16/11

In a homozygote (SS), the probability of producing a S gamete is 1.
In a heterozygote (Ss), the probability of producing a S gamete is 1/2 and s gamete is also 1/2

Now consider F2 generation.

Here the probability of getting SS is $1/2 \times 1/2 = 1/4$ ie 25% are homozygous dominant.
The probability of getting ss is $1/2 \times 1/2 = 1/4$ ie 25% homozygous recessive.

Adding probabilities: Pro. What is the probability of getting Ss and sS?

Probability of Ss (S from sperm & s from egg) = $1/2 \times 1/2 = 1/4$
Probability of sS (s from sperm & S from egg) = $1/2 \times 1/2 = 1/4$

Both Ss & sS are heterozygotes having same phenotype
Hence added probability is $1/4 + 1/2 = 1/2$ ie
50% will be heterozygotes.

DIHYBRID CROSS

- Mendel crossed a pea plant producing round yellow seeds with one producing green and wrinkled seeds of pure bred variety.
- In F1 generation plants obtained producing only round yellow seeds.
- F1 were allowed for self-pollination to get F2

- In F2, 4 different types of plants were produced a) Round yellow b) round green c) Wrinkled yellow d) Wrinkled green.
- Phenotype ratio of 4 types were 9:3:3:1

Dihybrid cross: examination of 2 seperate traits in a single cross.
- for example: RRYY × rryy

The $F_1$ generation of a dihybrid cross ($R_rY_y$) shows only the dominant phenotypes of each trait.

RR YY × rr yy

(RY) (RY) (ry) (ry)

$F_1 = R_rY_y$

$F_1 \times F_1$

$R_rY_y \times R_rY_y$

(RY) (Ry) (rY) (ry)

AABB × aabb

↓

AaBb $F_1$ generation

| | AB | Ab | aB | ab |
|---|---|---|---|---|
| AB | AABB | AABb | AaBB | AaBb |
| Ab | AABb | AAbb | AaBb | Aabb |
| aB | AaBB | AaBb | aaBB | aaBb |
| ab | AaBb | Aabb | aaBb | aabb. |

$F_2$ Generat

Now what is the probability of getting an SS homozygote? ie 1/4
heterozygote (Ss or sS) is 1/4 + 1/4 = 1/2.

The added probability (ie spherical seed) = 3/4
The probability of yellow seed = 3/4
The probability of spherical yellow seed = 3/4 x 3/4
= 9/16.
(Since both events are independent).
Probability of yellow seed = 3/4
Probability of wrinkled seed = 1/4.
Hence added probability = 3/4 x 1/4 = 3/16.
Wrinkled yellow = 3/16
Wrinkled green = 1/16.

## PRINCIPLE OF INDEPENDENT ASSORTMENT (MENDEL'S 2nd Law)

The factors for two or more pairs of contrasting characters are distributed independently of one another at the time of gamete formation

In a dihybrid cross, the alleles of each gene assort independently

## DIHYBRID TEST CROSS

A dihybrid test cross involves crossing of F1 dihybrid with a double recessive parental type. RrYy (F1) x rryy (P)

| | YR | yr | Yr | yR |
|---|---|---|---|---|
| yr | YyRr | yyrr | Yyrr | yyRr |

Genotypic and Phenotypic ratio is 1:1:1:1

Q. Pure strain of mice with brown fur X grey fur. F1 we got only brown colour. Then F1 X F1. What is dominant then Phenotypic, genotypic ratio?

Ans: Dominant - Brown.
Phenotypic - 3:1
Genotypic - 1:2:1

Q.: Mice having Black, Long X White, short
F1 - Black short.
F2 - 9:3:3:1
↓ ↓ ↓ ↓
Black short, Black long, ~~Black~~ ~~short~~ White long, White short.