Biology Genetics Test Review Guide Name: _____

18	heredity
13	genetics
16	monohybrid breeding
15	true-breeding
5	allele
10	dominant
11	recessive
4	homozygous
2	heterozygous
21	genotype
20	phenotype
1	punnett square
12	test cross
19	probability
3	codominance
14	multiple alleles
9	polygenic trait
8	P generation
17	F1 generation
7	F2 generation
6	incomplete dominance

1)diagram used by biologists to predict the outcome of a genetic cross

2)refers to an individual with two different alleles for a trait

3)condition in which both alleles for a gene are expressed when present

4)refers to an individual with two identical alleles for a trait

5)an alternative form of a gene

6)condition in which a trait in an individual is intermediate between the phenotype of its two parents

7)the offspring from crosses among individuals of the F1 generation

8)the first two individuals that mate in a genetic cross

9)characteristic of an organism that is influenced by several genes

10)genetic trait that is expressed when it's allele is homozygous or heterozygous

11)genetic trait that is not expressed when the contrasting form of the trait is present

12)a genetic cross of an individual whose phenotype is dominant but whose genotype is unknown

13)study of heredity

14)the existence of more than two alleles

15)displaying only one form of a particular trait in offspring

16)cross involving one pair of contrasting traits

17)the first offspring from a cross of two varieties in the parental(P) generation

18)transmission of genetic traits from parent to offspring

19)the likelihood that a specific event will occur

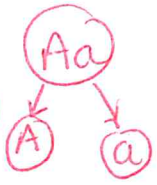
20)observable characteristics of an organism

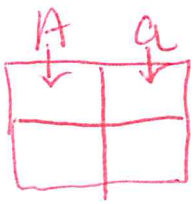
21)the genetic makeup of an organism as indicated by its set of alleles

Who was Mendel? considered father of genetics, researched inheritance patterns with peas. Recognized "factors" (traits) can be passed from parent to offspring

Explain and Apply Each Law

1. Law of Dominance - dominant forms of a gene will mask recessive ones.
   Ex) Presence of a B will hide b.
2. Law of Segregation - genes, or alleles, segregate during gamete formation (during meiosis)





3. Law of Independent Assortment
   genes, or traits, segregate independent of each other during gamete formation (during meiosis)

AaBb

(AB) or (Ab) or (aB) or (ab)

Punnett Square Practice

1. In guinea pigs, black color is dominant over white. BB x bb
   a. Cross a homogeneous black pig with a white pig & give the results for the possible offspring.

      Phenotypic ratio: 4 Black : 0 white

      Genotypic ratio: 0 BB : 4 Bb : 0 bb

	B	B
b	Bb	Bb
b	Bb	Bb

   b. Explain how two black guinea pigs can have a white offspring.

      They must both be heterozygous

	B	b
B	BB	Bb
b	Bb	bb ← white

2. When yellow canaries (Y) are crossed with white canaries (y), cream-colored offspring are produced.
   a. What type of inheritance does this trait have? incomplete
   b. What are the genotypes and phenotypes for the three options for canary coloring?

      Yellow = YY White = WW

      Cream = WY

   c. Cross a yellow male with a cream-colored female & give the offspring results.

      0 white : 2 cream : 2 yellow

      0 WW : 2 WY : 2 YY

      Are the same <

	Y	Y
W	WY	WY
Y	YY	YY

   d. Can a pet storeowner mate a cream-colored male and a white female to obtain a yellow offspring? Explain.

      WY WW

      No, b/c the white female cannot contribute a Y allele.

3. When a black hamsters and a white hamsters are mated a spotted hamster are produced.
   a. What type of inheritance does this trait have? Codominance
   b. What are the genotypes and phenotypes for the three options for hamster coloring?

      Black = BB White = WW

      Spots = BW

   c. Cross a spotted male with a white female & give the offspring results.

      Phenotypic Ratio: 0 Black : 2 spots : 2 white

      Genotypic Ratio: 0 BB : 0 BW : 0 WW

      Are the same <

	B	W
W	BW	WW
W	BW	WW

4. A woman with type AB blood marries a man with type B blood. They have a child with type A blood.
   a. What type of inheritance does this trait have? multiple alleles
   b. What are the alleles that can be used for this trait? A, B, O
   c. What are the genotypes for the mother and father? Explain.

      AB BO ← cannot be BB if they have a type A child

   d. Provide the following ratios:

      Phenotypic Ratio: 1 Type A : 2 Type B : 1 Type AB

      Genotypic Ratio: 1 AO : 1 AB : 1 BB : 1 BO

	A	B
B	AB	BB
O	AO ← Child	BO

   e. Can they have a child with type O blood? Explain.

