CONCEPT: DIHYBRID CROSS

Punnet Square

● A dihybrid cross is a mating occurring between organisms containing two different traits

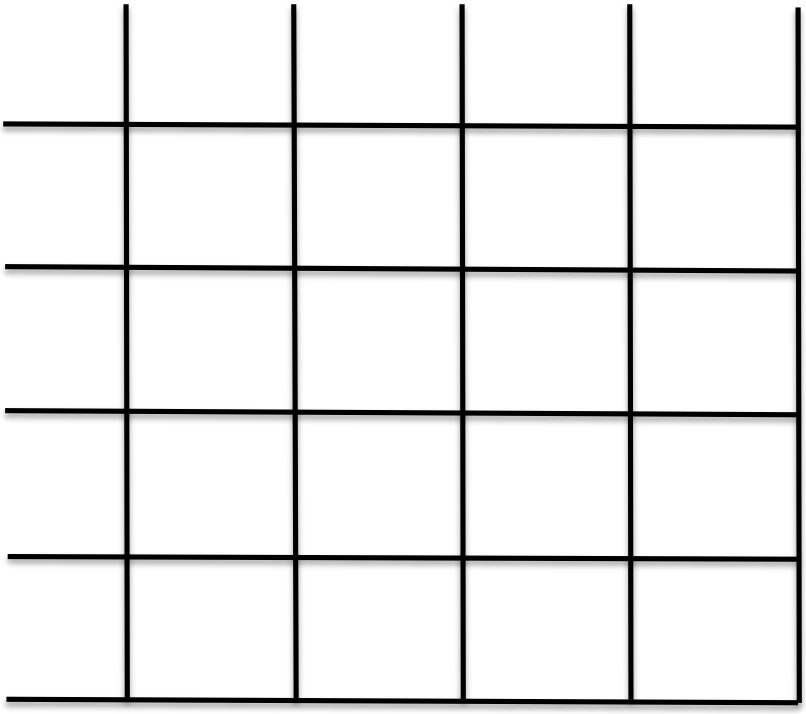
□ Typically written like BbSs (heterozygous)

□ Done for genes that independently assort

- Inheriting one trait will not affect the inheritance of the other trait (Ex. color and shape)

□ Two methods of doing a dihybrid cross

1. Punnet Square
2. Branch Diagram



1. Punnet Square

Starting Genotypes

Mother: Yy Rr

Father: Yy Rr

Starting Phenotypes

Mother: Yellow, round

Father: Yellow, Round

1. What is the probability of having a yellow round offspring? _____
2. What is the probability of having a yellow wrinkled offspring? _____
3. What is the probability of having a green round offspring? _____
4. What is the probability of having a green wrinkled offspring? _____

□ The common dihybrid ratio is **9:3:3:1**

Branching Diagram

2. Branching Diagram

□ Branching diagram uses math to calculate the the probability of certain genotypes?

Starting Genotypes

Mother: Yy Rr

Father: Yy Rr

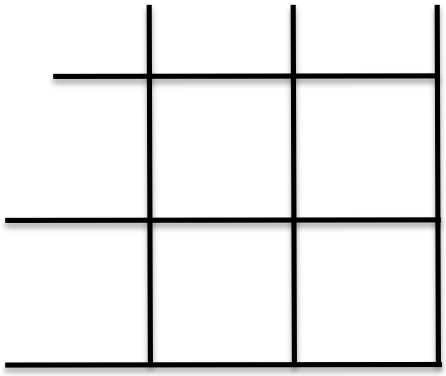
Starting Phenotypes

Mother: Yellow, round

Father: Yellow, Round

Steps

1. What is the probability of the offspring being yellow? Or green?
2. What is the probability of the offspring being round? Or wrinkled?



