Preliminaries.

	Offspring Probabilities		
Parent Genotypes	AA	Aa	aa
$AA \times AA$	1	0	0
$AA \times Aa$	1/2	1/2	0
$AA \times aa$	0	1	0
$Aa \times Aa$	1/4	1/2	1/4
$Aa \times aa$	0	1/2	1/2
$aa \times aa$	0	0	1

Homozgous dominant individuals have the AA genotype, homozgous recessive individuals have the aa genotype, and heterozygoous dominant individuals have the Aa genotype.

Individuals with genotypes AA and Aa express the dominant trait. Individuals with genotype aa are recessive for this gene.

Here are some practice problems.

(a) In an $AA \times Aa$ cross that produces 16 independent offspring, what is the expected number of heterozygotes? What is the probability that exactly 10 offspring are heterozygotes?

(b) In an $Aa \times Aa$ cross that produces 16 independent offspring, what is the expected number of dominant offspring? What is the probability of exactly 10 dominant offspring?

(c) A heterozygote individual from the F_1 generation is pollinated with pollen collected from a large sample of F_2 individuals. In the F_2 generation, the genotype frequencies of AA, Aa, and aa are 1/4, 1/2, and 1/4 respectively. You can think of the pollen grain lead to offspring as selected independently at random. What proportion of the offspring are expected to have the dominant trait?

(d) A random individual from the F_2 population is selected. This individual is crossed with an aa individual. Given that all six offspring have the dominant phenotype, what is the probability that the randomly selected parent has genotype AA?

(e) A random individual from the F_2 population is selected. This individual is crossed with an aa individual. Given that five of six offspring have the dominant phenotype, what is the probability that the randomly selected parent has genotype AA?

(f) A random individual from the F_2 population is selected. This individual is crossed with an aa individual. Given that all four of six offspring have the dominant phenotype and that two do not, what is the probability that the randomly selected parent has genotype Aa?

(g) Repeat the previous problem except that the cross was with an Aa individual.