April 7, 2017

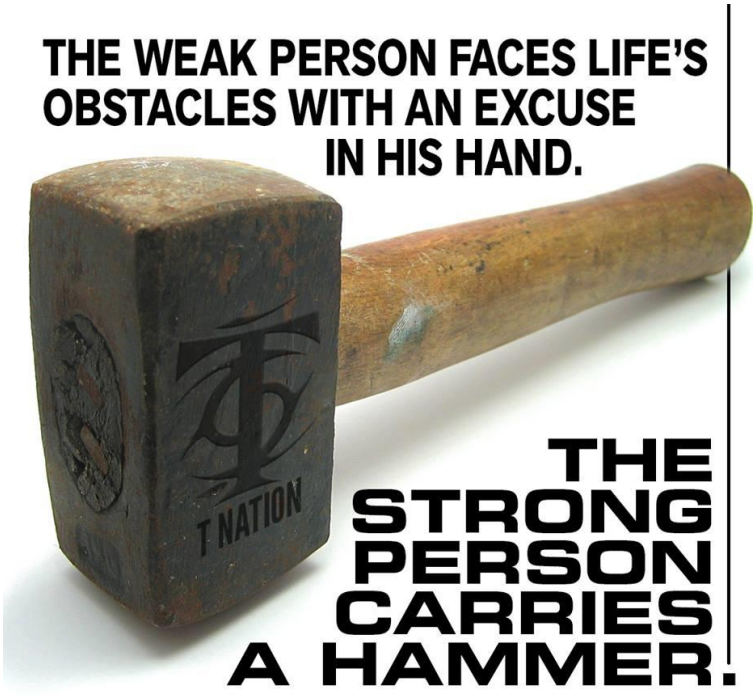
Aims:

✓ **SWBAT** explain how most traits are inherited.

Agenda

1. Do Now
2. Class Notes
3. Guided Practice
4. Independent Practice
5. Practicing our AIMS:
    - ✓ G.10-Types of Inheritance

How will you help our class earn all of our S.T.R.I.V.E. Points?



This is a BEASTIE unit!
Stay on top of HW!

Aim Check:

SCIENCE 8 Types of Inheritance G.10	**Name:** _____ **Date**: _____ **Homeroom:** _____	**Heredity**  ...aka why you're the cute one ☺

OBJECTIVES: By the end of class, students will be able to...

✓ **SWBAT** explain how most traits are inherited

DO NOW

1. In each case where Mendel crossed true breeding plants as parents, the offspring displayed only one of the two traits seen in the parents. This observation supports which principle of genetics?

   A. The law of segregation
   B. The law of independent assortment
   C. The law of dominance
   D. The law of allele frequency

2. This principle states that alleles separate during sex cell formation

   A. The law of segregation
   B. The law of independent assortment
   C. The law of dominance
   D. The law of allele frequency

3. The law of independent assortment states that

   A. Separation of the alleles during fertilization are independent of each other.
   B. Separation of the alleles during meiosis are independent of each other.
   C. Separation of the alleles during meiosis is independent of any environmental factors.
   D. Separation of the alleles during fertilization are independent of any environmental factors.

CLASS NOTES

In many ways Gregor Mendel was lucky in discovering his genetic laws. He happened to use pea plants, which happened to have a number of _____ traits that were_____.

In addition, for the traits he studied in his peas, one allele happened to be dominant for the trait and the other was a recessive form.

Things aren't always so clear-cut and "simple" in the world of genetics, but luckily for Mendel (and the science world) he happened to work with an organism whose genetic make-up was fairly clear-cut & simple.

TAKING IT UP A NOTCH

Mendel studied are controlled by genes with only two possible alleles. These alleles are either dominant or recessive.
Pea color is either green or yellow; height is either short or tall.

