

Key

X-LINKED TRAITS

X-linked traits begin with a different punnett square setup. Study the following setup and use this to begin each x-linked punnett square. Trait letters go after and above to the right of the X like a superscript. Go ahead and try to cross the punnett below.

	X^H	X^h
X^H	$X^H X^H$	$X^H X^h$
X^h	$X^H X^h$	$X^h X^h$
Y	$X^H Y$	$X^h Y$

The choices available for genotype are stated below. I have used the letter of the trait above, but obviously, depending on the trait, the letter would change.

Female genotype choices:

$\frac{H}{H}$
XX homozygous dominant normal

$\frac{H}{h}$
XX heterozygous dominant normal

$\frac{h}{h}$
XX homozygous recessive (affected in an X-linked recessive trait)

Male genotype choices:

$\frac{H}{Y}$ XY dominant - not affected

$\frac{h}{Y}$ XY recessive - affected

Notice above that there are only two choices for the male. He either has the dominant trait on his X or he does not. You will not be putting any letters up and to the right of the Y letter (or chromosome). This is because the trait is X-LINKED, so it does not appear on the Y chromosome.

Because the male either has the trait, or does not, there is no carrier, or heterozygous for the male. The female, however, has all of the choices you have been using. In order to present this concept I have chosen not to include the X-linked dominant, and also the Y-linked diseases in general. You may run into them while you are reading about your genetic illnesses.

Let's try some other problems:

- Using the letters C and c (please underscore the recessive c): Cross a colorblind male with a heterozygous female.

	X^c	Y
X^C	$X^C X^c$	$X^C Y$
X^c	$X^c X^c$	$X^c Y$

- State the phenotypes of the males/females separately after crossing the above:

1 female colorblind, 1 normal (carrier), 1 male normal, 1 male colorblind

- Using the letters R and r : cross a homozygous red-eyed female fruit fly with a white-eyed male.

Wrong $\begin{matrix} R & R \\ Rr & Rr \\ Rr & Rr \end{matrix}$ → $\begin{matrix} X^R & X^R \\ X^R & X^r \\ X^R & X^r \\ Y & Y \end{matrix}$

- Give the male/female results of the above cross:

2 red eyed females > 100% red eyes
2 red eyed males