

Name: _____

Date: _____

Catalyst/Bellringer: Read the passage below and then answer the questions.**Factors Affecting Population Size:**

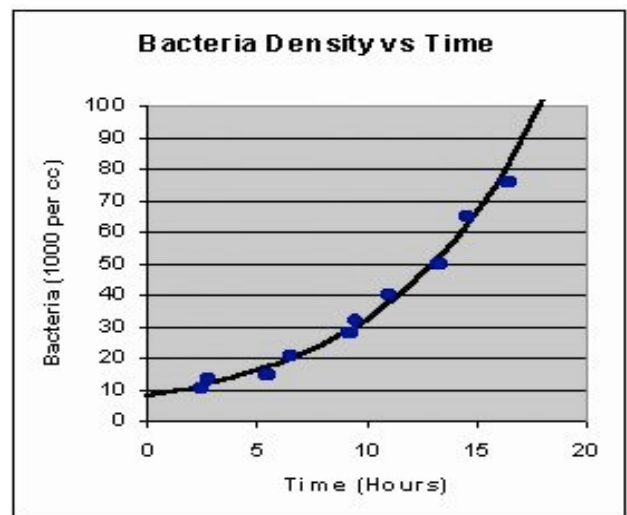
A population will increase if new individuals are added to it and decrease if individuals are removed from it. There are three main factors that determine if individuals are added to or removed from a population:

1. The number of births of new organisms
2. The number of deaths of existing organisms
3. The number of organisms that enter or leave the population

The movement of organisms into an area is known as **immigration**. The movement of organisms out of an area is known as **emigration**.

Exponential Growth:

The graph shows the growth of a population of bacteria over the course of several hours. Notice that the graph takes the shape of a **J-Curve**. This curve represents **Exponential Growth**, which occurs when the population of organisms doubles at a regular rate, for example, every 5 hours.

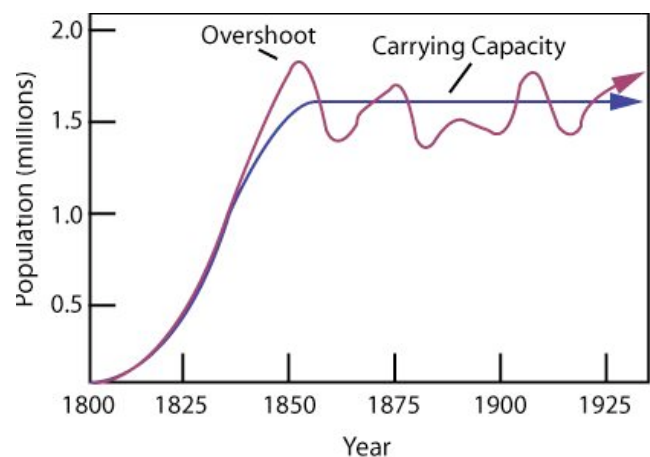
**Limiting Factors:**

Under ideal conditions and unlimited resources, a population will experience **exponential growth**.

Most populations, however, eventually **stabilize** rather than grow endlessly. Environmental factors that limit the size of a population are called **Limiting Factors**. In addition to the availability of food, other limiting factors include the availability of water, oxygen, and sunlight, as well as the relationships with other organisms (predation and competition) and the ability to remove waste. There are two types of limiting factors:

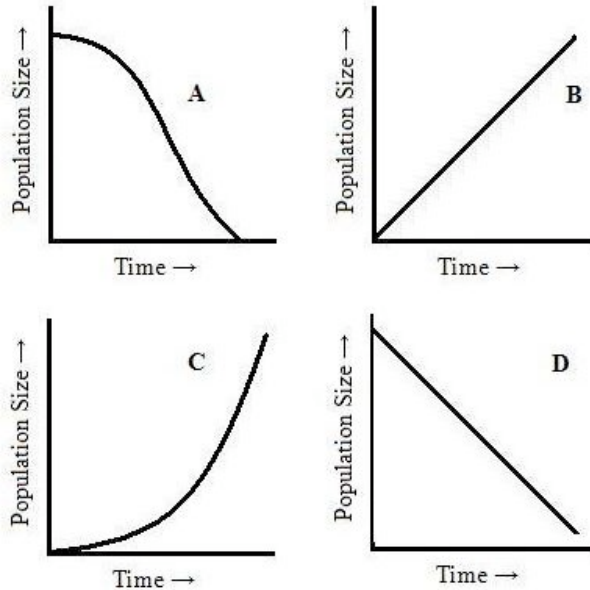
Carrying Capacity:

The largest population that a given environment can support over a long period of time is known as the **Carrying Capacity**. The carrying capacity of an environment is different for each species in varying habitats. Knowing the carrying capacity for an environment is important to conservationists trying to manage wildlife



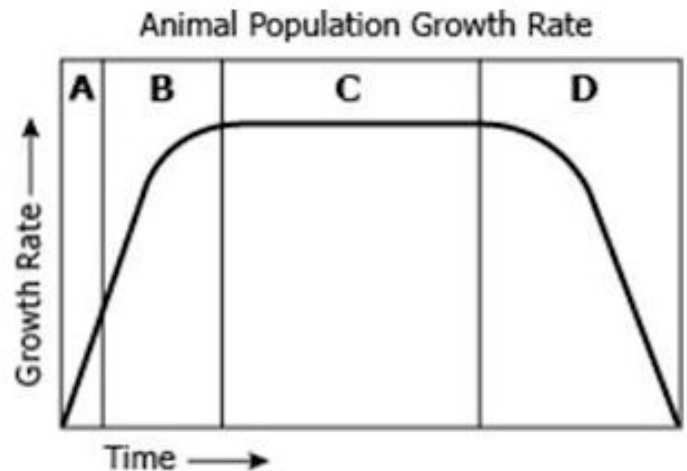
populations. Some organisms require large tracts of land to survive. Others can flourish in a small area. Biologists can use information about the carrying capacity to decide how much habitat must be conserved to foster healthy wildlife populations.

- The maximum number of members of a species that an environment can support is called its-
 a. carrying capacity b. abiotic factor c. biotic factor d. limiting factor
- Which graph depicts exponential growth a population? A B C D



3. In which time period is the birth rate and death rate of these organisms approximately the same?

- A. Time period D C. Time period A
 B. Time period C D. Time period B



4. What are some limiting factors that may influence the size of an isolated human population?

Objective: I can demonstrate my understanding of Genetics Concepts.
Homework: Study for your Biology SOL. It is Tuesday, May 22nd!!!!

SOL Top Facts to Know: Genetics!

1. Compare and Contrast DNA & RNA

	DNA	RNA
Nucleotide Structure		
Sugar		
Structure		
Nitrogen Bases		
Location in the Cell		

2. _____ makes exact copies of DNA.

a. Cells must _____ their DNA before they can divide for growth and repair.

3. Protein Synthesis: _____

4. The study of Genetics has it's own language:

a. Gene: _____

b. Allele: _____

c. Genotype: _____

d. Phenotype: _____

e. Homozygous: _____

f. Heterozygous: _____

g. Dominant Allele: _____

h. Recessive Allele: _____

5. Sometimes Genetics follows different rules. This is called _____

a. _____ inheritance occurs when both phenotypes are expressed in an individual. Example: _____

b. _____ inheritance occurs when a heterozygous genotype causes a third intermediate phenotype to appear. Example: _____

6. Comparing & Contrasting Cellular Division:

	Mitosis	Meiosis
What is it used for?		
How many times does the cell divide?		
Does it make cells that are haploid or diploid?		
Does it make identical or unique cells?		
Where does it happen in people?		