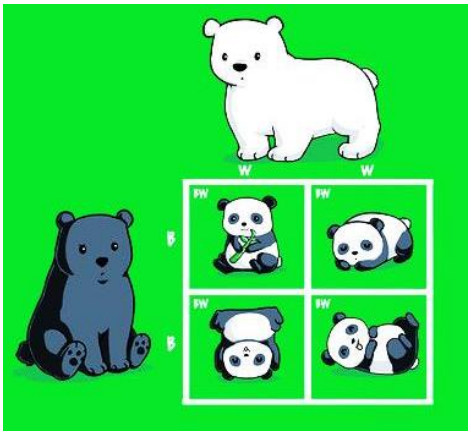
Most traits are the result of complex patterns of inheritance.

➔ INCOMPLETE DOMINANCE:_____

- **The resulting trait is somewhere** _____

➔ CODOMINANCE: _____

- The resulting offspring show both traits



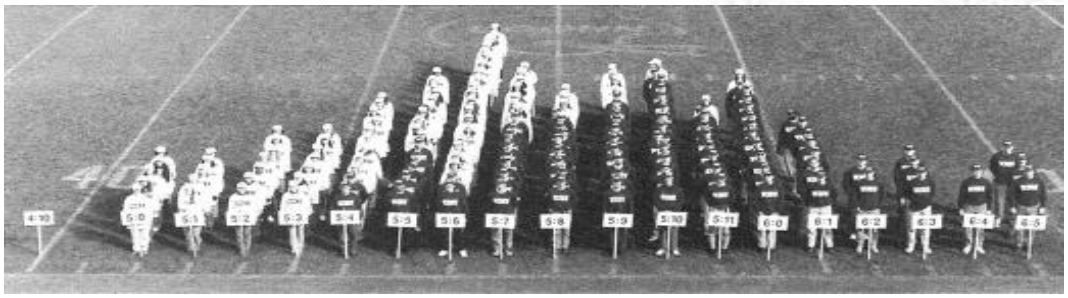
➔ MULTIPLE ALLELES: _____

- **Still, no matter how many possible alleles there are for a trait, an individual can only have two, one from each parent**

Phenotype	Genotype(s)
Blood Type A	
Blood Type B	
Blood Type O	
Blood Type AB	

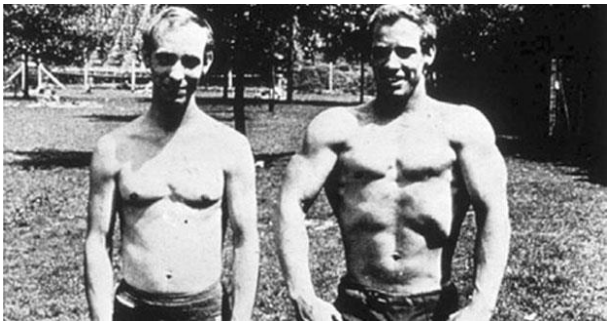
➔ POLYGENIC INHERITANCE: _____

- The alleles of different genes work together to produce these traits.



EPIGENTICS aka environmental effects

Otto and Ewald are two identical German twins, but you'd never know it by looking at them. Identical twins share virtually_____genetic material



How could they look so different?_____

_____

Specifically, the different ways they exercised and how it made their SAME genetic blueprint expresses itself differently.

So here's what's up: both twins are athletes.

Otto runs distance (_____), Ewald competes in the field events (_____), The different types of training resulted in two very different physical body types, even for a pair of humans with the exact same *genome*.

So what can we learn from looking at these twins?

_____

GUIDED PRACTICE

1. Identify whether each phenotype is the result of a DOMINANT/RECESSIVE, a CODOMINANT, or an INCOMPLETE DOMAINANCE relationship.

   a. A mother with a WIDOW'S PEAK and a father WITHOUT a widow's peak produce a child with a WIDOW'S PEAK. _____

   b. A mother with TYPE A blood and a father with TYPE B blood produce a child with TYPE AB blood. _____

   c. A flower with BLUE leaves is mated with a flower with YELLOW leaves and produces an offspring with GREEN leaves. _____

2. In the following scenarios R = RED flower color and r = WHITE flower color.
   a. If this is a dominant and recessive relationship identify what color flower you will see in each allele pair:

      i. RR: _____
      ii. Rr: _____
      iii. rr: _____

   b. If this is a CODOMINANT relationship, identify what color flower you will see in each allele pairing:

      i. RR: _____
      ii. Rr: _____
      iii. rr: _____

   c. If this is an INCOMPLETE dominance relationship, identify what color flower you will see in each allele pairing.

      i. RR: _____
      ii. Rr: _____
      iii. rr: _____

3. An imaginary insect called the Blingwing has three alleles for wing color: R (ruby red), S (sapphire blue) and T (topaz yellow).

