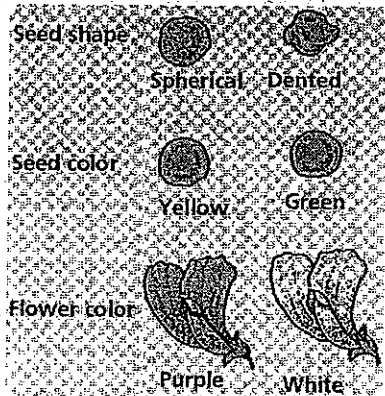


Extra Credit Information for Dihybrid Crosses

(This gives you information about how to do these types of crosses.)

DIHYBRID CROSSES (2 traits)

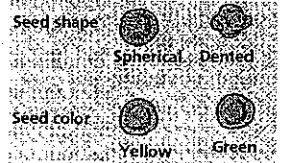


<http://mac122.lcu.ac.jp/BIOBK/BioBookgenIntro.html>

Mendel also asked the question?

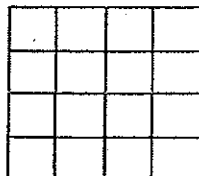
Does the gene that determines if a seed is round or wrinkled have anything to do with the gene for seed shape?

Must a seed that is yellow also be round?



**MAKING A CROSS with
TWO gene traits =
DIHYBRID CROSS**

A Punnett square for a DIHYBRID CROSS looks like this:



Biology

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F₂ Generation

1 2 3 4 5

LET'S MAKE A DIHYBRID CROSS

HOMOZYGOUS HOMOZYGOUS
YELLOW ROUND GREEN WRINKLED

RRYY

rryy

1. Figure out what parent alleles are
2. Choose correct Punnett square size
3. Put in possible parent gametes
4. Fill in boxes with offspring combinations
5. Determine probabilities of phenotypes & genotypes

LAW OF INDEPENDENT ASSORTMENT

the factors are distributed to gametes independently of other factors



Image modified from:
http://anthro.palomar.edu/mendel/mendel_1.htm

PRACTICE MAKING GAMETES

WHAT ARE THE POSSIBLE GAMETES
THIS PARENT CAN MAKE?

HOMOZYGOUS
ROUND YELLOW



Each gamete should
get one of each kind
of gene

RRYY

RY RY RY RY

PRACTICE MAKING GAMETES

WHAT ARE THE POSSIBLE GAMETES
THIS PARENT CAN MAKE?

HOMOZYGOUS
WRINKLED GREEN



Each gamete should
get one of each kind
of gene

rryy

ry ry ry ry

PRACTICE MAKING GAMETES

WHAT ARE THE POSSIBLE GAMETES
THIS PARENT CAN MAKE?

HETEROZYGOUS
ROUND YELLOW



Each gamete should
get one of each kind
of gene

RrYy

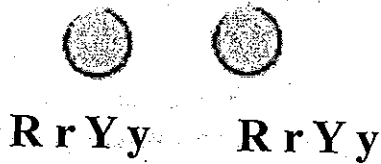
RY ry rY Ry

	ry	ry	ry	ry
RY	RrYy	RrYy	RrYy	RrYy
RY	RrYy	RrYy	RrYy	RrYy
RY	RrYy	RrYy	RrYy	RrYy
RY	RrYy	RrYy	RrYy	RrYy

100% of offspring = RrYy genotype
ROUND YELLOW phenotype

MAKE ANOTHER CROSS

HETEROZYGOUS ROUND YELLOW X HETEROZYGOUS ROUND YELLOW



POSSIBLE PARENT GAMETES?

RrYy



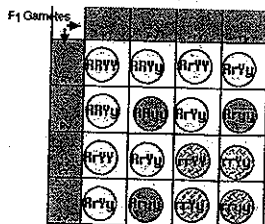
	RY	Ry	rY	ry	
RY	RRYY	RRYy	RrYY	RrYy	9 Round & Yellow
Ry	RRYy	RRyy	RrYy	Rryy	3 Round & green
rY	RrYY	RrYy	rrYY	rrYy	3 Wrinkled & yellow
ry	RrYy	Rryy	rrYy	rryy	1 wrinkled & green

Sign of a heterozygous dihybrid cross is a 9:3:3:1 ratio in offspring.

- 9 dominant TRAIT 1; dominant TRAIT 2
- 3 dominant TRAIT 1; recessive TRAIT 2
- 3 recessive TRAIT 1; dominant TRAIT 2
- 1 recessive TRAIT 1; recessive TRAIT 2

9:3:3:1 ratio is a clue that it's a HETEROZYGOUS TWO gene cross

PRACTICE MAKING GAMETES for DIHYBRID CROSSES



Results:
round-yellow : round-green : wrinkled-yellow : wrinkled-green
9 : 3 : 3 : 1

What are the possible gametes?

pure round & pure tall = R R T T



RT RT RT RT

What gametes can it produce?

What are the possible gametes?

Heterozygous Tall = T t R R
 & pure round ↙ ↓ ↓ ↘

TR tR tR TR
 What gametes can it produce?

What are the possible gametes?

Hybrid tall = T t r r
 & pure wrinkled ↙ ↓ ↓ ↘

Tr tr tr Tr
 What gametes can it produce?

What are the possible gametes?

Heterozygous tall = T t R r
 & hybrid round ↙ ↓ ↓ ↘

TR tr tR Tr
 What gametes can it produce?

SOUTH DAKOTA CORE SCIENCE STANDARDS

LIFE SCIENCE:

Indicator 1: Understand the fundamental structures, functions, classifications, and mechanisms found in living things.

9-12.L.1.1. Students are able to relate cellular functions and processes to specialized structures within cells.

Storage and transfer of genetic information

Core High School Life Science Performance Descriptors

High school students performing at the ADVANCED level:	predict how traits are transmitted from parents to offspring
High school students performing at the PROFICIENT level:	explain how traits are transmitted from parents to offspring;
High school students performing at the BASIC level	identify that genetic traits can be transmitted from parents to offspring;

SOUTH DAKOTA ADVANCED SCIENCE STANDARDS

LIFE SCIENCE:

Indicator 2: Analyze various patterns and products of natural and induced biological change.

9-12.L.2.1A. Students are able to predict the results of complex inheritance patterns involving multiple alleles and genes. (SYNTHESIS)

Examples: human skin color, polygenic inheritance