CONCEPT: SEX-LINKED INHERITANCE

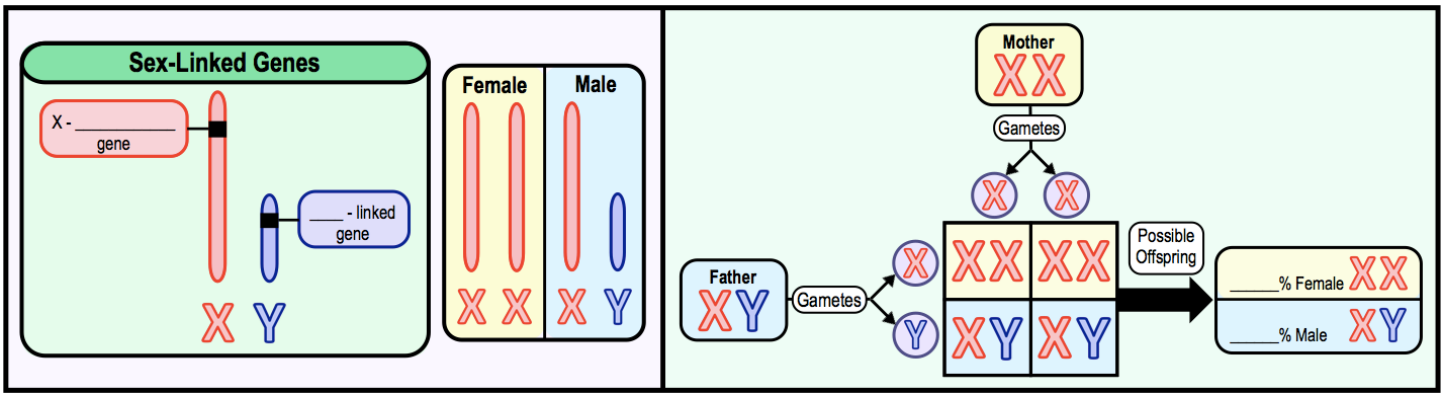
●Recall: *sex chromosomes* (X or Y) determine the _____ of an organism.

□ Female (♀): X _____ □ Male (♂): X _____

●_____**-Linked Genes**: genes found on *either* sex chromosome (X or Y).

□ X-chromosome contains ~1,100 ____**-linked genes**. □ Y-chromosome contains ~100 ____**-linked genes**.

□ With each fertilization, there is a _____% chance of having a female.



X-Linked Inheritance

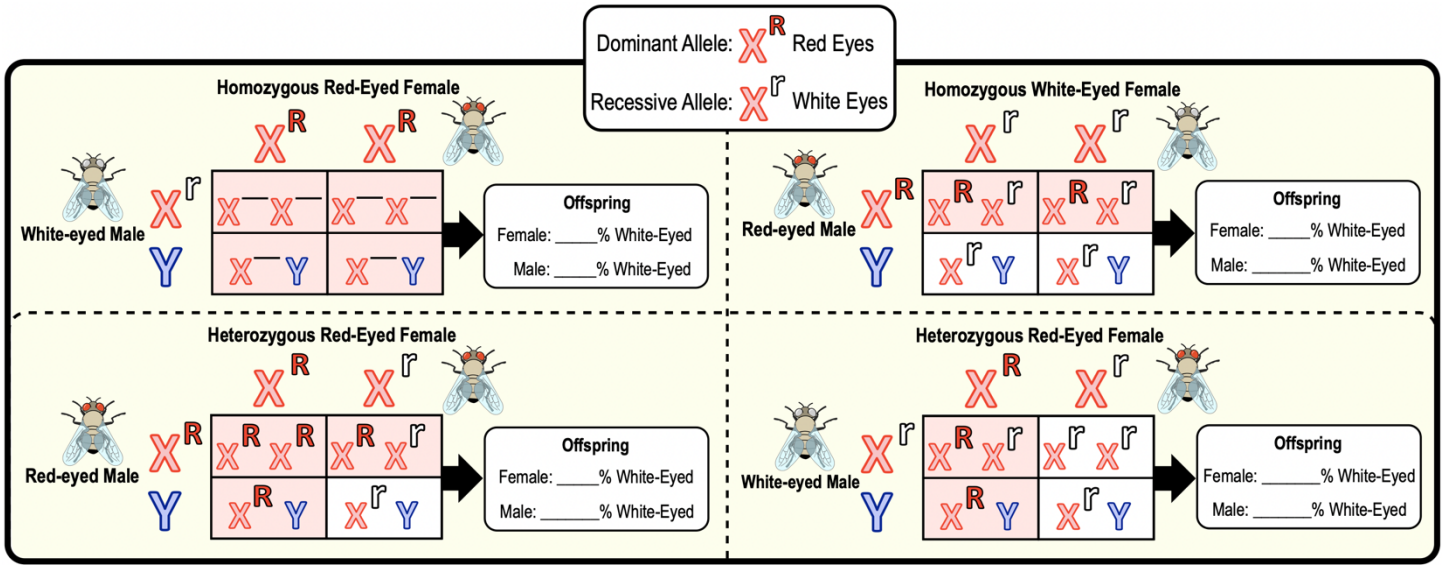
●Females have _____ alleles for each X-linked gene (one allele inherited from _____ parent).

