**Two Trait Genetics Problems KEY**

1. **In watermelons, solid green color is dominant over striped pattern, and short shape is dominant over long shape.** 
   1. **What is the genotype and phenotype of all the possible offspring if you cross a homozygous green, heterozygous short watermelon with a heterozygous green, long watermelon?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Gl | Gl | GL | GL |
| Gl | GGll | GGll | GGLl | GGLl |
| Gl | GGll | GGll | GGLl | GGLl |
| gl | Ggll | Ggll | GgLl | GgLl |
| gl | Ggll | Ggll | GgLl | GgLl |

Cross: \_\_GGLl x Ggll\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Genotypes:

4 GGLl

4 GGll

4 GgLl

4 Ggll

Phenotypes:  
 8 green, long  
 8 green, short

* 1. **Give the genotype and the phenotype of the offspring for a striped homozygous short watermelon and a green, short watermelon that’s heterozygous for both traits.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | gL | gL | gL | gL |
| GL | GgLL |  |  |  |
| Gl | GgLl |  |  |  |
| gL | ggLL |  |  |  |
| gl | ggLl |  |  |  |

Cross: \_\_ggLL x GgLl\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Genotypes:

4 GgLL, 4 GgLl, 4 ggLL, 4 ggLl

Phenotypes:

8 Green, short 8 stripe, short

1. **In summer squash, white fruit color is dominant over yellow fruit color and disk-shaped fruit is dominant over sphere-shaped fruit.**
   1. **If a squash plant true-breeding for white, disk-shaped fruit is crossed with a plant true-breeding for yellow, sphere-shaped fruit, what will be the genotype and the phenotype of the offspring (the F1 generation)?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | WD | WD | WD | WD |
| wd | WwDd | WwDd | WwDd | WwDd |
| wd | WwDd | WwDd | WwDd | WwDd |
| wd | WwDd | WwDd | WwDd | WwDd |
| wd | WwDd | WwDd | WwDd | WwDd |

Cross: \_\_WWDD x wwdd\_\_\_\_\_

Genotype: WwDd

Phenotype: white, disc

* 1. **If two individuals from the F1 generation are crossed, what will the phenotypic ratio of the next generation (the F2 generation) be?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | WD | Wd | wD | wd |
| WD | WWDD | WWDd | WwDD | WwDd |
| Wd | WWDd | WWdd | WwDd | Wwdd |
| wD | WwDD | WwDd | wwDD | wwDd |
| wd | WwDd | Wwdd | wwDd | wwdd |

Cross: \_\_WwDd x WwDd\_\_\_\_\_

Phenotypic ratio: 9:3:3:1

1. **In Guinea pigs the allele for short hair is dominant over the allele for long hair. The allele for black hair is dominant over the allele for brown hair. Suppose two Guinea pigs, *both heterozygous for both traits*, are mated. What are the odds of any one of their pups being:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | HB | Hb | hB | hb |
| HB | HHBB | HhBb | HhBB | HhBb |
| Hb | HHBb | HHbb | HhBb | Hhbb |
| hB | HhBB | HhBb | hhBB | hhBb |
| hb | HhBb | Hhbb | hhBb | hhbb |

**Cross: HhBb xHhBb**

1. short-haired and black?   
    HHBB or HhBB or HhBb or HhBB

Both dominant = 9/16

1. short-haired and brown? Hhbb or HHbb

Dominant, recessive = 3/16

1. long-haired and black? hhBB or hhBb

Recessive, dominant = 3/16

1. long haired and brown? hhbb

Recessive, recessive = 1/16

1. **Suppose that a Guinea pig boar that is heterozygous for both traits is mated with a sow that is heterozygous for fur, but whose fur is brown. What are the odds of any one of their pups being:   
      
    Cross: Hhff x HhFf**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Hf | Hf | hf | hf |
| HF | HHFf | HHFf | HhFf | HhFf |
| Hf | HHff | HHff | Hhff | Hhff |
| hF | HhFf | HhFf | hhFf | hhFf |
| hf | Hhff | Hhff | hhff | hhff |

1. short-haired and black? HHFf or HhFf
   1. Both dominant = 3/8
2. short-haired and brown? Hhff or Hhff
   1. Dominant, recessive = 3/8
3. long-haired and black? hhFf
   1. Recessive, dominant= 1/8
4. long haired and brown? hhff
   1. Recessive, recessive= 1/8

See if you can do it without the punnet squares……

1. **\_\_D\_\_\_\_ An organism of genotype AaBb can make gametes of all the following kinds except**
2. ab c. AB
3. aB d. Bb
4. **\_\_\_B\_\_ If AaBb is crossed with aabb, what proportion of the offspring would be expected to be aabb?**
   1. 9/16 c. 1/8
   2. 1/4 d. 1/16
5. \_\_\_A\_\_\_ **If the offspring of a cross show a 9/16 to 3/16 to 3/16 to 1/16 ratio (9:3:3:1), the parents of the   
    cross have the genotypes** 
   1. AaBb x AaBb c. aaBb x Aabb
   2. aaBb x aabb d. AaBb x aaBB
6. \_C\_\_\_\_\_ **Assume that you mated two individuals heterozygous for each of two traits and obtained 80   
    offspring. How many of them would be expected to look like their parents?** 
   1. 25 c. 45
   2. 60 d. 80
7. **\_\_\_B\_\_\_ An organism of genotype AaBb can make gametes of all the following kinds except:**
   1. AB c. ab
   2. Aa d. Ab
8. **\_\_\_C\_\_ If AaBb is crossed with aabb, what proportion of the offspring would be expected to be aaBb?**
   1. 1/16 c. 1/4
   2. 1/8 d. 9/16
9. **\_\_\_C\_\_\_ The offspring of a AaBb x AaBb cross show a \_\_\_\_\_\_\_\_\_\_phenotyoic ratio.** 
   1. 1:3:1 c. 9:3:3:1
   2. 3:3:3:3 d. 1:3:3:9
10. \_\_B\_\_\_\_ **If W = purple flower and w = white, and D = tall plants and d = short plants, a wwDd plant   
     would be** 
    1. purple and tall c. purple and short
    2. white and tall d. white and short
11. \_\_A\_\_\_\_ **If aaBb is crossed with AAbb, what proportion of the offspring will be AAbb?** 
    1. 0 c. 3/16
    2. 9/16 d. 1/4
12. \_\_C\_\_\_ **If AaBb is crossed with AaBb, what proportion of the offspring will be dominant for the 'A/a'  
     trait and recessive for the 'B/b' trait (i.e. A\_\_bb)?** 
    1. 9/16 c. 3/16
    2. 1/16 d. 0
13. \_\_D\_\_\_ **Whenever a capital letter is present, a red color is produced. In a cross of AaBb x AaBb, how   
     many red offspring would you expect out of 16?** 
    1. 1 c. 3
    2. 9 d. 15
14. \_\_A\_\_\_\_ **Genes that assort independently are** 
    1. Located on different chromosomes c. located on the same chromosome
    2. Alleles of each other d. dominant
15. \_\_\_C\_\_\_ **If two true-breeding parents are crossed with each other and all the offspring have their  
     mother's ears and their father's tail, the parents in the cross would be**
16. EETT x eett c. eeTT x EEtt
17. EeTt x EeTt d. eeTt x Eett