Goal 3 Guided Worksheet Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. DNA
   1. The structure of DNA is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ structure.
   2. The sides are composed of alternating \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ groups.
   3. The “rungs of the DNA ladder” are composed of complementary \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ always
      1. adenine, A to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      2. cytosine, C, to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      3. joined by weak \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   4. The sequence of nucleotides in DNA codes for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which is central key to cell function and life.
   5. Replication occurs during the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ phase of the cell cycle and allows daughter cells to have an exact copy of parental DNA.
   6. Cells respond to their environments by producing different types and amounts of protein.
   7. With few exceptions, all cells of an organism have the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_DNA but differ based on the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of genes.
2. DNA
   1. Advantages of the overproduction of proteins at the incorrect times: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Disadvantages of the overproduction, underproduction or production of proteins at the incorrect times: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **Protein Synthesis**
   1. Process of protein synthesis:
      1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** that produces an RNA copy of DNA, which is further modified into the three types of RNA

mRNA travels to the ribosome (rRNA)

* + 1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** – tRNA supplies appropriate amino acids
  1. Amino acids are linked by **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** to form polypeptides.
  2. P**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** chains form protein molecules.
  3. Proteins can be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (forming a part of the cell materials) or **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (hormones, enzymes, or chemicals involved in cell chemistry).
  4. An **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** forms a protein that leads to a particular function and phenotype (trait) in an organism.

1. What is CCG on the chart?
2. **Mutations**
   1. Mutations are changes in DNA coding and can be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
   2. Mutations can be**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**and spontaneous or caused by radiation and/or **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
   3. Describe how mutations change amino acid sequence, protein function, phenotype.
   4. Only mutations in **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (egg and sperm) or in the gamete produced from the primary sex cells can result in **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
3. Meiosis
   1. Genes are on \_\_\_\_\_\_\_\_\_\_\_\_\_ chromosome which allows them to be shuffled in meiosis..
   2. The process of meiosis leads to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and ultimately to greater genetic diversity.
   3. Genetic variation in sexually reproducing organisms including
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of chromosomes
      3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ failure of chromosomes to separate
      5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: combination of 2 set of genes.
4. Random Assortment
   1. Meiosis is the cell division which takes place to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (sperm and egg cells).
   2. In the first metaphase the chromosomes line up in pairs along the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   3. The random assortment basically means they can line up in any order before they are pulled to either ends of the cell....

VIII.

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| --- | --- |
| **Mitosis** | **Meiosis** |
| * \_\_\_\_\_\_\_\_\_\_\_\_Reproduction | * \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Reproduction |
| * \_\_\_\_\_\_\_\_\_\_\_ cell division | * Two cell divisions |
| * 2 identical cells produced | * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells produced |
| * Makes \_\_\_\_\_\_\_\_\_\_\_(somatic) cells | * Makes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| * Goes from diploid to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * Goes from diploid to \_\_\_\_\_\_\_\_\_\_\_ ( 2n to 1n) |
| * Chromosome number stays the same. | * Chromosome number reduced. |
| * DNA is replicated. | * DNA is replicated |

1. Genetics
   1. Determine parental genotypes based on offspring ratios. Example: B= brown, b= white If 3 out of the 4 offspring are Brown, what would the parents be?
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Traits are equally expressed. Example: roan cow or blood types
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Blending of traits ; Example: four o’clock flower
   4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are controlled by more than one pair of genes and that this pattern of inheritance is identified by the presence of a wide range of phenotypes (skin, hair, and eye color).
2. Karyotype
3. Punnett Square
   1. What is the genotypic(RR:Rr:rr) ratio of the square below?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. What is the phenotypic ( round: wrinkled) ratio? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Genetics
   1. Autosomal inheritance patterns:
      1. Sickle cell anemia (incomplete dominance)
         1. AA= normal but can get \_\_\_\_\_\_\_\_\_\_\_\_\_\_
         2. Aa= c\_\_\_\_\_\_\_\_\_\_\_; doesn’t have the symptoms of sickle cell anemia and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_get malaria.
         3. aa= Has sickle cell anemia
      2. Cystic fibrosis (recessive heredity)
      3. Huntington’s disease (dominant heredity).
5. **Blood Types: Codominant and Multiple alleles**

|  |  |
| --- | --- |
| **Blood type** | **Genotype** |
| A | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| B | IBIB, IB i |
| AB | \_\_\_\_\_\_\_\_\_\_\_ |
| O | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

