

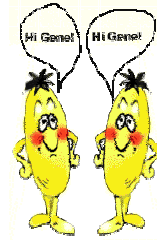
Name \_\_\_\_\_

Date \_\_\_\_\_

7 \_\_\_\_\_ *Life Science*  
*Sex-Linked Traits 7E-2*



Teacher:  
**Miss Stanley**



- \_\_\_\_\_ (a) 1. Hemophilia, a recessive trait found on the X chromosome, is sometimes called "bleeder's disease." Since hemophilia is recessive, we will use the letter h for the hemophilia gene and H for normal, dominant gene. Give the genotypes of (a) \_\_\_\_\_ (b) a woman with normal blood clotting whose father had hemophilia and (b) a \_\_\_\_\_ (c) a normal man whose father had hemophilia. (c) What is the probability that a \_\_\_\_\_ (d) mating between these two individuals will produce a child, regardless of sex, \_\_\_\_\_ (e) that has hemophilia? (d) If this couple has a daughter, what is the probability \_\_\_\_\_ (e) that the daughter will be a carrier of the hemophilia trait? (e) What is the \_\_\_\_\_ (f) probability a daughter would have hemophilia? (f) If this couple has a son, what \_\_\_\_\_ (f) is the probability he will have hemophilia?

- \_\_\_\_\_ (mother) 2. A boy, whose parents and grandparents had normal vision, is color-blind. \_\_\_\_\_ (grandmother) What are the genotypes for his mother and his maternal grandparents. \_\_\_\_\_ (grandfather)

- \_\_\_\_\_ (a) 3. The bison herd on Konza Prairie has begun to show a genetic defect. Some of \_\_\_\_\_ (b) the males have a condition known as "rabbit hock" in which the knee of the back \_\_\_\_\_ (c) leg is malformed slightly. We do not yet know the genes controlling this trait but for the sake of our question, we shall assume it is a sex-linked gene and that it is \_\_\_\_\_ (a) recessive. Now, suppose that the herd bull (the dominant one which does most of the breeding) who is normal mates with a cow that is a carrier for rabbit hock. (a) What are his chances of producing a normal son? (b) If he mates with this \_\_\_\_\_ (c) cow every year, what percentage of their daughters have normal knees? (c) \_\_\_\_\_ (c) What percentage of their daughters will be carriers of rabbit hock?

\_\_\_\_\_ (a) 4. A rancher owns a bull with many desirable characteristics. Unfortunately, he also has a sex-linked trait that in the recessive form leads to no pigment formation in the iris of the eye. This makes the bull very sensitive to sunlight and could lead to blindness. The rancher wishes to breed him to a cow that will minimize the chances of any offspring showing this trait. She would especially like to produce another bull with most of his sire's desirable qualities but without the nonpigmented eye. Two cows with the dominant normal colored eyes ( $X^N$ ) are available that have been genetically typed for this particular trait. Cow 1 has a genotype of  $X^N X^N$  and cow 2 is  $X^N X^n$ . (a) Which of these two cows should the rancher choose as a mate to her bull if she wishes to minimize the occurrence of the nonpigmented eye in his offspring? (b) What percentage of the male offspring from the preferred cross will have nonpigmented eyes?

\_\_\_\_\_ (a) 5. Clouded leopards are a medium sized, endangered species of cat, living in the very wet cloud forests of Central America. Assume that the normal spots ( $X^N$ ) are a dominant, sex-linked trait and that dark spots are the recessive counterpart. Suppose as a Conservation Biologist, you are involved in a clouded leopard breeding program. One year you cross a male with dark spots and a female with normal spots. She has four cubs and, conveniently, two are male and two female. One each of the male and female cubs have normal spots and one each have dark spots. (a) What is the genotype of the mother? Suppose a few years later, you cross the female cub that has normal spots with a male that also has normal spots. (b) How many of each genotype will be found in the cubs (assume 4)? (c) Will any of the cubs from this latest cross have dark spots? (d) If so, how many and of what sex will they be?

\_\_\_\_\_ (c)

\_\_\_\_\_ (d)

\_\_\_\_\_ (a) 6. A woman with red-green color-blindness has a mother with normal vision. (a) Knowing that color-blindness is a sex-linked recessive gene, can you determine what her father's phenotype is? (b) If so, what is it? The woman marries a man with normal vision. (c) What is the probability they will have sons who are red-green color-blind? (d) What is the probability they will have daughters who are red-green color-blind?

\_\_\_\_\_ (d)