Genetic and Meiosis
Test Review

NAME: _____

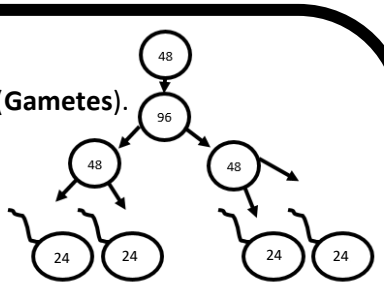
Test Date _____

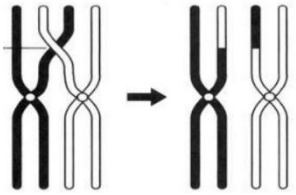
VOCABULARY

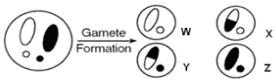
- Meiosis
- Crossing Over
- Gamete
- Somatic
- Haploid
- Diploid
- Heterozygous/Hybrid
- Homozygous/Purebred
- Recessive
- Dominant
- Phenotype
- Genotype
- Chromosome
- Insertion mutation
- Deletion mutation
- Substitution

Meiosis

- **Meiosis** Is the production and cellular division of sex cells (**Gametes**).
- Same steps of mitosis but goes through **2 divisions**
- **Haploid** cells are a result of meiosis. They have half the number of chromosomes.
- This is how you get half of your chromosomes from your mom and the other half from your dad.
- **Diploid** cells are **somatic** cells (all cells that are not sex cells) have full set of chromosomes.
- *****Crossing Over occurs in PROPHASE I and its purpose is to change the chromosome to increase genetic diversity.***
- Males continuously go through meiosis and produce sperm throughout their entire life.
- Females only experienced meiosis during development. Females are born with enough eggs for her entire life.







Monohybrids

Looking at the outcomes of ONE trait in an offspring.

NORMAL MONOHYBRID
Both Parents are Heterozygous for Brown Eyes

A = Brown Eyes
a = Blue Eyes

	A	a
A	AA	Aa
a	Aa	aa

3 Different Genotypes
AA : Aa : aa
1 : 2 : 1

2 Types of Phenotypes
Brown : Blue
3 : 1

What are the possible offspring of AA x aa? One parent can only pass on an A and one parent can only pass on an a. So all offspring must be Aa.

AA x aa
↓ ↓
Aa

all offspring are heterozygous (4:0)
100% (4:0) brown eyes, 100% (4:0) Aa

What are the possible offspring of Aa x aa? One parent can pass on an A or a and one parent can only pass on an a. So offspring are either Aa or aa (50:50)

	A	a
a	Aa	aa
a	Aa	aa

geno 1:1 (letters)
pheno 1:1 (eye color)

Dihybrids

Looking at the outcomes of TWO traits in an offspring.

Cross two bunnies that are hybrid long hair and hybrid black coats.

AA – long hair
Aa – long hair
aa – short hair

BB – black coat
Bb – black coat
bb – white coat

Get possible parent gametes:

AaBb x AaBb

AaBb

AaBb	AB	Ab	aB	ab
AB	AABB	AABb	AaBB	AaBb
Ab	AABb	AAbb	AaBb	Aabb
aB	AaBB	AaBb	aaBB	aaBb
ab	AaBb	Aabb	aaBb	aabb

All possible combinations of phenotypes:

Long hair, black coat = ?
Long hair, white coat = ?
Short hair, black coat = ?
Short hair, white coat = ?

Long hair, black coat = 9
Long hair, white coat = 3
Short hair, black coat = 3
Short hair, white coat = 1

Remember your short cut: If the parent genotype is repeated on the outside of the Punnett square, you can mark through that row or column.

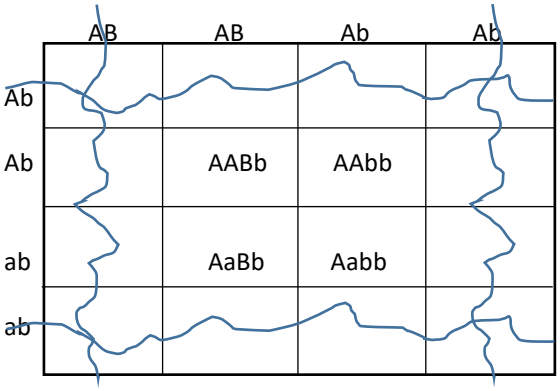
Cross a homozygous long hair, heterozygous black bunny with a heterozygous long hair, white bunny.

