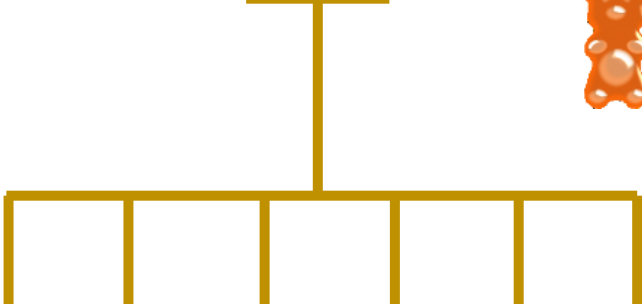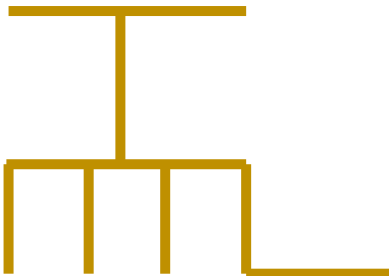
For an extra challenge, build a family tree with multiple traits. To do a more advanced family tree, break the problem into pieces and use the flash cards you made to work it out! This sort of bookkeeping helps you keep track of the details! The tree on the left shows the alleles present (genotype) and the one on the right shows the traits you would observe (phenotype)! If you have two of the same alleles you are considered **homozygous** for that trait; when you have two different alleles you are **heterozygous**! You must be homozygous for a recessive allele for it to be your phenotype.