

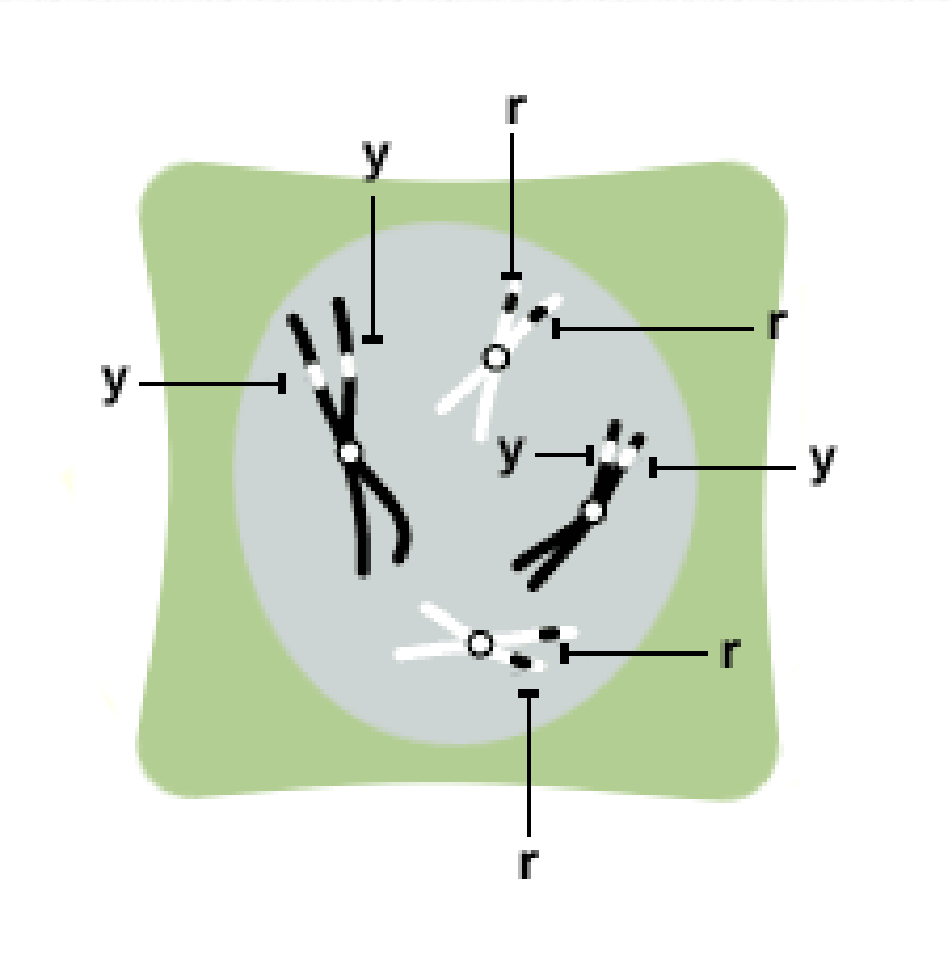


Dihybrid Crosses

- Y=yellow, y=green, R=round, r=wrinkled
- According to the Law of Independent Assortment, a plant that is hybrid for 2 traits will form FOUR different gametes



Independent assortment and Segregation..



