HARDY WEINBERG THEOREM DERIVATION

In a population with two alleles "A" and "a"…

Let proportion of AA = D (dominant genotype);
Aa = H (heterozygote genotype)
aa = R (recessive genotype)

Then D + H + R = 1
Let p = allele frequency of "A" & q = allele freq. of "a"
p = D + ½ H; q = R + ½ H

m		f	Freq. mating	Progeny AA	Progeny Aa	Progeny aa
AA	x	AA	DD	D^2		
AA	x	Aa	DH	DH/2	DH/2	
Aa	x	AA	HD	DH/2	DH/2	
AA	x	aa	DR		DR	
aa	x	AA	RD		DR	
Aa	x	Aa	HH	$H^2/4$	$H^2/2$	$H^2/4$
aa	x	Aa	RH		HR/2	HR/2
Aa	x	aa	HR		HR/2	HR/2
aa	x	aa	RR			R^2

Totals: $D^2 + DH + 1/4\ H^2$
$= (D + 1/2\ H)^2$
$= p^2$

$DH + 2\ DR + HR + H^2/2$
$= 2\ (D + 1/2\ H)\ (1/2\ H + R)$
$= 2pq$

$1/4\ H^2 + HR + R^2$
$= (1/2\ H + R)^2$
$= q^2$