Punnett Squares

Objective:

To learn how to figure out the possible genotypes and phenotypes of the offspring in a single trait cross.

Research

Punnett Square:

Shows the possible ways genes are combined when passed from parents to offspring.

Allele:

The different forms of a gene; such as B for brown or b for white.

Homozygous (purebred):

The two alleles are the same, such as BB or bb.

Heterozygous (hybrid):

The two alleles are different, such as Bb.

Genotype:

Genetic (inherited) make-up of an individual; the allele combination

Phenotype:

The expression of a trait; what it looks like

Example I

- In flowers, the color red is dominant to the color yellow. A purebred red flower is crossed with a yellow flower. What are the genotypes and phenotypes of the possible offspring and in what proportions (ratios)?

- Four steps to working out a cross.

Step One

- Assign the traits a letter. You always use the letter of the dominant trait.

  (dominant is upper case and recessive is lower case)

- **R** = dominant = **Red**
- **r** = recessive = **Yellow**

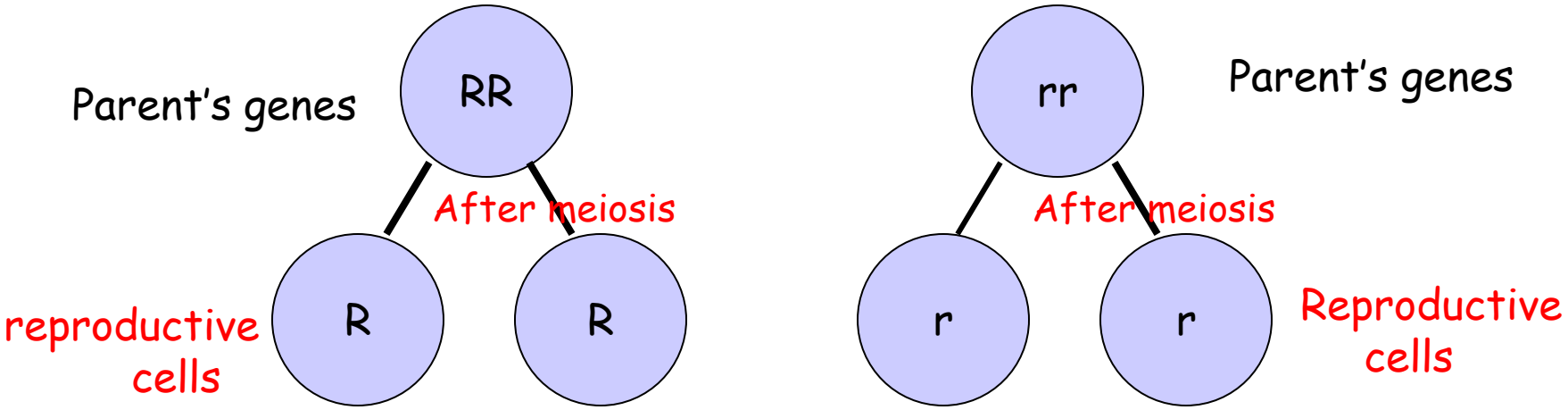
- **You do not switch letters when the dominant and recessive traits start with a different letter.**

Step Two

- Determine the parental genotypes.
- Purebred (Homozygous) red = RR
- Yellow (must be purebred/homozygous in order to be yellow) = rr