□ Therefore, females can be _____*zygous* dominant/recessive or _____*zygous* for X-linked genes.

●Males have _____ allele for each X-linked gene (_____ inherited from *mother*; _____ inherited from *father*).

□ Therefore, _____ express whatever X-linked allele is on their *single* X-chromosome.

EXAMPLE: Experiment Tracking Eye Color in Fruit Flies Revealed X-Linked Inheritance Pattern.



CONCEPT: SEX-LINKED INHERITANCE

PRACTICE: Wild type fruit flies have red eyes. A white-eyed female fly is crossed with a red-eyed male fly. All of the females from the cross are red-eyed and all of the males, white-eyed. What type of inheritance pattern is this?

a) Autosomal recessive.
c) Sex-linked on X chromosome.
e) Sex-linked on Y chromosome
a) Autosomal dominant.
d) Incomplete dominance.

PRACTICE: When Thomas Hunt Morgan crossed red-eyed F1 generation flies to each other, the F2 generation included both red- and white-eyed flies. Remarkably, all the white-eyed flies were male. What was the explanation for this result?

a) The gene involved is located on the Y chromosome.
b) The gene involved is located on the X chromosome.
c) The gene involved is located on an autosome, but only in males.
d) Other male-specific factors influence eye color in flies.

X-Linked Recessive Disorder: Hemophilia Inheritance

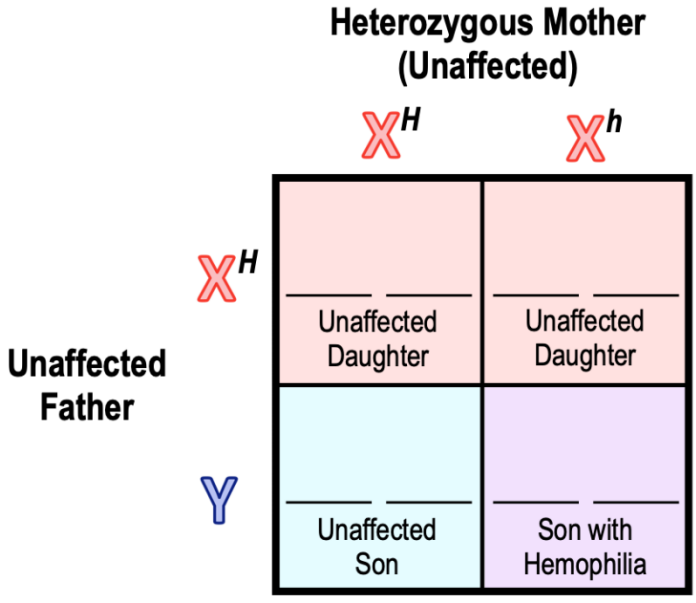
●Hemophilia (abnormal blood clotting) is an _____-linked _____ disorder in humans.

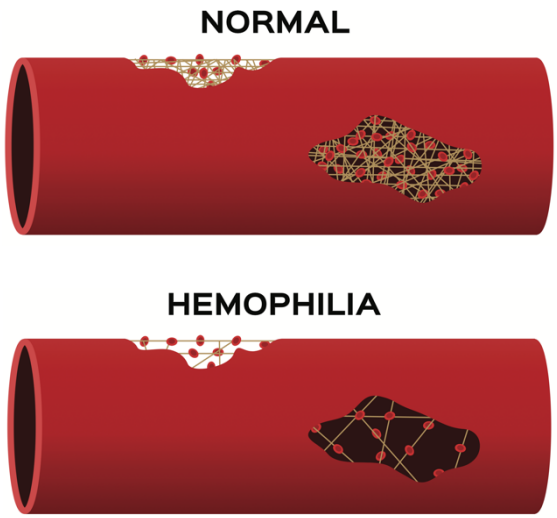
●**X-Linked Recessive Disorder**: expressed if individual only has the _____ allele(s) on X chromosome(s).

□ *Females* must be *homozygous recessive* (_____ recessive alleles) to be affected.

□ Males only require _____ recessive allele to be affected, making males _____ likely to be affected.

EXAMPLE: Hemophilia A is an X-Linked Recessive Disorder.





CONCEPT: SEX-LINKED INHERITANCE

PRACTICE: Women with X-linked disorders always pass the genes for the disorder on to _____. While men with X-linked disorders always pass the genes for the disorder on to _____.

a) only their daughters; only their daughters.

b) both their daughters and sons; only their sons.

c) both their daughters and sons; only their daughters.

d) both their daughters and sons; both their daughters and sons.

