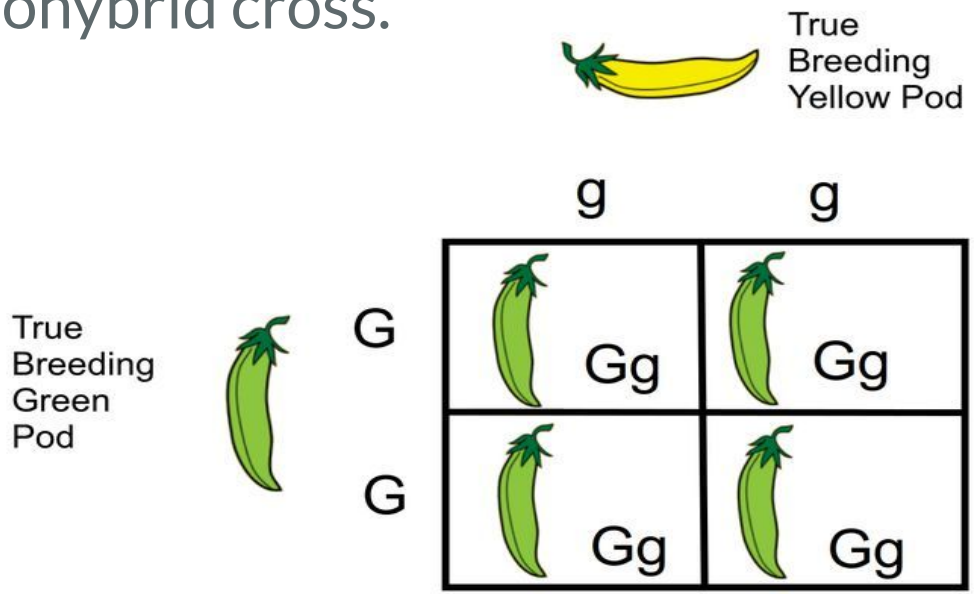
Solving Genetic Problems:

Monohybrid Cross

SBI3C Biology

Mono means One

If we are trying to figure out the inheritance of one trait, this is called a monohybrid cross.



Step 1: Read the problem carefully

A gardener is trying to improve the quality of his tomatoes. There is a gene for flavour intensity. The dominant allele is regular flavour, but the recessive allele is intensified flavour. It makes for a juicier, tastier tomato. If he breeds two plants that produce fairly ordinary tomatoes, but he knows that they are heterozygous, what are the chances he will produce intensified flavour tomatoes?

Read! Circle! Underline! Highlight! Mark it up!

Step 2: Assign symbols to the alleles

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Ordinary flavour is dominant. F

Intense flavour is recessive. f

Step 3: Write the P1 genotypes

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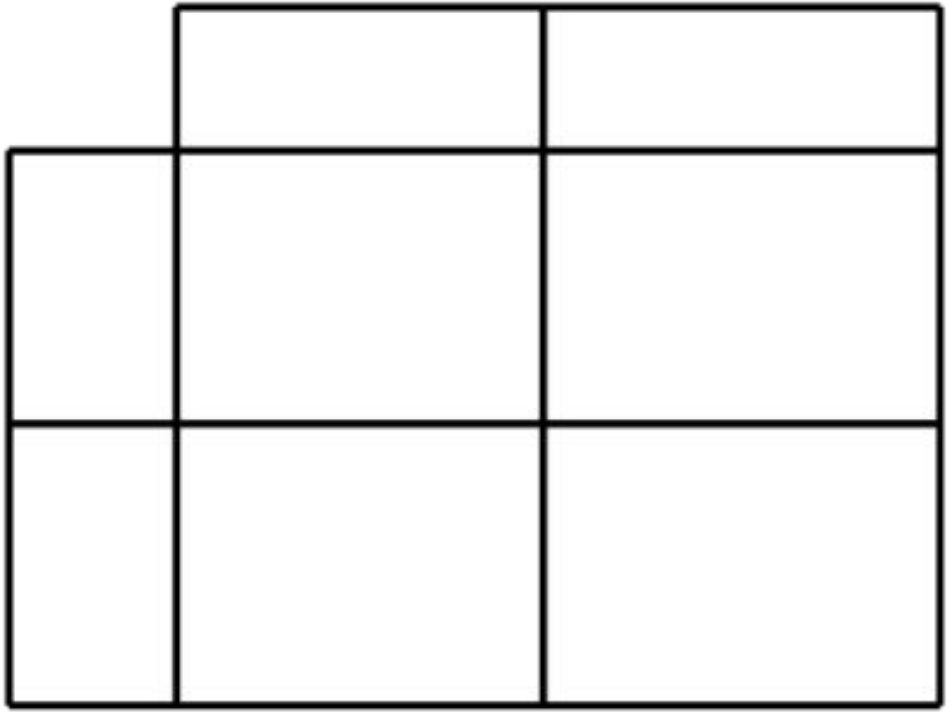
Both plants are heterozygous: Ff

