Variation of Traits

Do

# Mutations

## Activity

## Part I: Mutation Card Sort

Arrange the cards given to you by your teacher into the 3 types of DNA mutations. Each type of mutation will have an example card and a description card. Have your teacher check your card sort, and then fill in the chart below.

| Type of Mutation | Drawing of Mutation | Description of Mutation (in your own words) |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |

## Part II: Types of Mutations

Sometimes, a cell will make a mistake when it copies its DNA during DNA replication. Occasionally, an extra base is inserted, or a base may be left out. Any change in the DNA or genetic material is called a mutation. Depending on the change, the mutation can be harmful, helpful, or even neutral and have no effect. What determines the effect of the mutation is whether it affects the types of proteins being made during protein synthesis.

There are two major kinds of mutations: gene mutations, which is a change in the DNA, and chromosomal mutations, which have an effect on larger segments of chromosome. It is important to remember that only mutations that take place in sex cells will be passed on to the offspring.

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## Activity, continued

## Part II: Types of Mutations, continued

Below is an example of the amino acids created during protein synthesis. In each scenario, a mutation takes place during DNA replication. For each scenario, figure out the type of mutation that took place and if it affected the protein being produced.

| | | | | | |
|---|---|---|---|---|---|
| Original DNA | TAC | GAC | AAA | TCG | ATT |
| Original mRNA | AUG | CUG | UUU | AGC | UAA |
| Original Amino Acid | Met | Leu | Phe | Ser | Stop |

1.

| | | | | | |
|---|---|---|---|---|---|
| Mutated DNA | TAC | GAA | CAA | ATC | GATT |
| Mutated mRNA | | | | | |
| Mutated Amino Acid | | | | | |

a. What type of mutation took place?

_____

b. Did this mutation have an effect on the protein being produced? If so, what happened?

_____

_____

2.

| | | | | | |
|---|---|---|---|---|---|
| Mutated DNA | TAC | GAC | AAA | TCA | ATT |
| Mutated mRNA | | | | | |
| Mutated Amino Acid | | | | | |

a. What type of mutation took place?

_____

b. Did this mutation have an effect on the protein being produced? If so, what happened?

_____

_____

3.

| | | | | | |
|---|---|---|---|---|---|
| Mutated DNA | TAC | GAA | AAT | CGA | TT |
| Mutated mRNA | | | | | |
| Mutated Amino Acid | | | | | |

a. What type of mutation took place?

_____

b. Did this mutation have an effect on the protein being produced? If so, what happened?

_____

_____

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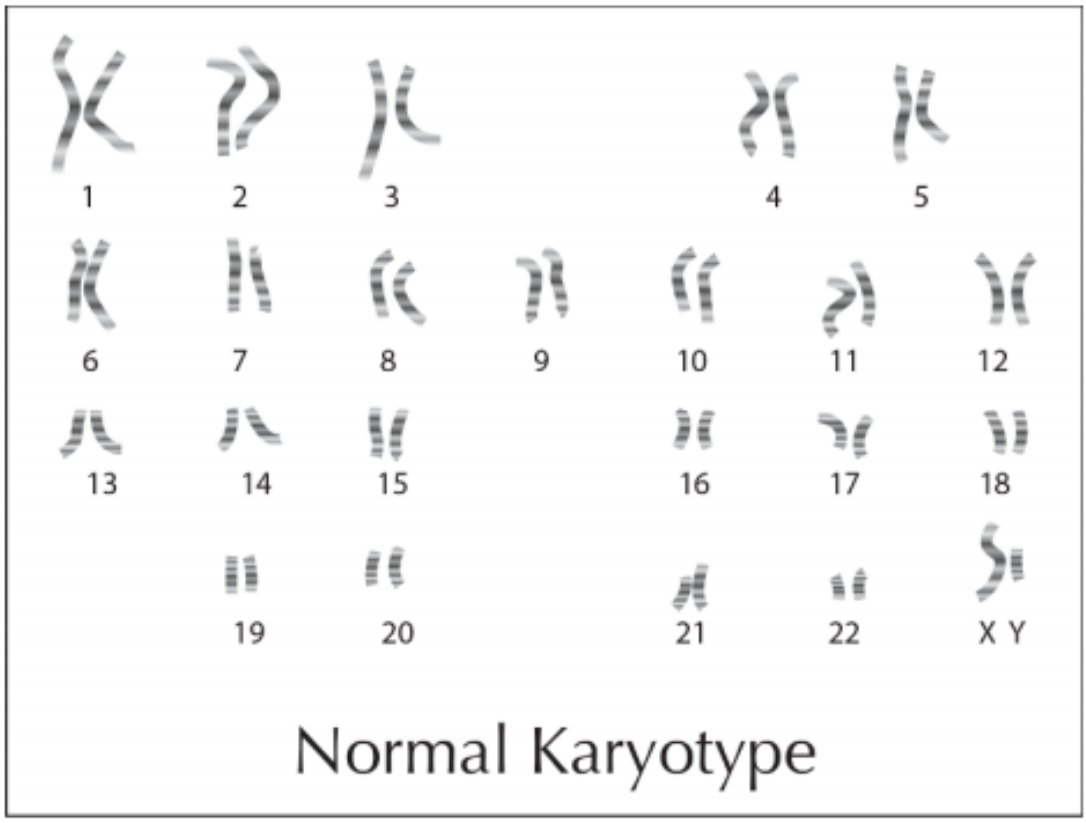
## Activity, continued