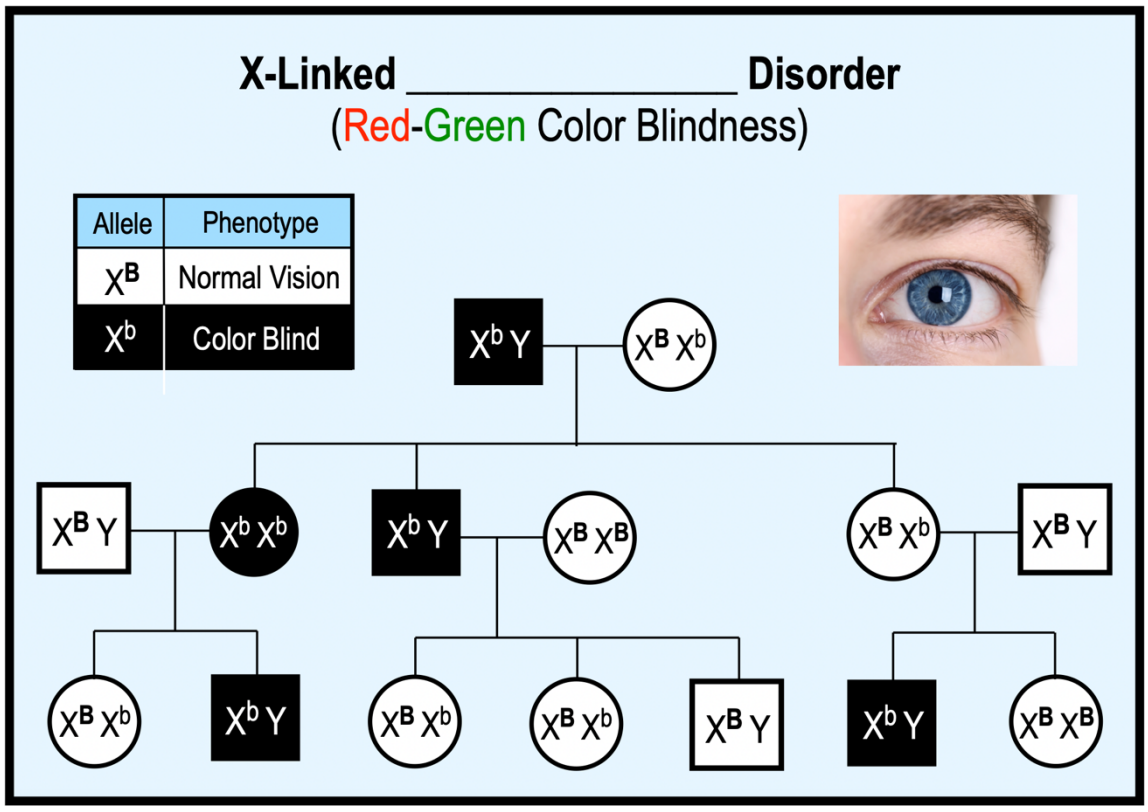
X-Linked Recessive Pedigrees

●Pedigrees depicting an X-linked recessive disorder show that _____ males are affected than females.

□ Females can only be affected if the father is affected & the mother is at least a carrier.

□ All sons of an affected _____ will be affected.

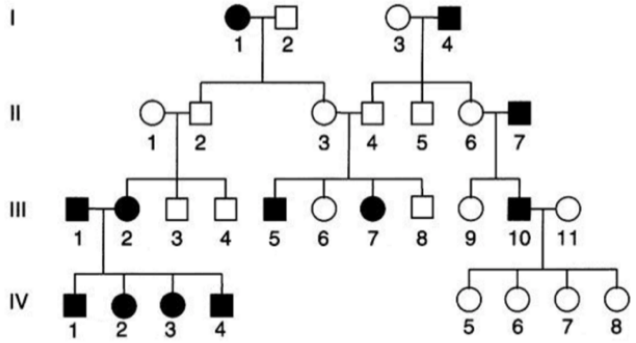
EXAMPLE: Pedigrees of an X-linked Recessive Disorder.



CONCEPT: SEX-LINKED INHERITANCE

EXAMPLE: What is the inheritance pattern of the following pedigree?

a) X-linked recessive.
b) X-linked dominant.
c) Autosomal Dominant.
d) Autosomal Recessive.
e) Y-linked.



PRACTICE: The following pedigree is for the X-linked-recessive trait for color blindness. Using X^N for the normal allele and X^n for the color blindness allele, fill in the top half of the boxes/circles with the genotype. Also, fill in the bottom half of the boxes/circles with the phenotype (Normal vision or color blind). If it is impossible to know for certain a specific allele in the genotype, then place a "?" to represent the allele that is in question.