1. **Sex- Linked Crosses**
   1. Examples : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and hemophilia
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_are more likely to express a sex-linked trait.
   3. Sex Linked traits are usually\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and linked to the X chromosome.
2. Pedigrees
   1. Males: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Females: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Affected: Shaded
3. Environmental factors and genes
   1. lung/mouth cancer – tobacco use
   2. skin cancer – vitamin \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, folic acid and sun exposure
   3. diabetes – diet/exercise and genetic interaction
   4. PKU – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. heart disease – diet/exercise and genetic interaction
4. Gel Electrophoresis
   1. Use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to cut DNA into different sized fragments
   2. Run those fragments on gels with l\_\_\_\_\_\_\_\_\_\_\_\_\_ fragments moving slower than shorter ones.
5. Transgenic and Transformation
   1. Transgenic organisms (plants, animals, & bacteria) are used in agriculture and industry

pharmaceutical applications such as the production of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. The steps in bacterial transformation
     1. insertion of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_into a bacterial plasmid,
     2. getting bacteria to take in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. selecting the transformed bacteria
     4. and producing the product

1. Ethics
   1. Identify the reasons for establishing the Human Genome Project.
      1. Identify the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on a human’s chromosome.
      2. The project is useful in determining whether individuals may carry genes for genetic conditions and in developing gene therapy.
   2. Gene therapy: Using \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to transfer the correct gene to a patient
      1. Used to treat: Severe Combined Immunodeficiency and Cystic Fibrosis
   3. Critique the ethical issues and implications of genomics and biotechnology (stem cell research, gene therapy and genetically modified organisms).
2. Evidence of Evolution
   1. Hypothesized early atmosphere and experiments that suggest how the first “cells” may have evolved and how early conditions affected the type of organism that developed Oparin’s hypothesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; tested by Miller
   2. Steps of evolution
      1. first anaerobic and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      2. then photosynthetic
      3. then eukaryotic
      4. then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Fossil evidence informs our understanding of the evolution of species and what can be inferred from this evidence.
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (molecular) similarities tell us what organisms have similar ancestors.
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_structures (homologies) tell us what organisms have similar ancestors.
3. **Natural selection**
   1. Cause and effect model for the process of natural selection:
      1. Species have the potential to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      2. Populations are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ due to mutations and genetic recombination.
      3. There is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ supply of resources required for life.
      4. Changing environments select for specific genetic phenotypes.
      5. Those organisms with\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ adaptations survive, reproduce and pass on their alleles.
      6. The accumulation and change in favored alleles leads to changes in species over time.
   2. Geographic isolation can cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. **Resistance**
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: transfer of immunity from one organism to another
      1. Mother to child
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_: dead or live viruses injected into an animal
      3. Body recognizes pathogens and is ready to kill it.
   2. Active immunity: A type of [immunity](http://www.biology-online.org/dictionary/Immunity) or [resistance](http://www.biology-online.org/dictionary/Resistance) developed in an [organism](http://www.biology-online.org/dictionary/Organism) by its own production of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_n response to an exposure to an [antigen](http://www.biology-online.org/dictionary/Antigen), a [pathogen](http://www.biology-online.org/dictionary/Pathogen) or to a [vaccine](http://www.biology-online.org/dictionary/Vaccine).
   3. Antivirals and vaccines.
5. Classification
   1. Classification is constantly\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ based on new knowledge generated by research on evolutionary relationships and the history of classification system.
   2. Currently Seven levels: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Currently\_\_\_\_\_\_\_\_\_\_\_\_\_ domains and\_\_\_\_\_\_\_\_\_ kingdoms:
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, eubacteria, protist, fungi, plants, animals
6. Classification
   1. Dichotomous key: Always start with #\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Phylogenetic tree : Used to find relationships and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_