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BIO120HYBR2

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Biology lab 10: Genetics

1. If a man homozygous for widow's peak (dominant) reproduces with a woman homozygous for continuous hairline (recessive), what are the chances of the children having a widow's peak? A continuous hairline? KEY

Male: WW

Female: ww

Ww	Ww
Ww	Ww

Genotype - Ww; Ww

Phenotype - all the children will have widow's peak (100% chance). Chance of a straight line is zero.

2. A son with cystic fibrosis is born to a couple who neither has cystic fibrosis. Cystic fibrosis is inherited as an autosomal recessive disease. What are the chances that any child to this couple will have cystic fibrosis?

Male: cc



Female: cc

cc	cc
cc	cc

The chance of having a child with cystic fibrosis is zero.

3. Huntington's disease is caused by a dominant allele found on an autosome (not a sex chromosome). A man who is heterozygous for Huntington's disease reproduces with a woman who does not have the disease. What are the chances that a child will inherit the allele for Huntington's disease? If the child does inherit the allele, what are the chances that she or he will pass it on?

Male: Hh

Female: hh

Hh	Hh
hh	hh

The chances to inherit the allele 50%.

The chances of passing this allele are 50%.

4. In humans, the ability to taste phenylthiourea (PTU) is dominant. "Tasters" perceive a bitter taste from PTU, while "non-tasters" experience no bitter taste. What are the genotypes of Mr. and Mrs. Coleman who can both taste PTU, and who have three children, one of who is a non-taster?

Male: Tt

Female: Tt

TT	Tt
Tt	tt

Genotype of non - taster is tt

For homozygous male taster and heterozygous female taster

TT	Tt
TT	Tt

All offsprings will be tasters

For a heterozygous taster and non-taster

Tt	Tt
tt	tt

The phenotypes of offsprings will be 50% tasters and 50% non-tasters.

5. Coat colors of the Shorthorn breed of Cattle represent a classical example of codominant alleles. The red allele and white allele are codominant which results in cattle with roan color when both alleles are present. If roan Shorthorns are crossed among themselves, what phenotypic results are expected in the offspring?



Parents: SS

SS	SS
SS	SS

All the offsprings will have coat colors.

6. Human eye color was once thought to be controlled by a single gene: Brown (B) dominant over blue (b). It is now known that eye color is polygenic. Assuming simple Mendelian inheritance (one gene – not polygenic), can a brown eyed parents have a blue-eyed child?

Male: Bb

Female: Bb

BB	Bb
Bb	bb

Brown eyed parents can have a blue eyed child if both parents are heterozygous for brown color.

It would also be possible for blue eyed parents to have a brown eyed child when both parents are heterozygous for blue color.



7. Brown fur is dominant to white fur in mice. A mouse with brown fur (Mouse 1) is mated with a white furred mouse (Mouse 2) and all ten of the offspring had brown fur. When Mouse 3 (also brown phenotype) was mated with Mouse 2 (white fur), some of the offspring had white fur.

Determine the probable genotype of each of the mice.

Mouse 1: BB

Mouse 2: bb

Bb	Bb
Bb	Bb

All the offsprings were brown.

Mouse 3: Bb

Mouse 2: bb

Bb	Bb
bb	bb

Half of the mice will be brown and the other half will be white.

Male: BB

Female: Bb

BB	Bb
BB	Bb



All phenotypes are brown. 50% homozygous, 50% heterozygous.

Male: BB

Female: bb

Bb	Bb
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Bb	Bb
----	----

All offsprings will be brown.

8. In radish plants, the shape of the radish may be long (LL), round (ll) or oval (Ll). If oval is crossed with oval, what proportion of the offspring will also be oval? What genetic property do the L and l alleles exhibit?

Parents: Ll crossed with Ll

LL	Ll
Ll	ll

Genotype: LL, Ll, Ll, ll

% of oval offspring = 50%

9. A man has type AB blood. What is his genotype? _____AB_____

Could this man be the father of a child with type B blood? _____yes_____

If so, what blood types could the child's mother have? _____AB, BO_____

10. In fruit flies, the gene that controls eye color is on the X chromosome. Red eye color is dominant to white colored eyes. What are the expected phenotypic results if a heterozygous female is crossed with a male with white eyes?

