UNIT 8: GENETICS

Big Idea: Information
Living systems store, retrieve, transmit, and respond to information essential to life.

GENETICS (pgs. 277-282)
• LEARNING TARGET #1: DEFINE & UNDERSTAND the following vocabulary:
  - genetics
  - traits
  - dominant
  - recessive
  - law of segregation
  - law of independent assortment
  - allele
  - gene
  - genotype
  - phenotype
  - monohybrid cross
  - dihybrid cross
  - homozygous
  - heterozygous
  - complete dominance
  - incomplete dominance
  - codominance
• LEARNING TARGET #2: EXPLAIN the difference between an allele and a gene.
• LEARNING TARGET #3: DISTINGUISH between dominant and recessive alleles & how each allele is expressed.
• LEARNING TARGET #4: STATE two laws of heredity that were developed from Gregor Mendel’s work.
• LEARNING TARGET #5: EXPLAIN how probability is used to predict the results of genetic crosses.
• LEARNING TARGET #6: USE a Punnett Square to predict the results of monohybrid and dihybrid crosses.
• LEARNING TARGET #7: DEMONSTRATE how to use a Punnett Square to determine the following items from a particular cross:
  - possible genotype & phenotype of offspring
  - genotypic & phenotypic ratios of possible offspring
  - genotypic & phenotypic probabilities of possible offspring

The following questions address each learning target.
INCLUDE DETAILS & SAVE FOR SIDE NOTES!

1. For Learning Target #1, define/describe the vocabulary listed in an UNDERSTANDABLE way. Your descriptions can include but are not limited to:
   • definition in your own words
   • picture(s) for clarity
2. For Learning Target #2, explain the difference between a gene & allele. Provide an example of each.
3. For Learning Target #3:
   • What is the difference between dominant & recessive traits?
   • In an example of complete dominance, if a dominant & a recessive allele are paired together, which characteristic will be expressed? JUSTIFY your response.
   • In an example of incomplete dominance, if a dominant & recessive allele are paired, which characteristic will be expressed? JUSTIFY your response.
   • In an example of codominance, which characteristic is expressed? JUSTIFY your response.
   • What conditions must be present to guarantee the expression of a recessive allele?
4. For Learning Target #4:
   • During the process of meiosis, what stage(s) demonstrates the law of segregation?
   • Using what you know about meiosis, describe an example when the law of independent assortment applies.
5. For Learning Target #5:
   • What is probability?
   • What is a generic math formula that can be used to calculate probability?
6. For Learning Target #6, work through the following examples by setting up a Punnett Square for each:

**MONOHYBRID CROSSES:**
For each example, set up a Punnett Square that will allow you to predict the results of each cross.
   a) Predict the results when a daisy homozygous dominant for purple flower is crossed with a daisy that is homozygous recessive for white flowers. (A = purple & a = white)
   b) Predict the results when a mouse homozygous dominant for black coat color is crossed with a heterozygous mouse. (B=black & b=brown)
   c) Predict the results when two heterozygous black mice are crossed.

**DIHYBRID CROSSES:**
For each example, set up a Punnett Square that will allow you to predict the results of each cross.
   a) In pea plants, the allele for round seeds (R) is dominant over the allele for wrinkled seeds (r). The allele for yellow seeds (Y) is dominant over the allele for green seeds (y). Set up a Punnett Square that allows you to predict the results of a cross between a pea plant that is homozygous for round, yellow seeds and one that is homozygous for wrinkled, green seeds.
   b) Predict the results of a cross between two pea plants that are heterozygous for round, yellow seeds.

7. For Learning Target #7, use the monohybrid and dihybrid cross examples in learning target #6.
   - What are all the possible genotypes & phenotypes produced for the monohybrid and dihybrid crosses in learning target #6?
   - What are all the possible genotypic & phenotypic ratios for the monohybrid and dihybrid crosses in learning target #6?
   - What is the probability of producing each genotype & phenotype for the monohybrid and dihybrid crosses in learning target #6?