Answer on Question #64124 - Biology - Genetics

Recall that mendel crossed a true breeding tall, purple-flowered pea plants with a true breeding dwarf, white flowered plant. All the f1 plants were tall and purple flowered. If an f1 plant is now self-pollinated, what is the probability of obtaining an f2 plant heterozygous for the genes controlling height and flower color?

Solution
Alleles:
T – tall allele
t – dwarf allele
P - purple-flowered allele
p - white flowered allele

All parental plants are true breeding, so all of them are homozygous.
Genotypes of parental plants:
TTPP - genotypes of tall, purple-flowered pea plant (homozygous dominant)
ttpp – genotype of dwarf, white flowered plant (homozygous recessive)

Gametes produced by parenal plants:
ttpp → tp
TTPP → TP
Combine these gametes in the Punnet square for TTPP × ttpp crossing:

	TP
tp	TtPp

We've obtained all f1 plants with the same genotype TtPp (heterozygote) and with the phenotype of tall and purple flowered plant.

At the next step f1 plants were crossed: TtPp × TtPp
TtPp plant can produce 4 types of gametes:
TtPp → TP, Tp, tP, tp
So, the Punnet square:

TtPp

	TP	**Tp**	**tP**	**tp**
TP	TTPP	TTPp	TtPP	TtPp
Tp	TTPp	TTpp	TtPp	Ttpp
tP	TtPP	TtPp	ttPP	ttPp
tp	TtPp	Ttpp	ttPp	ttpp

In conclusion, from 16 offsprings (f2 generation) only 4 plants have genotype TtPp (heterozygous heterozygous for the genes controlling height and flower color)
Probability of TtPp f2 genotype: 4/16 = 1/4 = 25%
Answer:
the probability of obtaining an f2 plant heterozygous for the genes controlling height and flower color is 1/4