      No, mom's AB blood type will not provide an "O" allele

5. A couple has four children. Their first child has type A blood, the second type O blood, the third type AB blood, and the fourth has type B blood.

AA or AO OO AB BB or BO

a. What are the genotypes and phenotypes of the parents? Explain

AO x BO each must have an "O" allele (for the 2nd child), but also need A + B alleles

	B	O
A	AB	AO
O	BO	OO

b. What is the probability that their next child will be type O blood? Explain.

25%, see punnett square

6. A woman who is heterozygous for hemophilia, which is sex-linked, marries a normal man.

X^HX^h X^HY

What will be the possible phenotype ratio of their children?

2 Normal Females : 1 Normal Male : 1 Hemophilic male

	X^H	Y ← Normal man
X^H	X^HX^H	X^HY
X^h	X^HX^h	X^hY

Carrier

7. A woman who is a carrier for hemophilia marries a hemophiliac man.

X^HX^h X^hY

What will be their children's' possible phenotypes?

1 Normal Female : 1 Hemophilic Male : 1 Normal Male : 1 Hemophilic Female

	X^h	Y
X^H	X^HX^h	X^HY
X^h	X^hX^h	X^hY

8. Brown (B) fur color is dominant to white (b) and long fur length (L) is dominant to short (l). Complete a Punnett square for the following **dihybrid** (two traits) cross.

[**Hint: your square should have 4 boxes across and 4 boxes down, each gamete will have one of each letter]

BbLL X bbLl

a. What are the phenotypes of the two parents? BbLL = Brown long fur bbLl= white long fur

b. After you complete your Punnett square, provide the phenotypic ratio for all the offspring.

	BL	BL	bL	bL
bL	BbLL	BbLL	bbLL	bbLL
bl	BbLl	BbLl	bbLl	bbLl
bL	BbLL	BbLL	bbLL	bbLL
bl	BbLl	BbLl	bbLl	bbLl

8	Brown long fur
0	Brown short fur
8	White long fur
0	White short fur

Pedigrees

1. What is the purpose of a pedigree? show passing of a trait through generations

2. Males are represented by a square shape and females by a circle shape.

3. Those that are affected by the disorder will be shaded. Will all carriers be ½ shaded? not always some are ○□ or ◐◧

For Questions 1-9, use the pedigree chart shown below. Some of the labels may be used more than once.

C **1.** A male

A **2.** A female

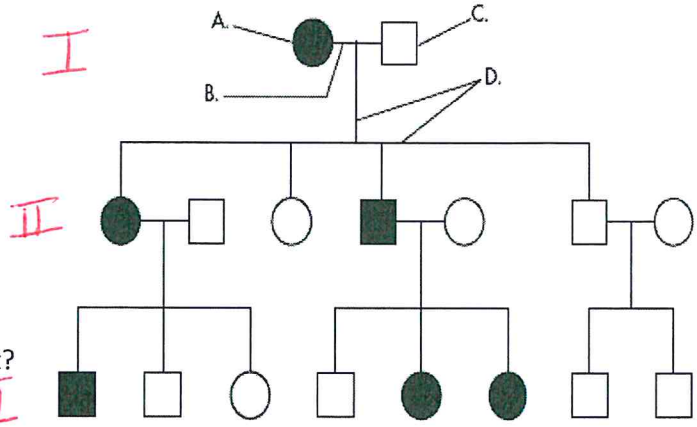
B **3.** A marriage

A **4.** A person who expresses the trait

C **5.** A person who does not express the trait

D **6.** A connection between parents and offspring

3 **7.** How many generations are shown on this chart? I, II, III



Assuming the chart above is tracing the dominant trait of "White Forelock (F)" through the family. F is a tuft of white hair on the forehead.

FF **8.** What is the most likely genotype of individual "A"? (FF, Ff or ff?)

Ff **9.** What is the most likely genotype of individual "C"? (FF, Ff or ff?)

