

Please write legibly. If it takes me too long to decipher your handwriting, I won't be able to give credit for your answer.

If you wish to keep your grade hidden from others, you must write your name above and also on the back of the last sheet.

1. a) What are the ends of chromosomes called?
b) What is the region of the chromosomes called where the microtubules of the spindle connect?
2. How many linkage groups are there in male humans?
3. Describe in detail and in sequential order, the process that could be used to make seedless pumpkins. Include how they would be made year after year, taking into account that pumpkins are annuals. Continue on the back of this sheet.
4. Which of the two kinds of inversions causes the possibility of the formation of acentric and dicentric chromosomes?
5. Describe, how in just a few seasons, nature could create a whole new plant species.

6. A plant with the following genotype $AaBbCcDdEeFfGghii$ is crossed to another with the genotype $aabbccddeeffgghii$. Assuming complete linkage of all the genes, how many different genotypes would be expected among the progeny of the cross?
7. In men the allele for baldness is sex influences, with a dominant mode of inheritance in males and a recessive mode in females. A woman, who has hair, but whose mother and father were bald has children with a man who has hair, but whose father was bald. What is the chance that the women children will end up bald? What is the chance that the men children will have hair?
8. Both color-blindness and hemophilia are sex-linked recessive diseases. A color-blind man marries a normal woman. Among their children are a color-blind boy, a color-blind girl, a normal girl and a boy with hemophilia. Draw the genotypes of each of the parents, including the associations of the alleles on the chromosomes.
9. Blue fins are dominant to white. Long fins are dominant to short. Some F1 fish with blue and long fins are crossed to fish with white short fins. The following are counted among the progeny:
- | | |
|--------------|-----|
| Blue, Short | 300 |
| White, Long | 300 |
| Blue, Long | 200 |
| White, Short | 200 |
- a) Draw the chromosomes as they are in the non-meiotic cells of the F1 fish, including correct association of alleles on the chromosomes and the distances between the two genes. (7 points)
- b) What were the phenotypes of the two parents of the F1? (3 points)
10. In the nematode, d (dumpy), u (uncoordinated), and k (knobby) are all recessive genes located on the same chromosome. The order of the genes is not known. You are asked to draw a map of the chromosomes of the F1, including the distances between the genes and the correct order. To do so, females heterozygous normal for all three traits were mated with dumpy, uncoordinated, knobby males and the

following progeny were observed:

<u>dumpy uncoordinated knobby</u>	<u>3</u>
<u>uncoordinated knobby</u>	<u>392</u>
<u>knobby</u>	<u>34</u>
<u>uncoordinated</u>	<u>61</u>
<u>dumpy uncoordinated</u>	<u>32</u>
<u>dummpy knobby</u>	<u>65</u>
<u>dumpy</u>	<u>410</u>
<u>wild-type</u>	<u>3</u>
Total	1000

Extra Credit: (20 points): From a three-point testcross mapping experiment, the following gamete genotype frequencies were obtained:

XYZ	365
xyz	367
xYz	110
XYz	5
XyZ	105

Draw a map of the chromosome, including correct assignment of the alleles to each parental chromosome, distances between the genes and correct order of the alleles. This is an all correct or not correct challenge question.

Extra Credit (10 points): The frequency of the baldness allele in the general population is 0.19. A man has a father with hair. His mother's father also had hair. This is all he knows of his background. What is the chance he will be bald?