Solving Genetics Problems

Essential Questions:

- **How are traits inherited for single-factor crosses?**
- **How are traits inheritied for two-factor crosses?**
- **How are sex-linked traits inherited?**

Single-factor cross:

Tongue-rolling is dominant to non-rolling. Cross a hybrid female with a non-roller.

1. **Assign symbols for traits.** R = roller r = non-roller
2. **Write parental genotypes.** ♀: Rr x ♂: rr
3. **Make a Punnett square of the cross.**
4. **Predict the genotype ratio of the offspring.**
5. **Predict the phenotype ratio of the offspring.**

	R	r
r	Rr	rr
r	Rr	rr

geno. ratio: 0 : 2 : 2

phenotype: 2 : 2

Two-factor cross:

Round is dominant to wrinkled R = round r = wrinkled

Yellow is dominant to green Y = yellow y = green

Cross two parents that are hybrid for both traits

Assign symbols $RrYy \times RrYy$

Specify possible gamete combinations

Make a Punnett square

gametes 2

RY Ry rY ry

FOIL

First Outer Inner Last

RrYy

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

9:3:3:1

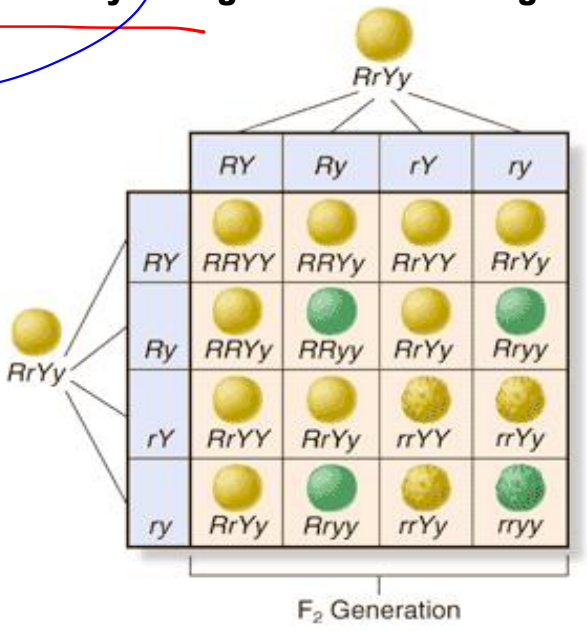
round, yellow 9/16

round, green: 3/16

wrink. yellow: 3/16

wrink. green: 1/16

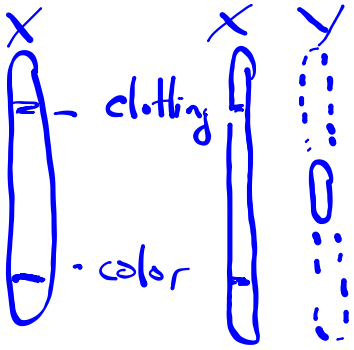
How does this result demonstrate that alleles segregate independently during the formation of gametes?



Sex-linked inheritance:

Traits in one gender more than another

- **hemophilia**
- **color-blindness**



X Y

♀ : XX

♂ : XY

normal Color vision: X^N

colorblind: X^n

	X^N	X^n
X^N	$X^N X^N$	$X^N X^n$
Y	$X^N Y$	$X^n Y$

♀: $X^N X^N$, $X^N X^n$ } normal

$X^n X^n$ - colorblind

Carrier

♂: $X^N Y$ - normal

$X^n Y$ - colorblind

1. X^h = hemophilia

X^H = normal

$X^H Y \times X^H X^h$

	X^H	X^h
X^H	$X^H X^H$	$X^H X^h$
Y	$X^H Y$	$X^h Y$

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