Mistakes Happen PowerPoint Notes

DNA is the genetic material of living organisms and is located in the chromosomes of each cell. What happens if a mistake is made when DNA is copied?

Mutations
Random errors can occur when DNA is copied, or damage can be caused by physical and chemical agents known as ______________. A mutation is a change in the ______________ material of an organism. Although usually the processes of DNA replication and meiosis happen without mistakes, mutations can happen in any ______________ and in any ______________. They also can be deliberately caused in the laboratory by scientists. Some mutations involve a change in the structure or number of ______________. For instance, during meiosis one or more pairs of chromosomes may fail to ______________. Sex cells with ______________ sets of chromosomes may be produced. In plants, a complete extra set of chromosomes can cause ______________ traits. Some varieties of strawberries are bred with extra sets of chromosomes. This causes the berries to grow extra ______________.

Genetic Disorders
A genetic disorder is an ______________ condition that an organism inherits from its parents. Genetic disorders can result from mutation of a single ______________ or mutation of the ______________. In order to be passed on to offspring, the mutation must be present in the ______________ cells. Some mutations are helpful while others are harmful. Genetic disorders are a harmful effect of mutations.

Some genetic disorders result from too many or too few chromosomes.

______________ syndrome, for example, is a genetic disorder in which a person’s cells have an ______________ copy of chromosome 21. People with Down’s syndrome have some mental and physical limitations. However, they can lead normal, productive lives.

Some genetic disorders result when a mutation causes the product of a single gene to be ______________ or missing. An example of this kind of disorder is cystic fibrosis. Cystic fibrosis affects about 30,000 children and adults in the United States. A recessive allele causes the body to produce abnormally thick, sticky ______________ that clogs the lungs and leads to life-threatening lung infections. Thick mucus also clogs the organs of the digestive system and often leads to digestive problems and liver damage. Another example of this type of genetic disorder is hemophilia, an inherited ______________ disorder in which blood doesn’t clot normally.

Gene Mutations
A gene mutation involves a change in one of the ______________ in the sequence along a gene. A change in the base sequence changes one of the three-letter codes for an ______________. This may cause the cell to produce the wrong ______________.
In the example, one of the bases in the sequence is substituted for another.

**Sickle Cell Anemia**
The mutation causes *sickle cell anemia*, a _______________ disorder. Sickle cells often cause blockages in the blood vessels of people who have them. This disease, called sickle cell anemia, is passed from parent to offspring. It has a higher incidence in Africans because the gene also protected against _______________. Normal hemoglobin has disc-shaped red blood cells that are _______________ (like a bag of jelly), which enables them to easily flow through small blood vessels. Diseased red blood cells have a sickle-shape, are _______________ (like pieces of wood), and often get stuck in small blood vessels and stop the flow of blood.

1. What effect did the sickle cell gene have on the people who were carriers of the mutation? _________________________________________________________________

2. Why has the sickle cell gene persisted even when sickle cell anemia is so debilitating? _________________________________________________________________

3. What are the odds that the child of parents who each carry one normal gene and one sickle cell mutation gene will have sickle cell anemia? _________________________________________________________________

4. What are the odds that a child of two carrier parents will also be a carrier and, thus, be protected from malaria? __________________________________________________________________________

**Amniocentesis**
To find out if a _______________ will have a genetic disorder, doctors use a procedure called amniocentesis. In amniocentesis, the doctor removes a small amount of the _______________ that surrounds the developing baby. That fluid contains _______________ from the baby. Next, the chromosomes from the cells are analyzed to look for abnormal _______________ or _______________ numbers.

5. What causes Tay-Sachs disease? _________________________________________________________________

6. What are the odds that a child born to two carrier parents will inherit Tay-Sachs disease? __________________________________________________________________________
Dominant Disorders: A 50-50 Chance

The affected parent has a ____________ defective gene (D), which dominates its normal counterpart (n). Each child has a ________ percent risk of inheriting the faulty gene and the disorder.

Recessive Disorders: One Chance in Four

_________ parents carry a single defective gene (d) but are protected by the presence of a ________________ gene (N), which is generally sufficient for normal function. Two defective copies of the gene are required to produce a disorder.

Each child has a 50% chance of being a carrier like both parents and a 25% risk of inheriting the disorder.