WLHS / Biology / Unit 6 – Genetics / Monson

Name_____
Date_____Per_____

1) Compare the processes of MITOSIS and MEIOSIS:

	MITOSIS…	**MEIOSIS…**
How many daughter cells are produced?		
If the parent cell has 22 chromosomes, how many chromosomes are in the daughter cells produced?		
Are cells produced diploid or haploid?		
Does crossing over occur?		
If crossing over does occur, WHEN does it happen?		
What is the reason or purpose for producing the daughter cells? (what are they used for?)		
How similar are the daughter cells to the parent cells?		
How similar are the daughter cells to each other?		
How many phases are in each process? (list them)		
WHERE in an animal's body does this process occur?		

2) More MEIOSIS questions:

- ➔ what happens during crossing over?_____
- ➔ in what phase do the homologous pairs of chromosomes separate?_____
- ➔ in what phase do the sister chromatids separate from each other in MEIOSIS?_____
- ➔ what is the SYMBOL used to show DIPLOID?_____ HAPLOID?_____

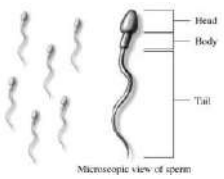
3) DEFINITIONS:

- multiple alleles:_____
- polygenic traits:_____
- codominance:_____
- incomplete dominance:_____
- gene:_____
- allele:_____
- homozygous:_____
- heterozygous:_____
- autosomal:_____
- sex-linked:_____

4) a) What is the chromosome number of a normal diploid human somatic (body) cell?_____

b) What is the haploid number for human cells?_____

c) How many chromosomes should a normal human sperm cell carry?_____



Microscopic view of sperm

GENETICS PROBLEMS:

1) In pea plants, pod color is an **AUTOSOMAL** trait. Green pods are dominant to yellow pods. A homozygous green pod plant is crossed with a homozygous yellow pod plant. Show the cross in the Punnett Square below.

CROSS:_____ X _____.

What percentage of the offspring are green?_____

What is the **GENOTYPE** ratio of the offspring?

_____

2) Now cross 2 of the offspring from the previous problem. Show the cross and complete the Punnett Square.

CROSS:_____ X _____.

Circle the square(s) which will be the YELLOW pod pea plant.

What is the **PHENOTYPE** ratio of the offspring?

_____

3) You are continuing your study of pea plants and will now conduct a DIHYBRID cross. In addition to the pod color trait in the previous problems (green is dominant to yellow), you also know that tall plants are dominant over short plants. Cross 2 plants, both of which are heterozygous green pod color and heterozygous tall.

CROSS:_____ X _____.

List the 4 gamete combinations possible in each parent: _____ _____ _____ _____

What is the phenotypic ratio of the offspring? (list below):

4) You've isolated 2 PUREBRED marigold flowers: a red marigold, and a yellow marigold. You conduct a cross between these two flowers, and find the hybrid (heterozygous) offspring are all ORANGE!

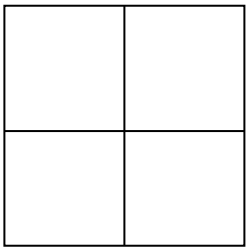
A) Why are they all orange?_____

B) List the genotypes and phenotypes of all 3 flower types (both parents and the offspring) described in this cross.

	GENOTYPE:	**PHENOTYPE**:
Parent 1:	_____	_____
Parent 2:	_____	_____
Offspring:	_____	_____

C) Now cross 2 orange marigolds. Show the cross and complete the Punnett Square below.

CROSS:_____ X _____.



What is the **GENOTYPE** ratio of the offspring?

_____

What is the **PHENOTYPE** ratio of the offspring?

_____

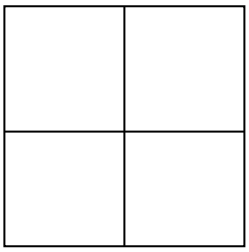
5) If marigolds had phenotypes of RED flowers, YELLOW flowers, and RED & YELLOW flowers:

➔ what type of inheritance is this?_____

➔ what are the genotypes of each? _____ _____ _____

6) Human Blood Groups (MULTIPLE ALLELES): David, who has type O blood, is married to Mary, who has type AB blood. Show the cross and Punnett Square:

CROSS:_____ X _____.