   A. If an organism can inherit only two alleles for a gene, what are the six possible allele pairs for the bling on the wings?

   B. Suppose the three alleles are incomplete dominant. What wing color would each pair of alleles produce?

4. In humans, there are four *phenotypes* of blood: type A, type B, type AB, and type O.

   The alleles I^A and I^B are codominant to each other and the *i* allele is recessive to both I^A and I^B.

a. What possible genotypes will produce B type of blood? _____

b. What is the only genotype that will produce O type of blood? _____

c. What is the only genotype that will produce AB type of blood? _____

You are blood type O and you marry a person with blood type AB.

a. Complete a Punnett square for this cross.

b. List the possible blood types (phenotypes) of your offspring. _____

INDEPENDENT PRACTICE

In the following scenarios C = BLACK cat color and c = WHITE cat color.

1. If this is a dominant and recessive relationship identify what color cat you will see in each allele pair :
    i. CC: _____
    ii. Cc: _____
    iii. cc: _____

2. If this is a CODOMINANT relationship, identify what color cat you will see in each allele pairing:
    i. CC: _____
    ii. Cc: _____
    iii. cc: _____

3. If this is an INCOMPLETE dominance relationship, identify what color cat you will see in each allele pairing.
    i. CC: _____
    ii. Cc: _____
    iii. cc: _____

There are three possible genotypes and phenotypes for wing color in a species of moth:

RR = red wings; RY = orange wings; YY = yellow wings.

Use Punnett square B for the following questions:

4. What is the pattern of inheritance in this example? **(codominance/incomplete dominance)**

5. What are the *genotypes* and *phenotypes* of the parents?

	R	Y
R	RR	RY
R	RR	RY

Punnett square B

6. What *percent* of the offspring will have
    Red wings?
    Orange wings?
    Yellow wings?

Part 7: Incomplete Dominance or Codominance

In Four o'clock flowers the alleles for flower color are both equal therefore neither dominates over the other. We call this condition incomplete dominance or codominance and it violates Mendel's principle of dominance. A red four o'clock flower (rr) is crossed with a white flower (ww). Since there is no dominant trait we use two different little letters for the genotype.

Step 1: *The genotype of the red flower will be "rr" and the genotype of the white flower is "ww".*

Step 2 and 3: *Complete a Punnett square for this cross.*

	r	r
w	rw	rw
w	rw	rw

Step 4: *All of the offspring will be "rw". So the genotypic ratio is:* **4 : 0 : 0**
rw ww rr

Step 5: *All of the offspring will have one of each allele (rw), so all will be pink.*

1. **Predict the offspring when two pink Four o'clock flowers are crossed.**
   a. Complete a Punnett square for this cross.

   b. What is the predicted genotypic ratio for the offspring?

   b. What is the predicted phenotypic ratio for the offspring?

2. In humans straight hair (ss) and curly hair (cc) are codominant traits, that result in hybrids who have wavy hair (sc). Cross a curly hair female with a wavy haired male.
   a. Complete a Punnett square for this cross.

   b. What are the chances of having a curly haired child?

3. Suppose a newborn baby was accidentally mixed up in the hospital. In an effort to determine the parents of the baby, the blood types of the baby and two sets of parents were determined.

Baby 1 had type O Mrs. Brown had type B Mr. Brown had type AB
Mrs. Smith had type B Mr. Smith had type B

a. Draw Punnett squares for each couple (you may need to do more than 1 square/ couple)

b. To which parents does baby #1 belong? Why? *Hint you may want to refer to your Punnett squares.*

Incomplete Dominance

OOmpah LOOmpahs can have red, blue, or purple hair. The allele that controls this trait is INCOMPLETELY DOMINANT, where purple hair is caused by the heterozygous condition. Create a "key" for the genotypes and phenotypes of hair color.