Step 4: Draw a Punnett Square grid

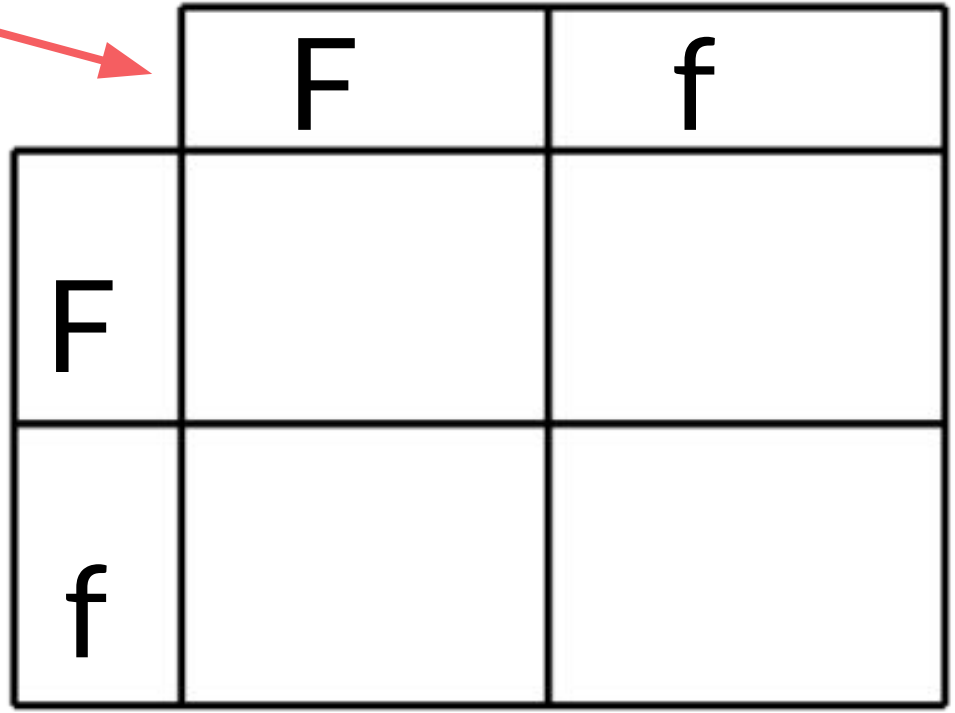
If it is a monohybrid cross (one trait) then you draw a four square grid.