Karyotypes

Look at the karyotype in Figure 1 below. Notice the two sex chromosomes, pair number 23, do not look alike. They are different because this karyotype is of a male, and a male has an X and a Y chromosome. **Circle the Y chromosome in the Karyotype below.**

How many chromosomes does a normal person have? 23 or (46)

Which chromosome is the longest and has the most genes? (1) or 21

Which chromosome is the shortest and has the fewest genes? 2 or (22)

In a normal karyotype how many autosomal chromosomes are there? 44 (22 sets)

Sex chromosomes? 2 (1 set)

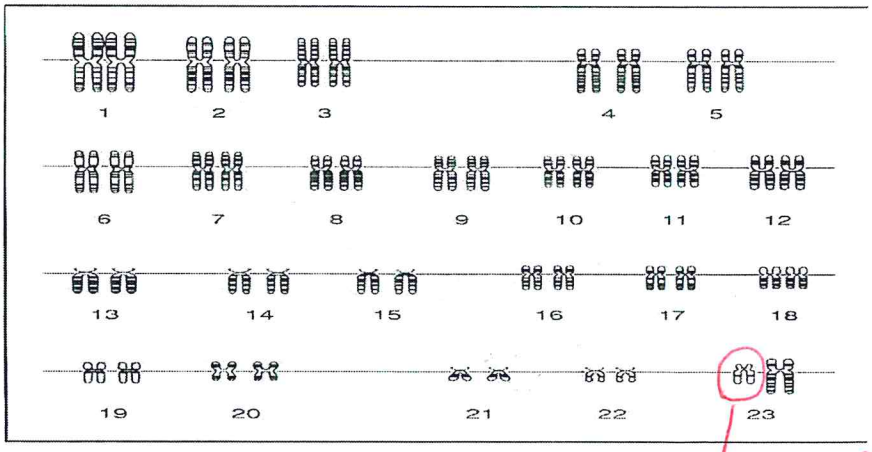


Figure 1

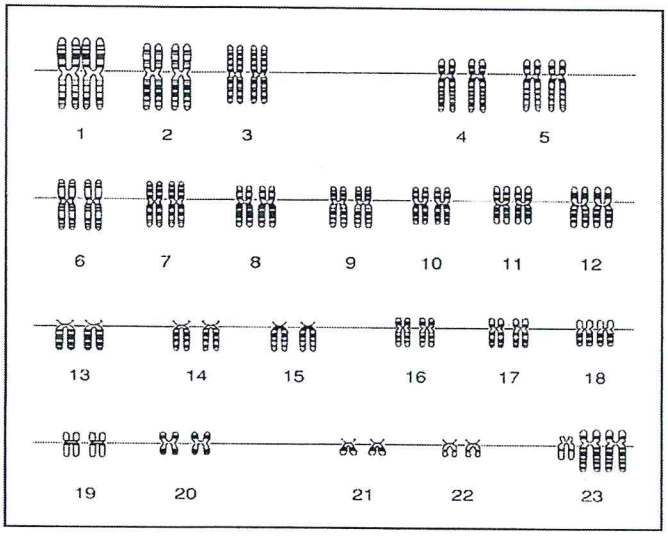


Figure 4

Look at the karyotype labeled figure 4.
Do you see any chromosomal abnormalities? YES NO

What chromosomes are abnormal?
AUTOSOME SEX

Identify the disorder in karyotype Figure 4.
Klienfelter Syndrome

Look at the karyotype to the left is it?
MALE or FEMALE
NORMAL or ABNORMAL

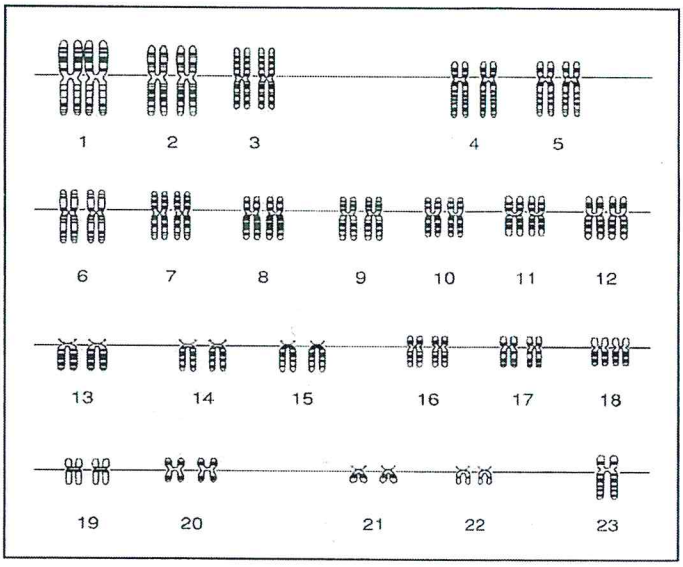


Figure 5

Identify the disorder in karyotype Figure 5.
Turner Syndrome

Nondisjuction is a chromosomal mutation that occurs during meiosis. Definition of Nondisjuction.
chromosomes fail to separate during anaphase I or II

One type of nondisjunction mutation is trisomy 21. What is another name for it? Down Syndrome
What disorder does the person below have?
Trisomy 21
Are they? MALE FEMALE