What blood types can their children have?

_____

Their fourth child is born with type AB blood. David accuses Mary of being unfaithful! Is he right? Explain.

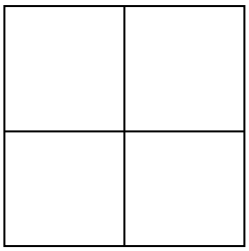
_____

7) A cross between a blue bird and a yellow bird produces what appears to be all green offspring. **Upon closer inspection, the green offspring actually have individual blue and yellow feathers.**

A) What pattern of heredity is being exhibited***? (read the problem CAREFULLY!)***_____

B) Cross a "green" bird with a yellow bird. Give all possible genotypes and phenotypes of the offspring.

CROSS:_____ X _____.



What if the **GENOTYPE** ratio of the offspring??

_____

What is the **PHENOTYPE** ratio of the offspring?

_____

8) In fruit flies, eye color is a sex linked trait located on the X chromosome. Red eye color is dominant over white color. Cross a red-eyed male with a heterozygous red-eyed female fly.

CROSS:_____ X _____.

What is the probability that a male will be white eyed?_____

What is the probability that a female will be white eyed?_____

What is the probability that a female will be a carrier?_____

9) Freckles are dominant to plain skin and the freckle gene is on an autosomal; hemophilia (a disease in which blood doesn't clot properly) is a sex-linked, recessive trait. A woman with plain skin and normal blood clotting (long family history of plain skin, but her dad was a hemophiliac) marries a man with freckles and hemophilia. **They have a hemophiliac son with plain skin.**

A) What is the son's genotype?_____

B) What are the parents' genotypes? MOM:_____ DAD:_____

C) What gametes can the parents make?

- ➔ MOM: _____ _____ _____ _____
- ➔ DAD: _____ _____ _____ _____

D) Do a Punnett Square showing a cross between these 2 parents.

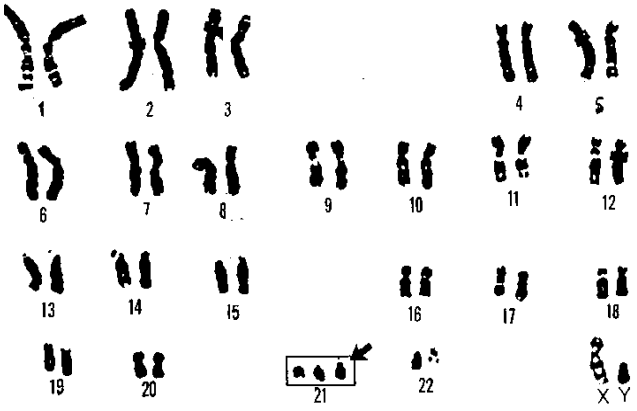
What is the chance they will have a DAUGHTER who has hemophilia AND has freckles?

_____

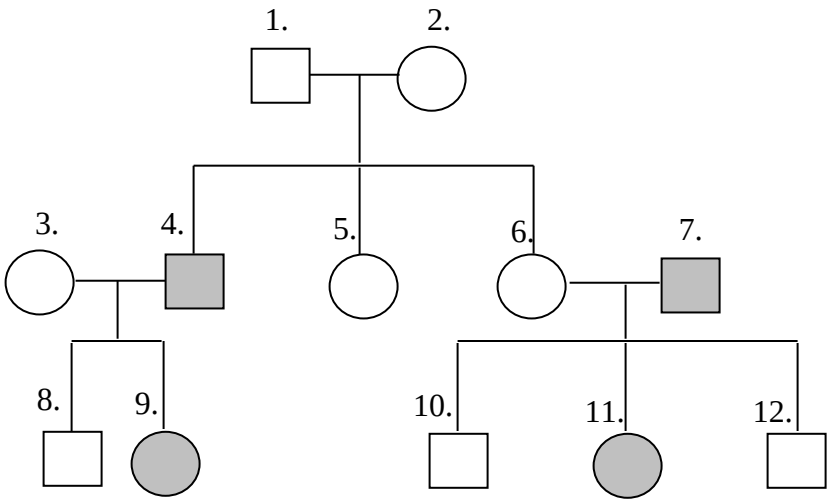
10) What is this picture called?_____
Identify whether or not this individual is male or female, and whether or not there are any chromosomal abnormalities.