AA – long hair
Aa – long hair
aa – short hair

BB – black coat
Bb – black coat
bb – white coat

Get possible parent gametes:

AABb x Aabb



Long hair, black coat = ?
Long hair, white coat = ?
Short hair, black coat = ?
Short hair, white coat = ?

Long hair, black coat = 2
Long hair, white coat = 2
Short hair, black coat = 0
Short hair, white coat = 0

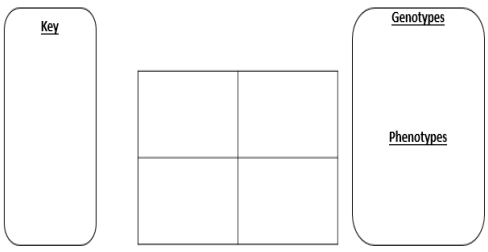
(HINT: look at parent AABb, the ONLY hair length allele it will pass on is a capital A to all the offspring, so ALL will have long hair! ☺

MIEOSIS QUESTIONS:

1. The purpose of meiosis is to increase _____ by creating gamete cells with _____ the number of chromosomes.
2. If an organism has somatic cells with 28 chromosomes, how many chromosomes will it have in its gamete cells? _____
3. If a male's sperm contains 12 chromosomes, how many chromosomes will one of his brain cells have? _____
4. What happens in Prophase 1 that leads to an increase in genetic diversity? _____
5. How does the chromosome number in gametes compare to the parent cell? _____
6. How many gamete cells will result from meiosis? _____
7. Meiosis is an example of _____ (asexual or sexual) reproduction.
8. How does crossing over contribute to offspring having genetic variation (different genes from each other)? _____
9. How does a mutation in a gamete's DNA affect offspring? _____

GENETICS PROBLEMS:

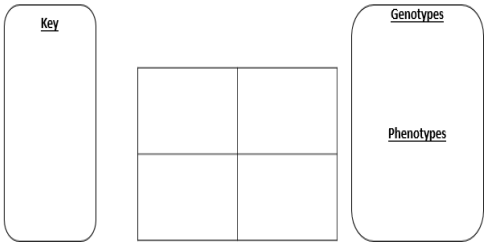
Cross two hybrid (Bb) red roses (red is dominant to white). Predict how many different phenotypes and genotypes will be in their offspring.



# of genotypes _____
# of phenotypes _____

Blue parakeets are dominant over yellow parakeets, cross a heterozygous (hybrid) blue parakeet with a yellow one. What are the parent genotypes?

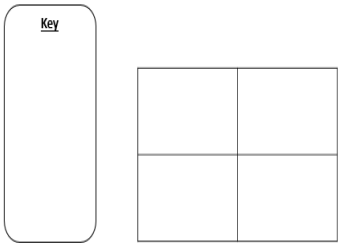
Mom: _____
Dad: _____



What % of offspring will look like mom?_____

What genotypes would two brown eyed parents have to be to have a blue eyed child? Brown (B) is dominant over blue (bb).

Parents: _____ X _____



Red seahorses are dominant over blue seahorses and a long dorsal fin is dominant to a short dorsal fin. Cross a hybrid (heterozygous) red, long finned (also heterozygous) seahorse with a blue heterozygous long finned seahorse. What is the phenotypic and genotypic ratio of the offspring?

Key

Genotypic ratio: _____

Phenotypic ratio: _____

B – five toes R – green skin
b – four toes r – blue skin

Try answering the following without making a Punnett Square?

If BBRr and Bbrr are crossed, how many toes will all their offspring have? _____ How can you tell?

_____

If Bbrr and Bbrr are crossed will all the offspring have blue skin? _____ How can you tell?

_____

In dihybrids, if both parents have all heterozygous traits (BbRr X BbRr), what will the phenotypic ratio of the offspring ALWAYS be?

PRE- AP only:

Draw a pedigree. A man and woman have four kids, the two oldest are girls, the two youngest are boys. The youngest boy marries a girl and they have two boys. The oldest girl marries a man and they have two girls.

The original parents are both homozygous dominant (RR). The two individuals that married into the family are homozygous (rr). Assign alleles to all individuals.