**REVIEW SHEET—Mendelian Genetics Test**

1. Explain how meiosis in sexual reproduction creates genetic variety: crossing over during meiosis increases variation
2. How does probability fit in with genetics?used to predict possible zygote outcomes
3. What is the difference between autosomes and sex chromosomes? Autosomes are chromosome pairs 1-22 and sex chromosomes are the 23rd pair that determine gender of a baby
4. What is the relationship between the P, F1, and F2 generations?P generation are the parent generation. F1 are the offspring of the P generation and F2 are the second generation
5. What is genetic linkage? What does a linkage map show? How does it relate to crossing over?
6. What is a zygote?a fertilized egg as a result of fertilization
7. What is a recessive trait? in a gene pair, the trait that is hidden by the dominant What is a dominant trait? the trait that hides the recessive allele
8. What is an allele? An alternative form of a gene
9. List the three possible combinations of alleles for a gamete.

1) TT ( homozygous dominant 2) Tt(heterozygous) 3) tt (homozygous recessive)

1. What is the difference between a genotype( the type of gene represented by letters) and phenotype(the physical expression of a gene---usually adjectives)?
2. What is the name of a chart used to determine possible combinations of genes?

Punnett square

1. In a Punnett square, what does each small square represent?possible zygote
2. Genetics events are based on the likelihood that an event will occur, called \_\_probability\_\_\_\_\_.
3. List and briefly describe Mendel’s three Laws of Heredity:

1)Law of Dominance—one gene is dominant and other form is recessive

2)Law of Segregation—During meiosis, homologous separate so that each gamete receives one of a pair of alleles.

3)Law of Independent Assortment—When alleles separate, the alleles for different trait separate independently from those of other traits

1. True or False? Plants with the same phenotype always have the same genotype. False—could be heterozygous or homozygous dominant
2. Parents have \_\_\_2\_\_\_\_alleles for every trait they have, while gametes have \_\_1\_\_\_\_allele for every trait(from each parent).
3. What is meant by multiple alleles for a gene? There are more than two forms of alleles. Give an example in humans. IA, IB, ii---resulting in human ABO blood groups
4. Define incomplete dominance—situation in which neither allele is dominant over the other and the heterozygous genotype shows a blended phenotype What does each genotype look like?answered above
5. How is codominance different than incomplete dominance?Codominance heterozygotes—BOTH alleles are expressed equally(checkered, striped, dotted). Incomplete dominance heterozygotes show a BLENDED phenotype( gray, pink, lavender)
6. What is the chromosomal difference between females and males?ffemale XX male XY
7. Draw a pedigree chart showing mother and father carriers that have 3 children. The oldest is a boy that is affected by the trait. The middle child is a girl that is affected by the trait, is married, and has a son that is affected by the trait. The youngest boy is married with 2 boys and a girl that are not affected. Is this trait autosomal or x-linked? Is this trait dominant or recessive?
8. What is sex-linked inheritance. Give some examples. Traits that are carried on the sex chromosomes—typically the X
9. Why are most sex-linked traits carried on the X chromosome?Everyone has at least one X
10. Sex-linked traits carried on the Y chromosome are only passed from father to son. Why? Daughters do not get a Y from Dad☺
11. How can the environment affect an organism’s gene expression? Example: male pattern baldness The environment or temperature can alter the normal expression of the genotype into a different phenotype

**Problems to Study:**

1. In pea plants, tall ( T ) is dominant to short ( t ). Cross two heterozygous parents.

Genotype ratio TT:Tt:tt 1:2:1

25%:50%:25%

Phenotype ratio Tall : short 3:1

75%:25%

1. In cats, tabby fur ( T ) is dominant over black fur ( t ). A homozygous tabby cat mates with a black cat.

Genotype ratio All Tt

Phenotype ratio All tabby

28. Complete the cross for the F2 generation of pea plants. Purple ( W ) & white ( w )

w w

F2 Genotype ratio WW:Ww:ww

W 1:2:1

F2 Phenotype ratio purple:white

W 3:1

F1 F2

29. Complete the dihybrid cross and give the phenotype out of 16 for two heterozygous pea plants. Round (R) is dominant to wrinkled (r) and Yellow (Y) is dominant to green (y).

9:3:3:1 9 Round, yellow

1. Round, green
2. wrinkled, yellow

1 wrinkled, green

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RY | Ry | rY | ry |
| RY |  |  |  |  |
| Ry |  |  |  |  |
| rY |  |  |  |  |
| ry |  |  |  |  |

29. Incomplete dominance. In four o’clock flowers, the two alleles for flower color are R for red color and R’ for white color.

1. Cross a homozygous red and a homozygous white.

Genotype ratio All R’R

Phenotype ratio All pink

1. Cross two pink four o’clocks.

Genotype ratio RR : R’R : R’R’

Phenotype ratio red: pink: white

1: 2: 1

1. Complete the chart for human genotype and phenotype for blood groups.

**IN NOTES**

|  |  |
| --- | --- |
| **Genotype** | **Phenotype** |
|  |  |
|  | **B** |
|  | **AB** |
| **i i** |  |

31. Cross a woman with type O blood with a man with type AB blood.

Name the genotypes of their children. AO, BO

What are the phenotypes of their children? A or B

1. Cross a woman heterozygous Type A with a man heterozygous Type B.

Name the genotypes of their children. AB, Bi, Ai, ii

What are the phenotypes of their children? AB, B, A, or O

1. Make a Punnett to show the possibility of a couple having a boy or a girl.

\_\_\_\_\_50\_\_\_\_\_\_\_% the baby will be a boy.

\_\_\_\_\_50\_\_\_\_\_\_\_% the baby will be a girl.

1. The gene for black color (B) is dominant over the gene for orange color (b) and the trait is sex-linked on the X-chromosome. Cross a heterozygous female with a black male. Give the genotype and phenotype ratios.

XBXb x XBY XBXB: XBXb: XBY: XbY 1:1:1:1

Black female 25% Black male 25%

Calico female 25% orange male 25%

1. In humans, the gene for color-blindness is a sex-linked trait carried on the X chromosome. A female carrier marries a colorblind male. Set up a Punnett and give the percent of each child for color-blindness.

\_\_\_\_25\_\_\_\_% colorblind female \_\_\_\_0\_\_\_\_\_% normal female

\_\_\_25\_\_\_\_\_% carrier female

\_\_\_\_25\_\_\_\_ % colorblind male \_\_\_25\_\_\_\_\_\_% colorblind male