_____ = Red Hair
_____ = Purple Hair
_____ = Blue Hair

1. Orville Oompah has purple hair and is married to Opal Oompah who brags that she has the bluest blue hair in the valley.

How many of Opal children will be able to brag about their blue hair also. _____
How many will take after their father? ____

2. One of Opal's children is born with shocking red hair.

Is Orville Oompah the father of this child? _____
But wait, Opal swears that she has been faithful, she claims the hospital goofed and got her baby mixed with someone else's. Is Opal the mother of the red haired child?

3. Olga Oompah has red hair and marries Oliver Oompah who has blue hair. They have 32 children. What is the color of these children's hair? _____

4. Olivia Oompah is married to Odo Oompah. Both of them have purple hair. They have 100 children. What is the hair color of their children and in what proportion?

Red _____ Blue _____ Purple _____

5. In the land of OOmpah, blue hair is highly valued. Blue haired OOmpahs get special benefits. Oscar Oompah has purple hair but he wants a wife that will give him children with blue hair.

What color hair should he look for in a wife? _____

If he can't find this type of Oompah what should be his second choice? _____

6. Ophelia Oompah is not married but she wants to have children. She goes to a fertility clinic where she is fertilized by an anonymous sperm donor. Ophelia has red hair. 5 months later, a litter of oompahs is born, of the eight babies in the litter, 4 of them have red hair, and 4 of them have purple hair. What color hair did the babies' father have? _____ (Show the cross)

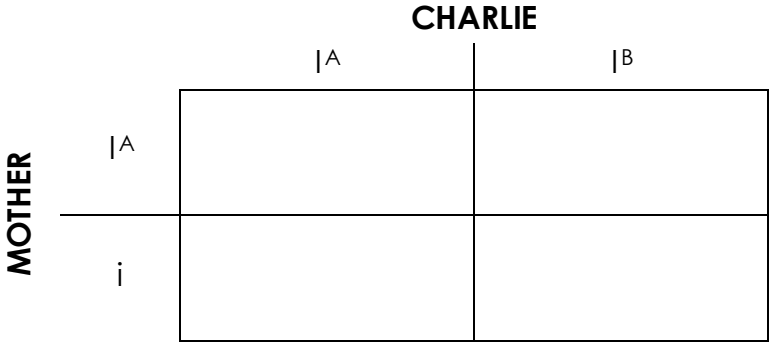
Science 8  G.10 Types of Inheritance	Name: _____ Date: _____ Homeroom: _____ Quick Notes:	SKILL SNAPSHOT Like A Scholar? Yes No Redo? Yes No

Directions: Support your selection by jotting down your reasoning.

Question	Reasoning
1. The pattern of inheritance in which both genes are expressed equally is A. codominance. B. incomplete dominance. C. multiple alleles D. polygenic inheritance.	
2. A particular trait has more than two possible alleles. This is an example of A. incomplete dominance. B. codominance. C. polygenic inheritance. D. multiple alleles.	
3. In snapdragons the gene for a pink flower is RW. This is an example of A. incomplete dominance. B. codominance. C. polygenic inheritance. D. multiple alleles.	
4. A cross of a red cow with a white bull produces roan (even expression of both red and white hair) offspring. This type of inheritance is known as A. incomplete dominance. B. codominance. C. polygenic inheritance. D. multiple alleles.	

In the 1950's, a young woman sued film star/director Charlie Chaplin for parental support of her illegitimate child. Charlie Chaplin's blood type was already on record as type AB. The mother of the child was heterozygous for type A and her son had type O blood.

5. Complete the Punnett square for the possible cross of Charlie and the mother.



6. The judge ruled in favor of the mother and ordered Charlie Chaplin to pay child support costs of the child. Was the judge correct in his decision based on blood typing evidence? Explain why or why not. **refer to your Punnett square to support your answer.*