_____ Yy , Yellow

_____ Rr round → Yellow Round

_____ rr wrinkled → Yellow Wrinkled

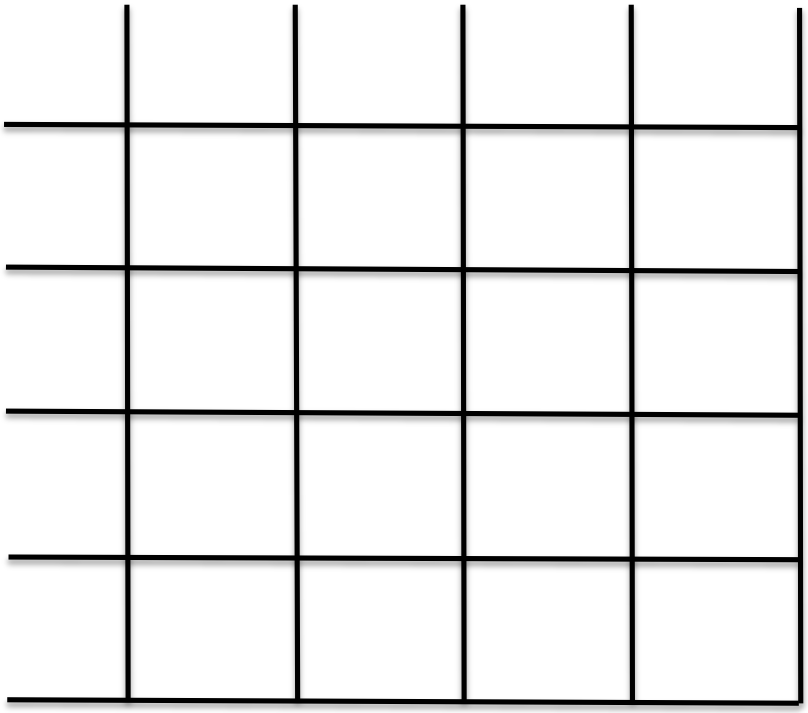
_____ yy, Green

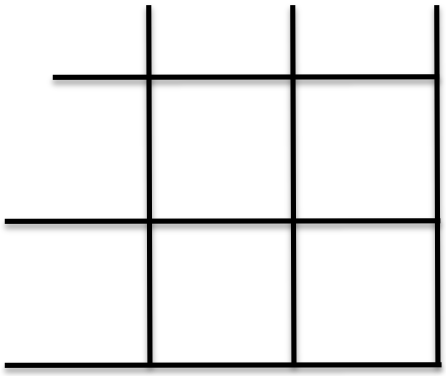
_____ Rr round → Green Round

_____ rr wrinkled → Green Wrinkled

PRACTICE

1. Assume you have mated a homozygous dominant purple, square plant with a homozygous recessive pink, spherical plant. What is the proportion of purple and spherical plants that would be produced in the F_2 generation?





2. Write out all of the following gametes that can be produced from individuals with the following genotypes.
    a. AaBB

    b. AaBb

    c. AaBbCc

    d. AaBbcc

3. Two organisms with the genotypes Aa bb Cc Dd Ee and Aa Bb Cc dd Ee were crossed. Use the branch method to determine the proportion of the following genotypes in the offspring.
    I. aa bb cc dd ee
        a. 1/256
        b. 1/64
        c. 1/16
        d. 1/4

II. Aa bb Cc dd ee
    a. 1/256
    b. 1/64
    c. 1/16
    d. 1/4

III. AA BB CC Dd ee
    a. 1/256
    b. 1/64
    c. 1/16
    d. 0

3. In melons, spots (S) are dominant to no spots (s) and bitterness (B) is dominant to sweet (b). Answer the following questions that arise from a crossing of a homozygous dominant plant with a homozygous recessive plant. Assume Mendelian inheritance.
   I. What is the F_2 phenotypic ratio if the F_1 generation is intercrossed?
      a. 12:3:1
      b. 4:3:2:1
      c. 9:3:3:1
      d. 3:1