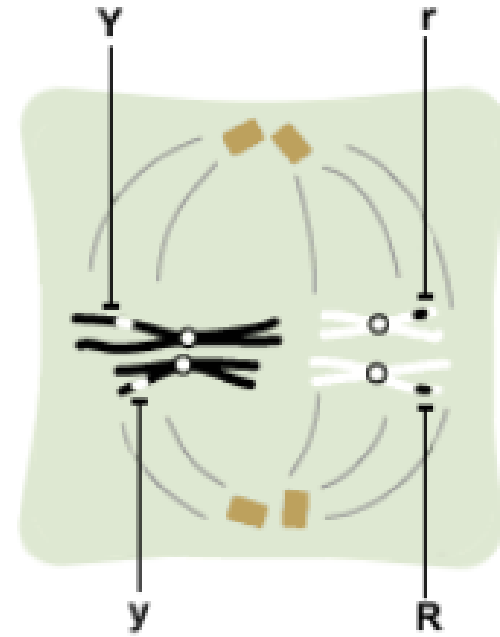
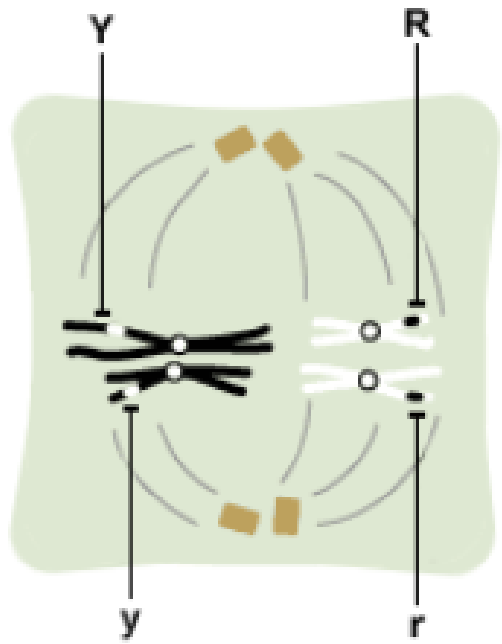


Diagram 1: Original Maternal and Paternal chromosomes aligned towards the same pole

Diagram 2: Original Maternal and Paternal chromosomes not aligned

Mendel used Peas again:

Character	Traits	Alleles	Genotypes	Phenotypes
Seed coat	Round	R	RRYY	Round Yellow
	Wrinkled	r	RRYy	Round Yellow
			RRyy	Round Green
Cotyledon colour	Yellow	Y	RrYY	Round Yellow
	Green	y	RrYy	Round Yellow
			Rryy	Round Green
			rrYY	Wrinkled Yellow
			rrYy	Wrinkled Yellow
			rryy	Wrinkled Green

The expected probability of each type of seed can be calculated:

Probability of an F2 seed being round = 75% or $\frac{3}{4}$

Probability of an F2 seed being wrinkled = 25% or $\frac{1}{4}$

Probability of an F2 seed being yellow = 75% or $\frac{3}{4}$

Probability of an F2 seed being green = 25% or $\frac{1}{4}$

Therefore,

Probability of an F2 seed being round and yellow = $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16} = 56.25\%$

Probability of an F2 seed being round and green = $\frac{3}{4} \times \frac{1}{4} = \frac{3}{16} = 18.75\%$

Probability of an F2 seed being wrinkled and yellow = $\frac{1}{4} \times \frac{3}{4} = \frac{3}{16} = 18.75\%$

Probability of an F2 seed being wrinkled and green = $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16} = 6.25\%$

Probabilities...

From this we can predict how many seeds we could expect to get in a sample:

In 556 seeds we could expect:

$$556 \times \frac{9}{16} \text{ round yellow} = 313$$

$$556 \times \frac{3}{16} \text{ round green} = 104$$

$$556 \times \frac{3}{16} \text{ wrinkled yellow} = 104$$

$$556 \times \frac{1}{16} \text{ wrinkled green} = 35$$

NOTICE: HETEROZYGOUS CROSS HAS RATIO OF
9:3:3:1

EXAMPLE #2:

- A pea plant that heterozygous for the traits tall (T) and round seeds (R), is crossed with a dwarf with wrinkled seeds. Determine the phenotype and genotype ratios of the F1 generation
-

- P: _____
- P phenotype: _____
- Gametes: _____
- F1:



EXAMPLE #3:

- Yellow seeds (Y) are dominant over green seeds (y). Round seeds (R) are dominant over wrinkled seeds (r). If two plants that are heterozygous for BOTH traits (dihybrid) are crossed, what will be the phenotype and genotype ratios of the F1 generation?
-