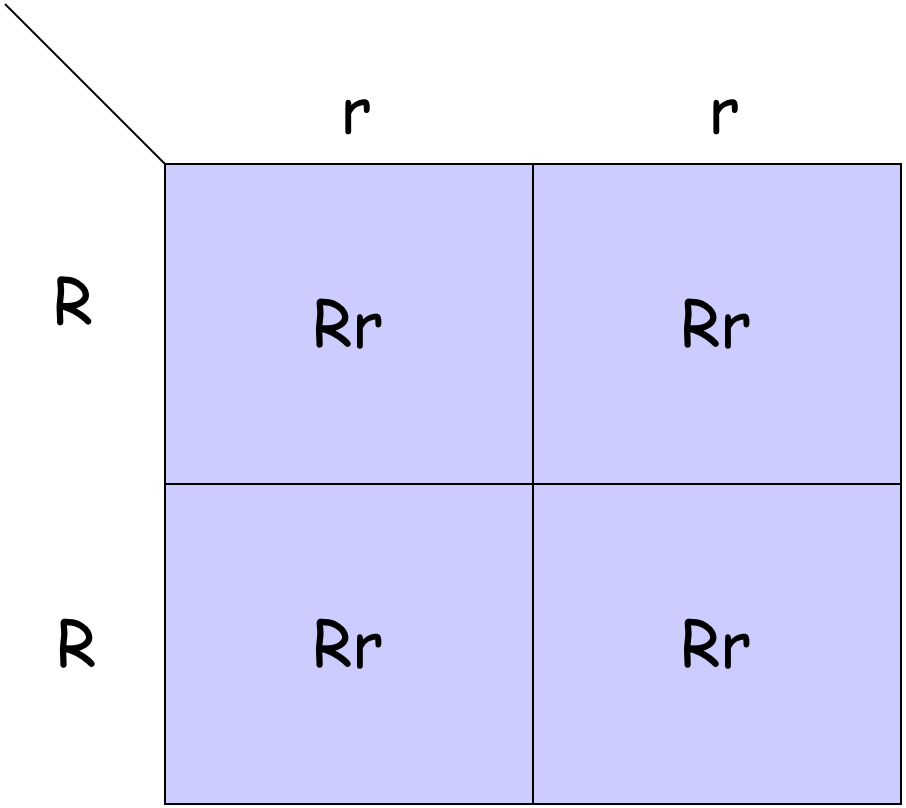
Step Three

- Possible reproductive cells.



Step Four

- Punnett Square



Ratio's

- Genotypes: RR : Rr : rr
- Ratio: 0 : 4 : 0

- Phenotypes: Red : Yellow
- Ratio: 4 : 0

Practice Problems for Punnett Squares:

- In chimpanzees, straight fingers (S) are dominant to bent fingers (s). Complete the following to determine what the cross between a chimpanzee who is a purebred for straight fingers with a chimpanzee who has bent fingers.

Step One

- Assign the traits a letter.

  Dominant = __straight__ so we are using the letter __S__

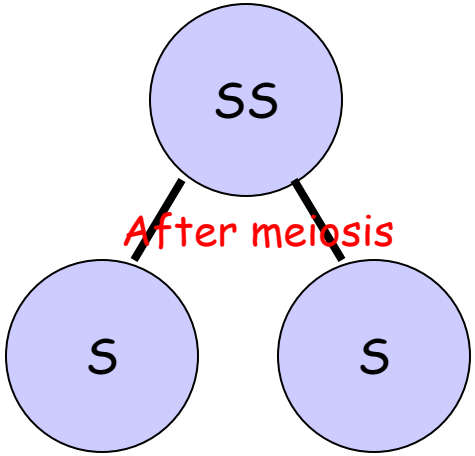
Step Two

- Determine the parental genotypes.

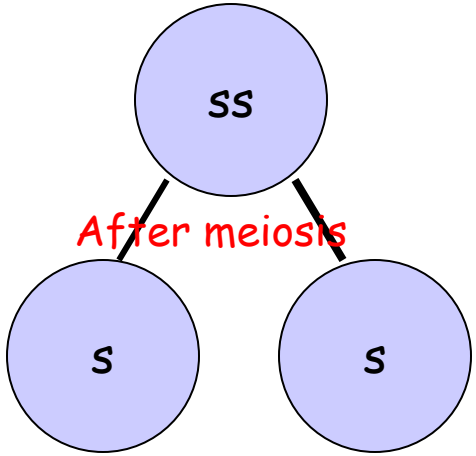
Purebred straight fingers = **SS**
Bent fingers = **ss**

Step Three

- Possible reproductive cells.



