Here are the formulae you are responsible for learning:

**Hardy-Weinberg and Null Models:**
Genotype frequencies expected for a population in Hardy-Weinberg equilibrium

\[ p = \frac{2}{3} p_f + \frac{1}{3} p_m \]  
(understand where this came from)

**One locus haploid selection:**

\[ p_{t+1} = \frac{p_t W_A}{p_t W_A + q_t W_a} \]

\[ p_t = \frac{p_0 W'_A}{q_0 W'_a} \]

\[ \Delta p = p_{t+1} - p_t = \frac{(W_A - W_a)p_t q_t}{W_i} \]

(and where these came from)

**One locus diploid selection:**

\[ p_{t+1} = \frac{p_t^2 W_{AA} + p_t q_t W_{Aa}}{W_i} \]

\[ p_t = \frac{p_0 W'_A}{q_0 W'_a} \]

\[ \hat{p} = \frac{W_{Aa} - W_{aa}}{2W_{AA} - W_{Aa} - W_{aa}} \]

(you should know the relative fitness equations: 1+s, 1+hs and 1)

**Mutation and generating variation:**

\[ \hat{p} = \frac{\nu}{\mu + \nu} \]  
(mutation only)

\[ \hat{q} = \frac{\mu}{hs} \]  
(h>0)

\[ \hat{q} = \sqrt{\frac{\mu}{s}} \]  
(h=0)(mutation-selection)

**Genetic association (aka Gametic disequilibrium or linkage disequilibrium)**

\[ D = x_{11} \cdot x_{22} - x_{12} \cdot x_{21} \]

\[ x_{11}[t+1] = x_{11}[t] - rD_t \]

\[ x_{12}[t+1] = x_{12}[t] + rD_t \]

\[ x_{21}[t+1] = x_{21}[t] + rD_t \]

\[ x_{22}[t+1] = x_{22}[t] - rD_t \]

\[ D[0] = (1-r)^t D[0] \]