7. A _____ is a genetic family tree that traces the inheritance of a particular _____ through a family.

a. _____ represents a female without the trait. _____ represents a female with the trait.

b. _____ represents a male without the trait. _____ represents a male with the trait.

8. A _____ is a picture of chromosomes from an individual's cells. A normal human karyotype should have _____ chromosomes. The last pair of chromosomes are the _____.

a. Male sex chromosome: _____

b. Female sex chromosome: _____

Activity 1: DNA Flip-Flop

FLIP

Recall that the nucleus is a small spherical, dense body in a cell. It is often called the "control center" because it controls all the activities of the cell including cell reproduction, and heredity. The nucleus contains the cell's DNA, or deoxyribonucleic acid. DNA is called a nucleic acid because it was first found in the nucleus. DNA has the genetic instructions to build your body! How you look is largely determined by your DNA!

In 1953, Rosalind Franklin, James Watson and Francis Crick established the structure of DNA. The shape of DNA is a **double helix**, which is like a twisted ladder. The building blocks of DNA are **nucleotides**. Each nucleotide is made of a **deoxyribose sugar** (looks like a house) and **phosphate** (looks like a circle), and a nitrogen base (the middle of the ladder). In the middle of the ladder are pairs of 4 types of nitrogen bases. The bases are known by their letters *A, G, T, C*, which stand for *Adenine, Guanine, Thymine, and Cytosine*. The bases can occur in any order along a strand of DNA. The order of these bases is the code for building proteins.

Label the thymines **T**.



Label the adenines **A**.



Label the guanines **G**.



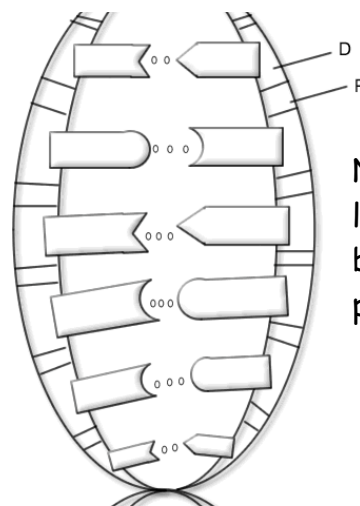
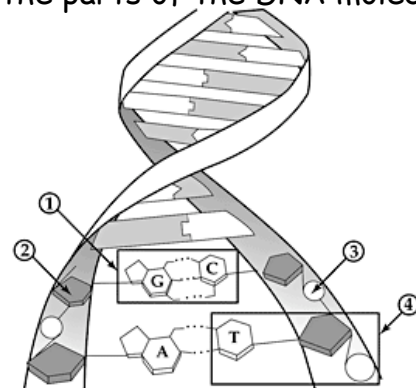
Label the cytosines **C**.

FLOP

1. Write out the full name for DNA.

2. Where in the cell is DNA located?

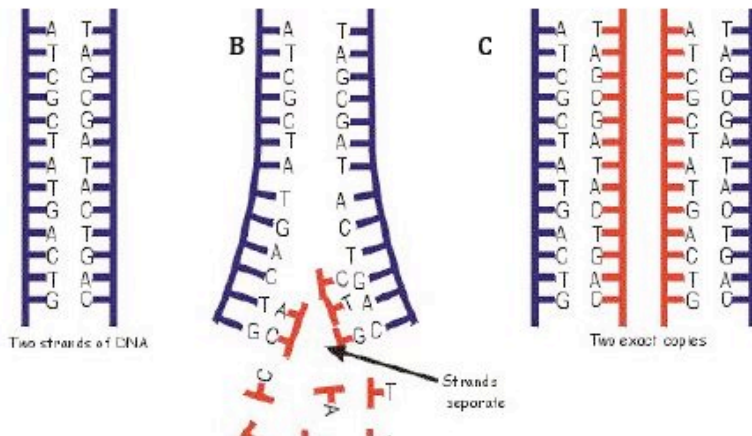
Label all the parts of the DNA molecule below.



