

1. Five different human populations have the following MN blood group frequencies:

	MM	MN	NN
Pop 1	0.08	0.40	0.52
Pop 2	0.20	0.20	0.60
Pop 3	0.64	0.32	0.04
Pop 4	0.36	0.39	0.25
Pop 5	0.81	0.18	0.01

a) What are the allele frequencies for each? (always show your work)

Pop 1

Pop 2

Pop 3

Pop 4

Pop 5

b) Which populations are in Hardy-Weinberg equilibrium?

2. An F1 plant with the genotype BbEe is mated to a bbee plant. The resulting seeds are planted and the following phenotypes produced in these numbers:

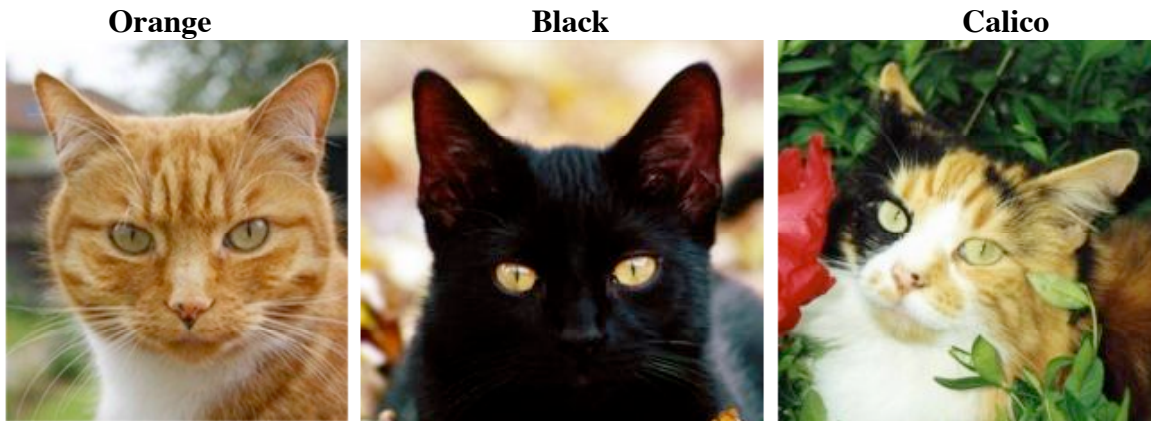
BE	67
Be	121
bE	103
be	42

a) What do you think were the genotypes of the parental strains that produced the F1?

b) What is the distance between the genes? Show your work!

c) What is the likelihood that the genes are linked? Use  $\chi^2$  analysis.

3. Orange is a sex-linked color in cats. In females the alleles are “co-dominant” due to X-inactivation, producing tortoiseshell/calico color. For practical purposes I will refer to non-orange color as black, though in truth there are a lot of non-orange colors. In Boston in 1964 a group of stray cats were counted and color noted. There were 99 black males, 102 black females, 28 orange males, 4 orange females, no tortoiseshell/calico males, and 48 tortoiseshell/calico females.



Use the letters O for orange and o for not orange (black) if you need to use them (keep a big size difference between O and o)

- a) What are p and q?
- b) Is the population in Hardy Weinberg equilibrium?
- c) Why are there so many more orange males than orange females?
- d) On very rare occasions one finds a male tortoiseshell. They are usually sterile. What do you think causes that?

4. You are studying Brazilian Banana flies. They can have green or yellow (Y) bodies, brown (B) or blue eyes, and long (L) or short antennae. You mate two flies from true-breeding strains (P1, P2) and then test cross the F1. These are the results from your test cross:

<u>Phenotype</u>	<u>number</u>
green, brown eyes, long antennae	291
green, brown eyes, short antennae	16
green, blue eyes, long antennae	624
green, blue eyes, short antennae	82
yellow, brown eyes, long antennae	88
yellow, brown eyes, short antennae	606
yellow, blue eyes, long antennae	14
yellow, blue eyes, short antennae	279

a) What were the phenotypes of the two true-breeding strains?

b) Calculate the distances between the genes, show your calculations, draw a map showing map units.