## Part III: Chromosomal Mutations and Karyotyping

A karyotype is a map of an organism's chromosomes. Chromosomes are extracted from an organism's cells and then stained. The chromosomes are then arranged and numbered by size, from largest to smallest. Once the chromosomes are organized by size, they are further paired by using banding characteristics and location of the centromere. During chromosomal analysis, this arrangement helps scientists quickly identify chromosomal mutations that could possibly indicate a genetic abnormality. A karyotype is shown below. Notice that there are 23 pairs of chromosomes in a normal karyotype. The first 22 pairs are called autosomes. The 23rd pair of chromosomes indicates the sex of the person.

Sex chromosomes XX = female  Sex chromosomes XY = male

The example shown here is a normal karyotype. There are 23 pairs of chromosomes. There are no chromosomes missing, and there are no extra chromosomes on any pair.



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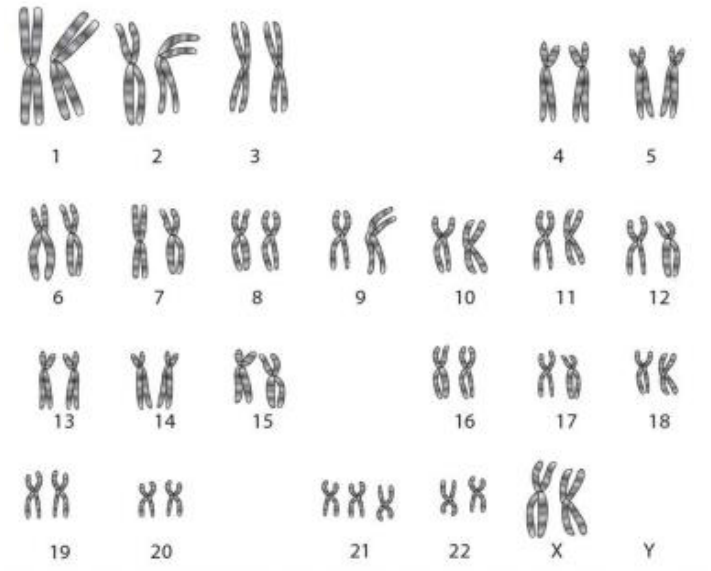
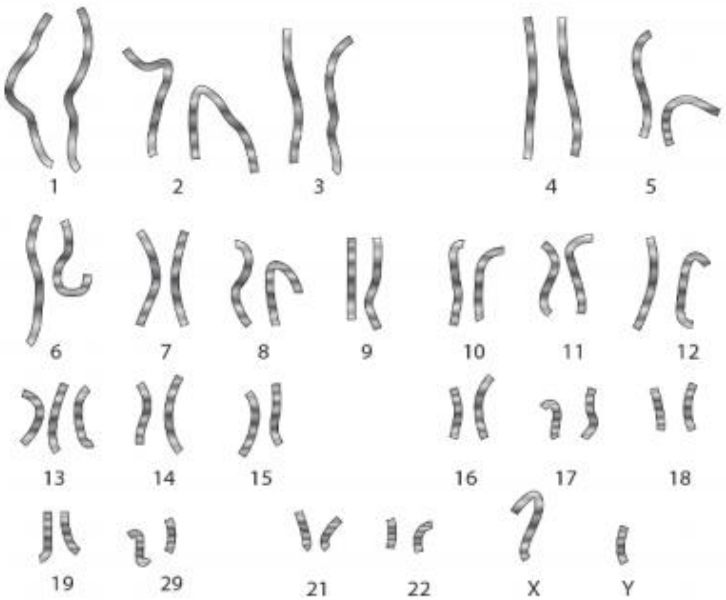
## Activity, continued

## Part III: Chromosomal Mutations and Karyotyping, continued

Analyze the karyotypes below and use the table provided to you by your teacher to determine which genetic abnormality exists.




1. What genetic disorder is shown?
   _____
2. Which chromosomes are affected?
   _____
3. What are the sex chromosomes for this person?
   _____
4. What is the gender of this person?
   _____




1. What genetic disorder is shown?
   _____
2. Which chromosomes are affected?
   _____
3. What are the sex chromosomes for this person?
   _____
4. What is the gender of this person?
   _____