- P: _____
- P phenotypes: _____
- Gametes: _____
- F1

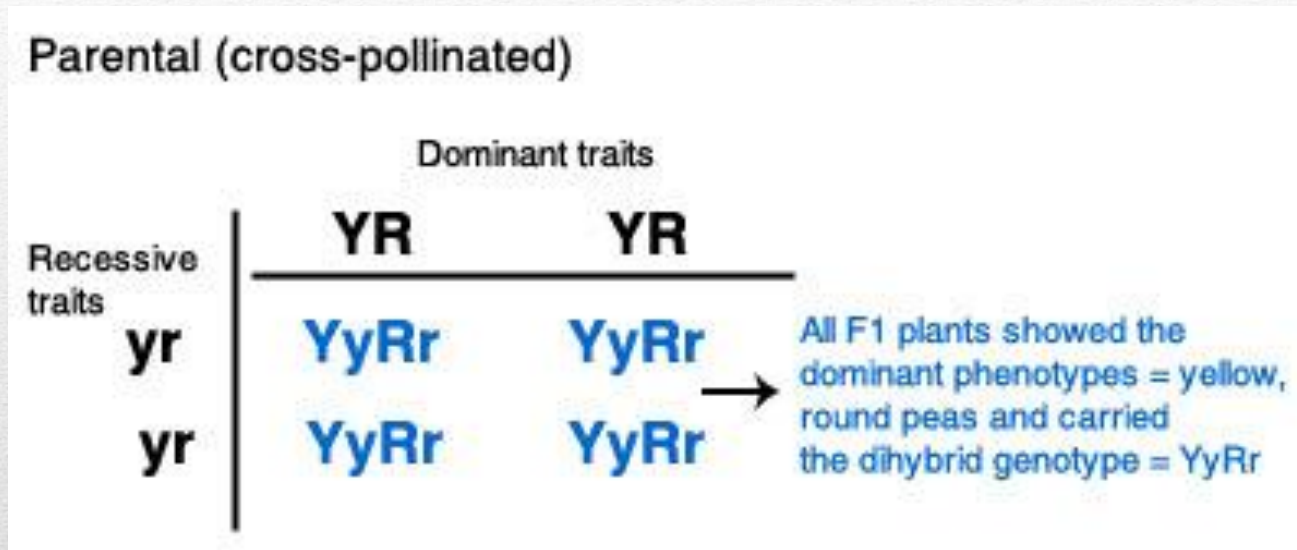
	YR	Yr	yR	yr
YR				
Yr				
yR				
yr				



- Possible outcomes

- Parent YYRR → all offspring are yellow and round
 - Parent YyRR → offspring will be yellow or green AND all round
 - Parent YYRr → offspring will be all yellow AND round or wrinkled
 - Parent YyRr → offspring will be yellow or green AND round or wrinkled
-

- PARENT YYRR



Offspring all yellow/round

- PARENT $YyRR$

	YR	yR
yr	$YyRr$	$yyRr$

**Offspring: yellow/round
or green/round**

- PARENT YYRr

	YR	Yr
yr	YyRr	Yyrr

**Offspring: yellow/round
or yellow wrinkled**

- PARENT YyRr x yyrr

Dihybrid testcross (YyRr x yyrr)

	YR	yR	Yr	yr
yr	YyRr	yyRr	Yyrr	yyrr

Resulting plants show equal mixture:

- Blue = double dominant (Yellow Round)
- Purple = single dominant (Yellow wrinkled)
- Pink = single dominant (green Round)
- Red = double recessive (green wrinkled)

**OFFSPRING: Yellow/round,
yellow/wrinkled, green round,
green wrinkled**

- When doing an example test cross;
 1. State your variable designation
 2. Write down your predicted genotype
 3. Do a Punnet square to prove your prediction
 4. Write a statement
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- Ex. In the “chocolate moose” brown fur is dominant to yellow fur and round ears are dominant to pointed ears. If a brown and round eared moose is test crossed and the offspring are as follows, what were the genotypes of the original parent?

5 brown round

2 yellow round

2 brown pointed

1 yellow pointed