Male: rr

Female: Rr

Rr	Rr
rr	rr

Phenotype: 50% red, 50% white

11. Hemophilia is also a recessive, sex linked trait. What are the expected phenotypic results among the children of a woman who does not have hemophilia but her did, and whose husband is non-hemophilia?

Male: hh

Female: hh

hh	hh
hh	hh

All the children are non - hemophilic.

12. Red green color blindness in humans is a sex-linked recessive trait. In a very large family in which all the daughters have normal vision and all the sons are colorblind, what are the probable genotypes of the parents?

Male: cc

Female: Cc

Cc	Cc
cc	cc

13. A phenotypically normal male and a phenotypically normal female have five children – Two fraternal twin boys and three girls. One of the boys has hemophilia. What are the probable genotypes of all individuals in this family?

Male: Hh

Female: Hh

HH	Hh
Hh	hh

Son with hemophilia - hh

Son without hemophilia - Hh

Daughters - HH, Hh

Probability that a daughter has hemophilia - 0

Probability that a daughter is a carrier - 50%

14. Explain the inheritance pattern (i.e. – autosomal dominant; autosomal recessive; sex-linked dominant; sex-linked recessive).

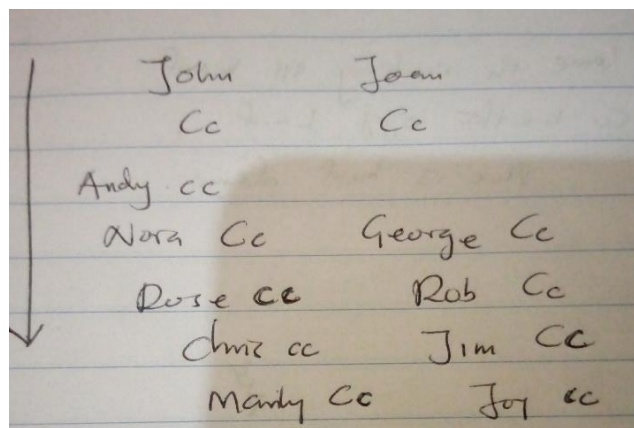
A. Autosomal dominant - all the cells are dominant with only three being recessive.

B. 1, 2, 4, 9, are autosomal recessive.

15. The gene associated with color blindness is recessive and is located on the X chromosome. John married Joan and had 3 children, one boy and two girls. The boy, Andy, who is the oldest, was colorblind. The youngest child, Nora, married George and they had 3 boys, none of whom



where colorblind. The middle child, Rose, married Rob and they had 4 children (2 boys followed by 2 girls). The oldest boy (Chris) was colorblind; the second boy (Jim) was not. The older daughter, Marilyn, was not colorblind but the youngest daughter (Joy) was. Draw a pedigree for this family. Write the name of each person on the pedigree. List the probable genotypes (or put them on the pedigree) for each individual. For individuals where their phenotype was not given, you will need to figure that out based on the children/parents. Shade them in on the pedigree if you determine that they are colorblind.



Comment Summary

Page 1

1. Please have a key -- it will help me with giving partial credit.
Cystic fibrosis is recessive. Male is Cc if C - normal and c - cystic fibrosis
Female is also Cc.

Page 3

2. #5 -- refer to the lecture/PowerPoint regarding codominance. Parents are all heterozygous and you have all three phenotypes in the offspring.

Page 4

3. Two blue parents are bb x bb so no brown possible.

Page 5

4. Both males in the last two punnett square are Bb.

Page 6

5. Genetic property - is incomplete dominance.
6. Mom could also be A or O.
Need punnett squares.
7. Number 10 -13 are all sex-linked. You need sex chromosomes. Redo and resubmit.

Page 8

8. Both pedigrees are incorrect. Rewatch the lecture and redo.