SEX:_____

PROBLEMS?_____



11) The pedigree below shows the inheritance of ALBINISM. Shaded in circles or squares indicate affected individuals.

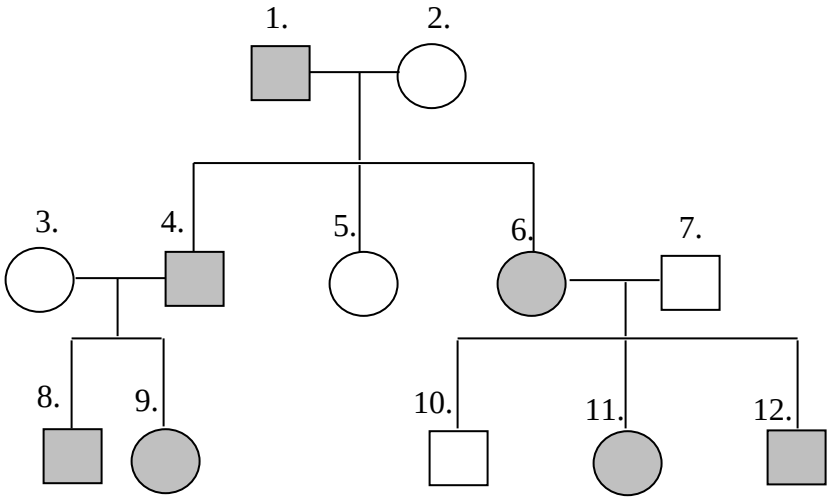


a) Is this trait sex-linked or autosomal? Is it inherited in a dominant or recessive fashion? ***How do you know?***

---

b) Next to each circle / square, list the genotypes for all of the individuals in the family (if there is more than one possible genotype, write all possibilities)

12) The pedigree below shows the inheritance of **HUNTINGTON'S DISEASE**. Individuals with this trait will suffer from a deterioration of their nervous system. The typical age of onset is age 35-45 (so, most people by this age will have had children). Shaded in circles or squares indicate affected individuals.



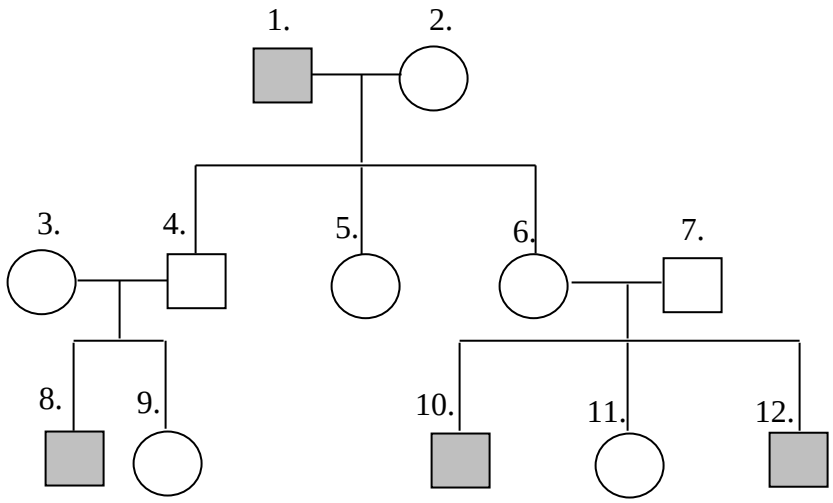
a) Is this trait sex-linked or autosomal? Is it inherited in a dominant or recessive fashion? ***How do you know?***

---

b) Next to each circle / square, list the genotypes for all of the individuals in the family (if there is more than one possible genotype, write **all** possibilities)

(one more pedigree problem on the next page!)

13) The pedigree below shows the inheritance of **HEMOPHILIA**. Individuals with this produce an abnormal blood clotting factor, resulting in blood that does not clot properly. Shaded in circles or squares indicate affected individuals.



a) Is this trait sex-linked or autosomal? Is it inherited in a dominant or recessive fashion? ***How do you know?***

---

b) Next to each circle / square, list the genotypes for all of the individuals in the family (if there is more than one possible genotype, write **all** possibilities)