

PRACTICE PROBLEMS 3 ANSWERS

1. (a) *ADE met, ade MET* (b) *ADE MET, ade met* (c) recombination frequency = # recombinants / # total = 28/100 = 0.28

2. (a) wild type (b) *ADE MET, ade met* (c) *ADE met, ade MET* (d) 28/100 = 0.28
 How to do it: since you don't know the genotypes of the parents of the diploid, you have to identify parentals as the most common pair of reciprocal genotypes, while the recombinants are the least common. These parental genotypes are the genotypes of the two chromosomes in the diploid parent.

3. (a) Parentals are *vestigial* and *black*; recombinants are wild type and *black vestigial*. (b) 25/150 = 0.167

How to do it: The female parent had to be heterozygous for both black body color and vestigial wings; if she had been homozygous dominant, all progeny would have had the wild type phenotype. The parental genotypes are those that are most common among the progeny, so that female's parents were $b^+ b^+ vg\ vg$ X $b\ b\ vg^+ vg^+$. This will give the female chromosomes in which b^+ and vg are on one chromosome, and b and vg^+ are on the other. The male contributes only $b\ vg$ chromosomes. While going through this reasoning, it is wise to write out the chromosomes of each individual, starting with the female's parents.

4. *sh* is the middle locus because it is the one that is switched in its relation to the other markers in the double crossover classes compared to the parentals. Then you can get the map by calculating two distances:

$$c-sh = 99 + 15 + 84 + 20 = 218 \quad 218/6708 = 0.0324 = 3.2\% \text{ recomb.} = 3.2 \text{ map units}$$

$$sh-wx = 974 + 15 + 20 + 951 = 1960 \quad 1960/6708 = 0.2923 = 29.2 \text{ map units}$$

Of course if you aren't sure which gene is in the middle, then you would have to calculate all three pairwise distances, including *c-wx*.