Notice: Which letters (nitrogen bases) are always paired together?

Activity 2: DNA Replication

The figure below shows DNA replicating. In the space provided, describe what is occurring at each letter section of the figure.



A: _____

 B: _____

 C: _____

Activity 3: Protein Synthesis

		Second Base				
		U	C	A	G	
U	Phe	Ser	Tyr	Cys	U	
	Phe	Ser	Tyr	Cys	C	
	Leu	Ser	stop	stop	A	
	Leu	Ser	stop	Trp	G	
C	Leu	Pro	His	Arg	U	
	Leu	Pro	His	Arg	C	
	Leu	Pro	Gin	Arg	A	
A	Leu	Pro	Gin	Arg	G	
	Ile	Thr	Asn	Ser	U	
	Ile	Thr	Asn	Ser	C	
	Ile	Thr	Lys	Arg	A	
G	Met	Thr	Lys	Arg	G	
	Val	Ala	Asp	Gly	U	
	Val	Ala	Asp	Gly	C	
	Val	Ala	Glu	Gly	A	
	Val	Ala	Glu	Gly	G	

Genetic Code for Amino Acids

- Turn the DNA molecule below into an mRNA. Then use the genetic code chart on the left to determine the sequence of amino acids that will be created from the mRNA molecule.

TAC-GGT-ACG-AAC-CAG-GGA-TTT-GCC-ATA

_____-_____-_____-_____-_____-_____-_____-_____-_____-
 _____-_____-_____-_____-_____-_____-_____-_____-_____-

- What process converts DNA into mRNA?
 - translation
 - replication
 - transcription
 - amino acids
- What process converts mRNA into a protein?
 - translation
 - replication
 - transcription
 - amino acids

Activity 4: Vocabulary Review: Match the term with its correct definition or example.

- | | |
|-------------------------|---|
| 1. Homozygous | A. Bb |
| 2. Gene | B. Dominant disorder that affects the brain |
| 3. Heterozygous | C. Two alleles that are both uppercase or lowercase |
| 4. Dominant Allele | D. Recessive disorder that affects the lungs |
| 5. Huntington's Disease | E. A segment of DNA that codes for a protein |
| 6. Recessive Allele | F. A strong allele represented by an uppercase letter |
| 7. Homozygous Recessive | G. The pairing of two capital alleles |
| 8. Cystic Fibrosis | H. bb |
| 9. Homozygous Dominant | I. A weak allele represented by a lowercase letter |

Activity 5: Punnett Square Practice

Free earlobes are dominant to attached earlobes. A man and a woman who are both homozygous dominant are having a child.

Key: _____ = Free earlobes _____ = Attached earlobes **Parents:** _____ x _____

Answer:

What are the possible genotypes in the offspring?

What is the likelihood (%) of each possible genotype?

What are the possible phenotypes in the offspring?

What is the expected ratio of free to attached earlobes?

In humans, the allele for freckles (F) is dominant. The allele for no freckles (f) is recessive. One male with no freckles and one female with freckles had several children. All of the children had freckles. What is most likely the mother's genotype?

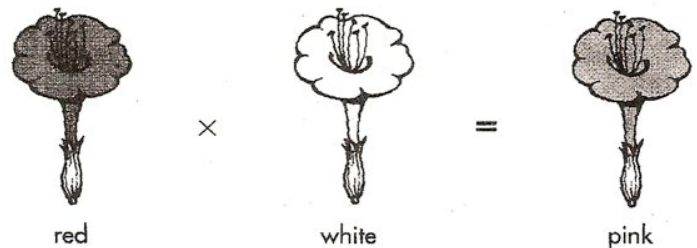
- A. FF
- B. ff
- C. Ff
- D. all of the above

Tay-Sachs disease is a recessive disorder that causes the brain and nervous system to break down. Children who are homozygous recessive for this allele (nn) rarely survive past five years of age. A man and woman who do not have Tay-Sachs disease had four children. One of children had Tay-Sachs. What are the parents' genotypes?

