Genetics Review #2
Honors Biology 2021

Name: Key 2021
Date: Block:

Practice Questions:

1. The inside of a Punnett square shows:
   a. all the possible gametes b. all the possible parents c. all the possible offspring

2. In peaches, the gene for fuzzy skin is dominant to the gene for smooth skin (resulting in peaches and nectarines, respectively). Two trees with fuzzy fruit are crossed and the offspring were in the ratio of 942 fuzzy to 298 smooth. What are the genotypes of the parents?
   a. FF x Ff b. Ff x Ff c. Ff x ff d. none of these

3. The ability to taste PTC paper is caused by a dominant allele. If Jesse is a PTC taster, but their sibling is not, and one parent is a taster and one is not. What is Jesse's genotype for this trait?
   a. TT b. tt c. Tt d. none of these is correct

4. Alvin has free earlobes (caused by a dominant gene) and is unable to taste PTC (the ability to taste is dominant). Alvin's father had attached earlobes. Alvin and Katrina who has free earlobes and is a taster (she is homozygous for both traits) decide to have children. Will all of their children be tasters and have free earlobes?
   a. yes b. no

5. Two colorblind people will have all colorblind biological offspring (colorblindness is on the X chromosome).
   a. true b. false

6. A female whose father was colorblind has a daughter who is colorblind. What is the genotype of the biological male parent? a. X^NY b. X^nY c. impossible to tell

7. Olga is married for the second time. Her first husband was blood type A and her child by that marriage was type O. Her new husband is type B and their child is type AB. What is Olga's genotype and blood type? a. I^Ai, blood type A b. ii, blood type O c. I^AI^A, blood type A d. I^AI^B, blood type AB

8. Is it possible for a type B parent to have a type A child? a. yes b. no

9. Labrador Retrievers come in three colors: black, chocolate brown and yellow. The allele "B" is dominant to brown (b); however in order to lay down any Brown or Black pigments, the "E" gene must also be present (E promotes color deposition allowing a dark color). If the E gene is not present (ee), then a dark color can not be deposited and this will result in a yellow lab. What is the genotype for a brown lab?
   a. BbEe or BBEE b. bbee c. BBee d. bbEE or bbEe e. Bbee

10. Can two black labs have a yellow offspring? a. yes b. no
    a. Explain below:
    If they are both heterozygous for Ee.

11. Can two yellow labs have a brown offspring? a. yes b. no
    a. Explain below:
    Yellow labs must be ee, and therefore will only produce more yellow labs

Practice Problems: *Answer these problems and show work where appropriate.*

1. A rooster with gray feathers and a hen of the same phenotype produce 15 gray, 6 black, and 8 white feathered chicks. What is the simplest explanation for the inheritance of these feather colors in chickens? What phenotypes and in what proportions would you expect in the offspring of a cross between a gray feathered rooster and a black feathered hen?

$C^B C^b$ = gray
$C^B C^B$ = black
$C^b C^b$ = white

Codominant or Incomplete dominance

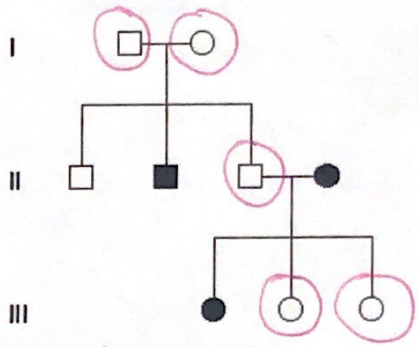
$C^B C^b \times C^B C^B$

	C^B	C^B
C^B	$C^B C^B$	$C^B C^B$
C^b	$C^B C^b$	$C^B C^b$

½ black
½ gray

2. Chands syndrome is an autosomal recessive condition characterized by very curly hair, underdeveloped nails, and atypically-shaped eyelids. In the pedigree at the right, which individuals **must** be carriers? (circle them)

Recessive Pedigree



3. In maize (corn) plants, the allele for tall plants is dominant to short. On a different chromosome, a dominant allele causes purple kernels and the recessive allele causes red kernels. A cross between a heterozygous tall, heterozygous purple kernel plant and a plant that is short and produces red kernels (heterozygous) would produce what offspring and in what ratio?

T = tall
t = short
E = purple
e = red

TtEe × ttEe

	TE	Te	tE	te
tE	TtEE	TtEe	ttEE	ttEe
te	TtEe	Ttee	ttEe	ttee

3/8 Tall, purple
3/8 short, purple
1/8 tall, red
1/8 short, red

4. What is the probability that two parents with color vision will have color blind male and female offspring if the female parent's father is color blind? Colorblindness is a sex-linked trait.

$X^B Y$
$X^B X^b$

	X^B	Y
X^B	$X^B X^B$	$X^B Y$
X^b	$X^B X^b$	$X^b Y$

25% chance of colorblind offspring (50% of male offspring)
Note of female offspring will be colorblind.

5. A scientist was working with fruit flies. They were trying to study genetic patterns among the flies through controlled mating experiments. When they crossed a white-eyed female with a red-eyed male, 42 flies hatched. There were 22 white-eyed flies and 20 red-eyed flies. Upon closer observations of the flies, the scientist discovered that all of the white-eyed flies were males! What pattern of inheritance does this scenario point to? Explain your answer.

eye color = sex linked!

Males can never be carriers. They only have one X chromosome.

6. The scientist from question 11 had a colleague that had offspring from a red-eyed female. The colleague was not sure who the father fly was (it's sometimes hard to manage flies, as you can imagine!). However, the offspring of the red-eyed female fly included some white-eyed females. What is the genotype of the father fly? What is the genotype of the female fly?

$X^B X^-$ = red eyed female
↑ must be "X^b" because female offspring had white eyes. ($X^b X^b$)
and therefore, the male parent is $X^b Y$