***Sex-linked Characteristics NOTES AND CFU BLAST!***

**Review Problem: Dominant/Recessive**

* Huntington disorder is a progressive degeneration of the nervous system that begins at middle age and results in an early death. It is caused by a single autosomal gene mutation that acts in a ***dominant*** fashion. (Use the letter “H” to represent the Huntington’s allele)
1. A 40 year old man was just diagnosed with Huntington disorder. What could his genotypes be? ­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. His wife went for genetic screening for the Huntington allele and learned that she did not have it. What is her genotype? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Assume it was determined through genetic screening that the husband only had one copy of the Huntington allele. What must his genotype be? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Draw a Punnett square to determine their children – circle the children with the Huntington allele.

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GENOTYPES:

Genotypic ratio:

PHENOTYPES:

Phenotypic ratio:

1. They have a 12 year old son. What is the chance that he inherited the disorder? \_\_\_\_\_\_\_
2. Now assume it was determined through genetic screening that the husband had two copies of the Huntington allele… now what must the son’s genotype be? \_\_\_\_\_\_\_\_\_\_\_\_

**Key Words and such…**

* Autosome \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Autosomal inheritance = dominant/recessive etc.
* Sex chromosomes = X and Y chromosomes
* Females have \_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ have XY

**Genetics and Abnormalities**

* Genetics is the study of heredity.
* Heredity is how different genes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**How are genes passed down from parents to children?**

* DNA is stored in our bodies’ \_\_\_\_\_\_\_\_\_\_\_. Genes can be found on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. A normal chromosome carries 1,000 or more genes. In our bodies, chromosomes are found in pairs.
* Chromosomes carry genetic information (DNA) that is passed down from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Cells need DNA to provide directions that allow the cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

MOM

DAD

* When an egg is fertilized by a sperm, the resulting embryo gets \_\_\_ of its chromosomes from its mother and \_\_\_ its chromosome from its father.
* The genetic information in these chromosomes provide directions for making a baby with certain characteristics.
* Humans have 23 pairs of chromosomes-46 total chromosomes. A human being inherits 23 chromosomes from their mother and 23 chromosomes from their father. The 23rd chromosome is the chromosome that determines whether \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. -*Label the diagrams of the chromosomes*

* **\_\_\_\_\_\_\_\_\_\_\_\_\_, your 23rd pair of chromosomes look different, XY.**
* **If you are female, your 23rd pair of chromosomes look the same, \_\_\_\_.**

**CFU Problem:**

1. How many genes are on a typical chromosome? \_\_\_\_\_\_\_\_
2. What percentage of your chromosomes comes from your Mom? What percentage comes from your Dad? Mom:\_\_\_\_\_\_\_\_\_ Dad:\_\_\_\_\_\_\_\_\_
3. Draw a Punnett Square for the 23rd chromosome:

GENOTYPES:

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Genotypic ratio:

PHENOTYPES:

Phenotypic ratio:

**Sex-linked traits!**

Are inherited by means of sex chromosomes (X, Y)

* In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, particularly x-linked, males typically display the phenotype, although it is possible for females to express the phenotype as well.

\_\_\_\_\_\_\_\_ experience a greater effect of sex-linked traits due to having only one x-chromosome, whereas \_\_\_\_\_\_\_\_\_\_\_\_ have two.

**Sex-Linked Disorders**

* Certain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (red-green) is a sex-linked (x-linked) genetic disorder
* Hemophilia is a sex-linked genetic disorder
* Fragile-x syndrome is inherited by means of sex-chromosomes

**Sex-linked Recessive Traits**

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* General statements for the pattern of inheritance of X-linked recessive traits or diseases:
	+ Two people without the disease (or trait) can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (trait).
	+ The disease (trait) often skips several generations before \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ The disease (trait) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ more often than girls.

**CFU #2: Sex-linked recessive traits**

Red-green colorblindness is caused by a recessive allele of a gene on the X chromosome. Suppose a normal man and a woman who is a carrier (heterozygous) for colorblindness have children. *Note C = normal vision allele; c = colorblind allele*

1. Complete the Punnett square

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GENOTYPES:

Genotypic ratio:

PHENOTYPES:

Phenotypic ratio:

**CFU #2 continued: hemophelia**

* Hemophilia, the inability of blood to clot, is caused by a recessive mutation of a gene on the X chromosome. Suppose a normal man and a woman who is a carrier for hemophilia have children. Complete a Punnett square to show the possible types of children .

GENOTYPES:

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Genotypic ratio:

PHENOTYPES:

Phenotypic ratio:

* What is the chance that they have a hemophiliac child? \_\_\_\_\_\_\_\_\_
* What sex will the hemophiliac child always be? \_\_\_\_\_\_\_\_\_\_\_
* At the hospital, just after their baby boy is born, the doctor informs them that there is a \_\_\_\_\_\_\_\_\_\_ chance that their boy is a hemophiliac.

**CFU #2 – Final Questions!**

* For X-linked recessive mutations, what genotypes must the parents be in order for a female to inherit the trait or disorder? Mom: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dad: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* In order for a woman be hemophiliac or colorblind, what must be her parent’s genotypes?