- A. TT and TT
- B. TT and Tt
- C. Tt and Tt
- D. Tt and tt

Activity 6: Complex Inheritance Punnett Squares

Not all characteristics of individuals result from purely dominant and recessive genes. In many cases both alleles for a single trait are expressed (you see a third phenotype). Such alleles show incomplete dominance, where neither allele is completely dominant or recessive. For example, in snapdragon flowers, alleles for red (r) and white (w) color together result in pink (rw) flowers.



Fill in the Punnett Square below for a cross between a red and a pink snapdragon. Use the allele "r" for red flower genes and the allele "w" for white flower genes. Then answer the questions below.

10. List all the different genotypes that are possible from this cross. How many are there? What is the genotype ratio?

11. List all the different phenotypes that are possible from this cross. How many are there? What is the phenotype ratio?

Activity 7: Mitosis vs. Meiosis: Identify if the following characteristics are related to mitosis, meiosis, or both by placing a “check” in the correct box(es)

CHARACTERISTICS	MITOSIS	MEIOSIS
A type of cell division		
Creates diploid (2N) cells		
Creates haploid (1N) cells		
Cell divides twice , producing four cells		
Cell divides once, producing two cells		
Makes gametes (sperm and egg)		
Makes somatic (body) cells		
Chromosome number stays the same (if you start with 46 chromosomes, you end with 46)		
Chromosome number is halved (if you start with 46 chromosomes, you end with 23)		
Associated with sexual reproduction		
Associated with asexual reproduction		
Daughter cells are identical to parent cell		
Mistakes can cause cancer		
Mistakes can cause Trisomy 21		

Steps to Calculating Chromosome Number

Use your 1N and 2N columns to figure out what you have and what you are trying to find
Use the following rules to calculate chromosome number:

1N 2N MULTIPLY BY 2

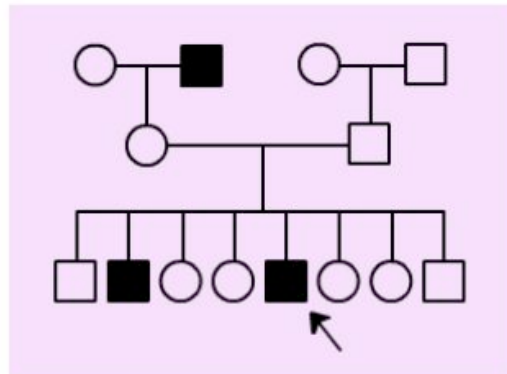
2N 1N DIVIDE BY 2

- 1. A human skin cell has 46 chromosomes. How many chromosomes will be in a human egg cell?**
- 2. An egg cell of a cockroach has 5 chromosomes. How many chromosomes will be in the fertilized zygote?**

3. A squirrel tail cell has 50 chromosomes. How many chromosomes are present an unfertilized squirrel egg cell?

Activity 8: Interpreting Pedigrees

A pedigree is a genetic family tree that traces the inheritance of a particular trait in a family. The following pedigree shows the inheritance of the genetic disease Phenylketonuria (PKU). Use the pedigree to answer the questions below:



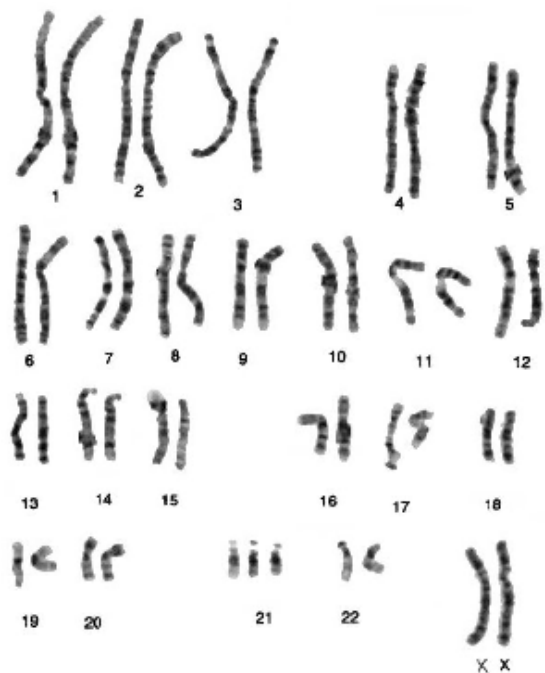
1. How many males are there in this family? _____
2. How many females are there in this family? _____
3. What does it mean if a circle or square is shaded? _____

4. How many males in this family have PKU? _____
5. How many females in the family have PKU? _____
6. Is PKU a dominant or a recessive trait? How do you know? _____

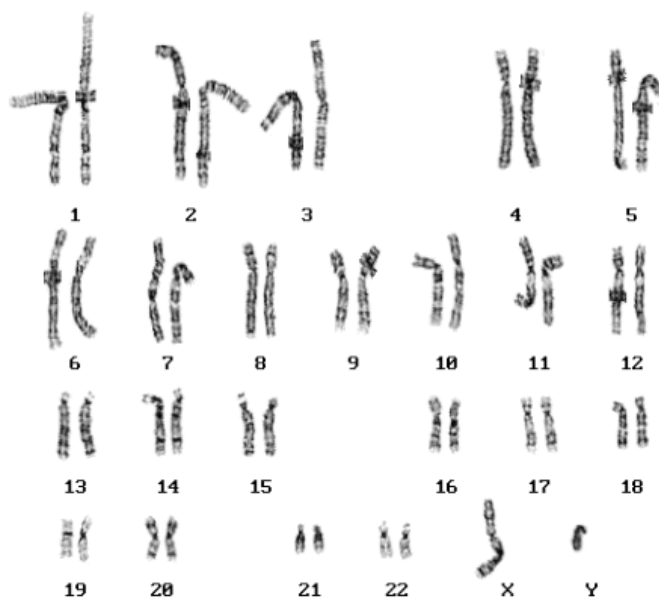
Activity 9: Reading Karyotypes

Directions: For each of the following karyotypes, determine the following:

1. What is this person’s sex – male or female?
2. Is this person normal, or do they have Trisomy 21 (Down Syndrome)



Male or Female?
Normal or Trisomy 21?



Male or Female?
Normal or Trisomy 21?

Activity 10: I've Finished Early...Now What?

1. Choose important vocabulary words and facts and make flashcards
2. Create a practice quiz with 10 questions
3. Get a blank piece of paper and create a ONE PAGER about this topic
4. Go to www.brainpop.com on your tablet. Find videos related to the topics in this packet. Watch the videos and try the quiz and activities at the end of each video.
Username: ccdis
Password: pop
5. Create a PowerPoint presentation to teach this topic to another student
6. Make a jeopardy review game about this topic!
Create at least 5 categories
In each category, you should make at least 3 questions (100 point, 200 point, and 300 point)
In each category, the three questions should get increasingly more difficult!
7. Re-read the SOL Top 10 Facts to know about this topic. Use a highlighter to highlight key words. Use a pen or pencil to put *s next to the facts you think you'll have the most trouble remembering. Come up with a memory device for each fact with a *. Write these memory devices on the page.
8. Go to JLab <http://education.jlab.org/solquiz/index.html> and complete practice SOL questions
9. Write a dialogue between two friends discussing this topic
10. Create a review poster to hang in the classroom about this topic.

THE EXPECTATION IS THAT YOU USE EVERY MINUTE OF CLASS TIME TO REVIEW FOR THE BIOLOGY SOL!