Step 5: Fill in the P1 Genotypes

One parent here

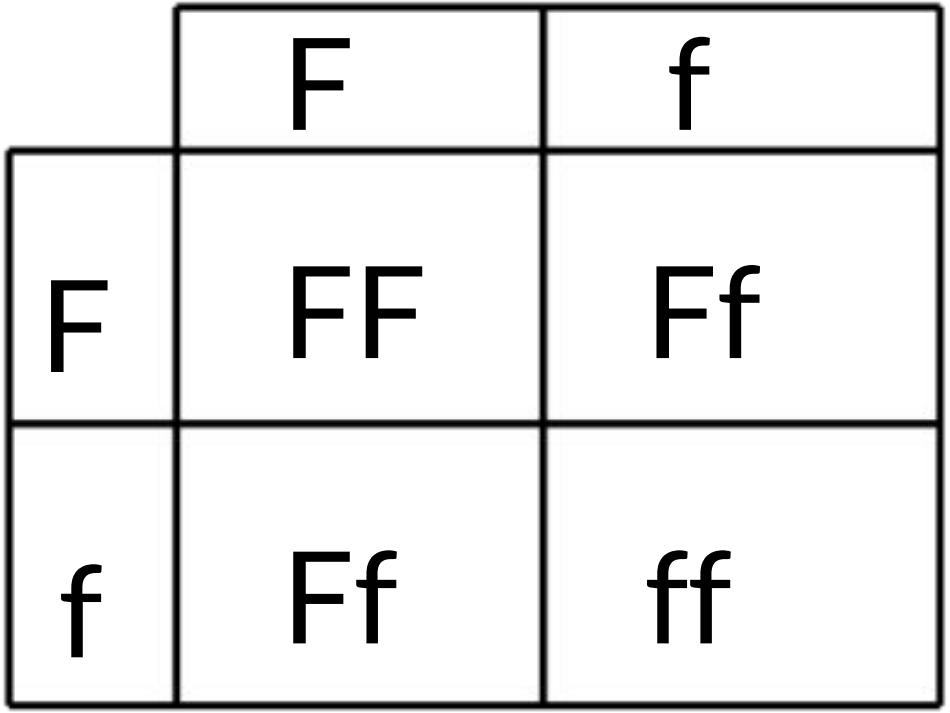
One parent here



Step 6: Fill in the F1 Genotypes

The F1 are the offspring.

Find their genotypes by matching columns & rows



Step 7: Write a Genotypic Ratio

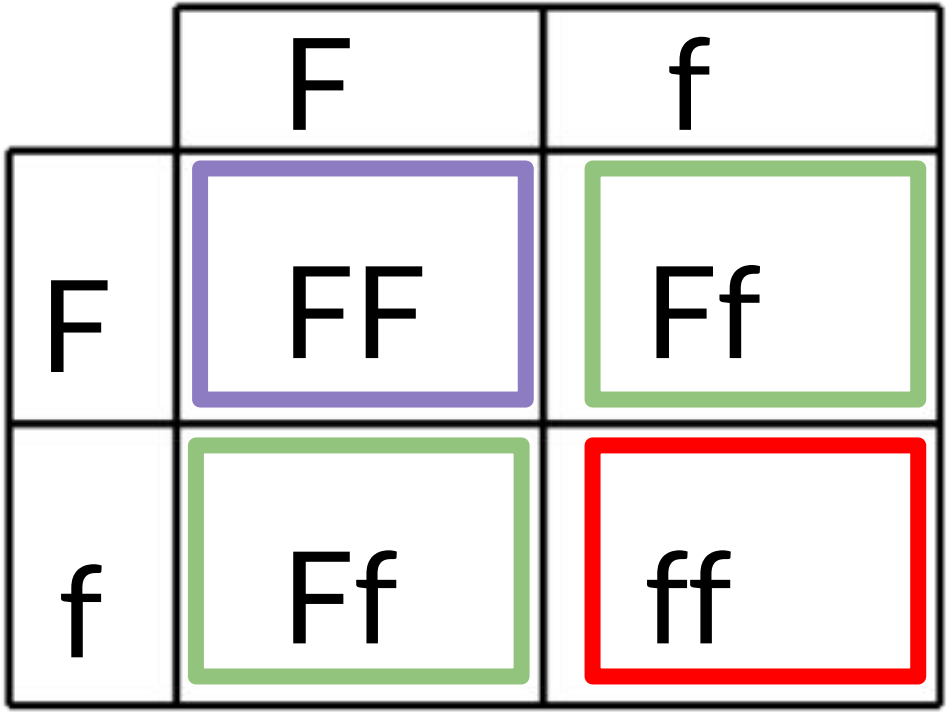
There are:

1 Homozygous Dominant

2 Heterozygous

1 Homozygous recessive

1:2:1 Ratio



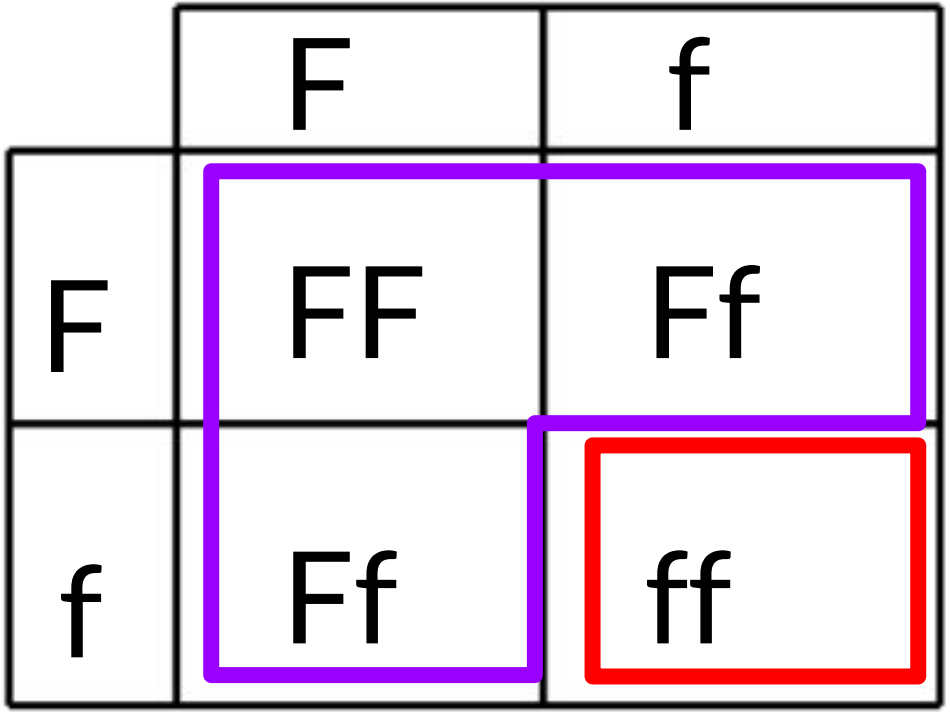
Step 8: Write a Phenotypic Ratio

There are:

3 plants with regular flavour tomatoes

1 plant with intensified flavour tomatoes

3:1 Ratio



Step 9: Write a concluding statement

A gardener is trying to improve the quality of his tomatoes. There is a gene for flavour intensity. The dominant allele is regular flavour, but the recessive allele is intensified flavour. It makes for a juicier, tastier tomato. If he breeds two plants that produce fairly ordinary tomatoes, but he knows that they are heterozygous, what are the chances he will produce intensified flavour tomatoes?

The gardener has a 25% chance of getting plants with improved flavour. Only 1 in 4 plants will be homozygous recessive, or intensified flavour plants.

Try these:

1. In pea plants, tall is dominant and short is recessive. If Mendel crossed purebred tall plants and heterozygous tall pea plants, would all of the offspring be tall plants?

2. Blue eyes are a recessive human trait, and Brown eyes are dominant. If a blue eyed woman has a child with a homozygous brown eyed man, what are the chances of having a blue eyed child?

3. In dogs, floppy ears are dominant and erect ears are recessive. If two dogs, both heterozygous for floppy ears, are mated, what is the chance of having erect-ear puppies?

Solutions:

1. Pea plant height

	T	T
T	TT	TT
t	Tt	Tt

Genotypic ratio 1:1

Phenotypic ratio 1:0

100% tall plants

2. Human eye colour

	b	b
B	Bb	Bb
B	Bb	Bb

Genotypic ratio 1:0

Phenotypic ratio 1:0

No chance of blue eyed child; 100% brown eyed children

3. Dog ear shape

	F	f
F	FF	Ff
f	Ff	ff

Genotypic ratio 1:2:1

Phenotypic ratio 3:1

25% chance of erect ears in puppies