


Reading Check

- 6. State** What type of chromosomes determine a person's sex or gender?

Reading Check

- 7. Explain** Why can only females pass on maternal inherited traits?

What is sex-linked inheritance?

Recall that humans have 23 pairs of homologous chromosomes in their body cells. Sperm and egg cells, however, have only one chromosome from each chromosome pair. Most homologous chromosome pairs are of equal size. There is one exception—the long X and short Y pair. Chromosomes X and Y are the **sex chromosomes** because they contain the genes that determine a person's gender or sex. 

Except for sperm and eggs, each cell in a male has an X chromosome and a Y chromosome. Each cell in a female has two X chromosomes. Because the Y chromosome is shorter than the X chromosome, many genes on the X chromosome are not on the Y chromosome. Each of those genes, then, has only one allele, the one on the X chromosome. A recessive phenotype is usually observed only if the genotype is homozygous. A recessive phenotype is observed in a male when a one-allele gene on a male's X chromosome has a recessive allele. That's why males are more likely than females to have X-linked recessive genetic conditions.

What is polygenic inheritance?

Some traits are determined by only one gene. This one gene, however, can affect more than one trait in an organism. In fact, many traits result from the interactions of more than one gene. **Polygenic inheritance** is when multiple genes determine the phenotype of a trait. When several genes determine a trait, many alleles affect the phenotype, even though each gene has only two alleles. Many phenotypes are possible when polygenic inheritance determines a trait. For example, polygenic inheritance determines your height, weight, and skin color.

What is maternal inheritance?

You have learned that DNA makes up the chromosomes in the nucleus of each cell. But, mitochondria contain DNA too. Mitochondria are scattered throughout the cytoplasm of cells, even egg cells. However, only the tail of a sperm cell has mitochondria. Since the sperm's tail does not enter the egg cell during fertilization, humans inherit mitochondrial genes only from their mothers. This means the inheritance of traits related to mitochondria can be traced from a grandmother to her children and her grandchildren. Maternally inherited traits can be passed to male offspring, but only female offspring can pass the gene on. 