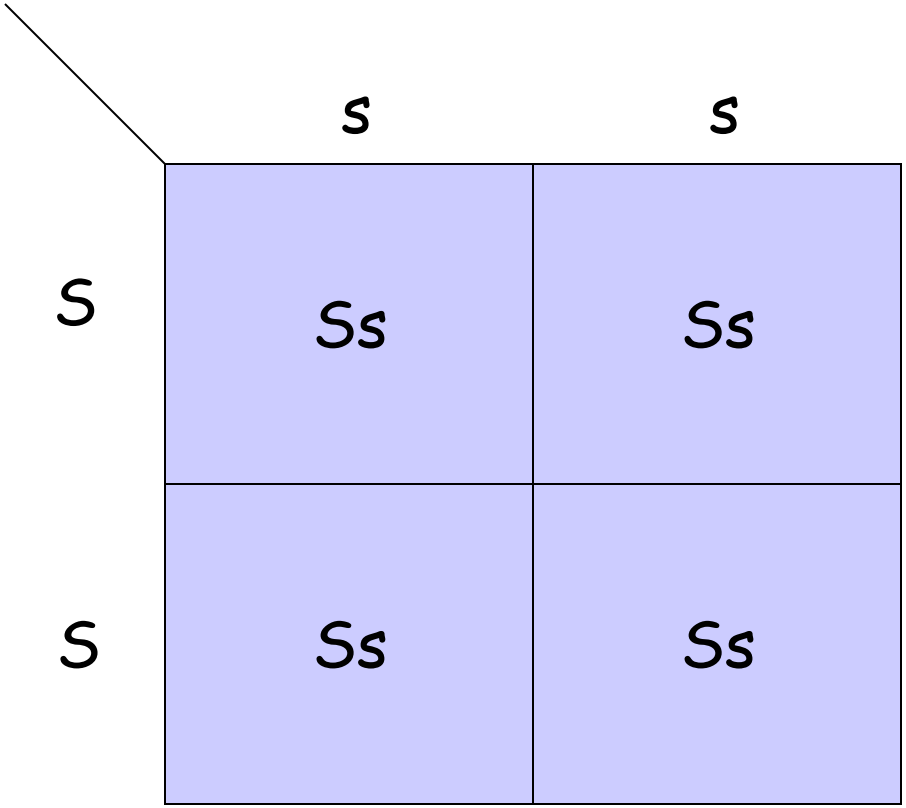
reproductive cells



reproductive cells

Step Four

- Punnett Square



A. What are the genotypes of the offspring?

Ss, Ss, Ss, and Ss

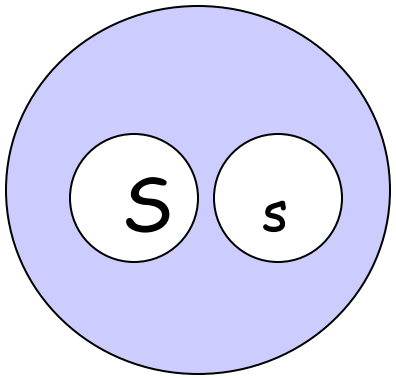
- B. What are the phenotypes of the offspring? **All straight fingers**
- C. What is the genotype ratio?

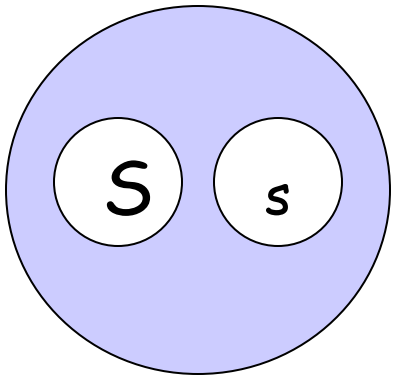
0 : 4 : 0

SS : Ss : ss

- D. What is the phenotype ratio?
- **4 : 0**
- straight : bent

2. Now cross two chimpanzees who are hybrids for straight fingers. Complete all steps to answer the following questions.





	S	s
S	SS	Ss
s	sS	ss

Make this Punnett square on your paper.

a. How many of the offspring from the above two parents will have straight fingers? 3 How many will have bent fingers? 1

b. Genotypes: SS, Ss, Ss, ss Genotype ratio: 1: 2: 1