Genetics Notes

1. Who is Gregor Mendel?
   1. Father of Genetics
   2. Principles of genetics were developed in the mid 19th century by Gregor Mendel an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Developed these principles without ANY scientific equipment - only his mind.
   4. History:
      1. Experimented with \_\_\_\_\_\_\_\_\_\_\_\_\_\_, by crossing various strains and observing the characteristics of their offspring.
      2. Studied the following characteristics:
         1. Pea color (Green, yellow)
         2. Pea shape (round, wrinkled)
         3. Flower color (purple, white)
         4. Plant height (tall, short)
      3. Made the following observations (example given is pea shape):
         1. When he crossed a round pea and wrinkled pea, the offspring (F1 gen.) always had round peas.
         2. When he crossed these F1 plants, however, he would get offspring which produced round and wrinkled peas in a 3:1 ratio.
   5. Vocabulary
      1. \_\_\_\_\_\_\_\_\_\_\_: The scientific study of heredity
      2. \_\_\_\_\_\_\_\_\_\_\_: Alternate forms of a gene/factor.
      3. \_\_\_\_\_\_\_\_\_\_\_: combination of alleles an organism has.
      4. \_\_\_\_\_\_\_\_\_\_\_: How an organism appears.
      5. \_\_\_\_\_\_\_\_\_\_\_: An allele which is expressed (masks the other).
      6. \_\_\_\_\_\_\_\_\_\_\_: An allele which is present but remains unexpressed (masked)
      7. \_\_\_\_\_\_\_\_\_\_\_: Both alleles for a trait are the same.
      8. \_\_\_\_\_\_\_\_\_\_\_: The organism's alleles for a trait are different.
      9. Traits: determined by the \_\_\_\_\_\_\_\_\_\_\_\_ on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. A gene is a segment of \_\_\_\_\_\_ that determines a trait.
      10. Chromosomes come in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pairs, thus genes come in pairs.
      11. Homologous pairs – \_\_\_\_\_\_\_\_\_\_\_\_\_\_ genes – one from female parent and one from male parent
      12. Example: Humans have 46 chromosomes or \_\_\_\_\_ pairs.
          1. One set from dad – 23 in \_\_\_\_\_\_\_\_\_
          2. One set from mom – 23 in \_\_\_\_\_\_\_\_\_
      13. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – different genes (possibilities) for the same trait –
          1. ex: blue eyes or brown eyes
   6. Dominant and Recessive Genes
      1. Gene that \_\_\_\_\_\_\_\_\_\_\_ the other gene from “showing” – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      2. Gene that does \_\_\_\_\_\_ “show” even though it is present – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      3. Symbol – Dominant gene – upper case letter – T

Recessive gene – lower case letter – t

* 1. Homozygous and Heterozygous
     1. Both genes of a pair are the same – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or purebred
        1. TT – homozygous dominant
        2. tt – homozygous recessive
     2. One dominant and one recessive gene – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or hybrid
        1. Tt – heterozygous
  2. Genotype and Phenotype
     1. Combination of genes an organism has (\_\_\_\_\_\_\_\_\_\_\_\_\_ makeup) – \_\_\_\_\_\_\_\_\_\_\_\_\_
        1. Ex: TT, Tt, tt
     2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_appearance resulting from gene make-up – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        1. Ex: hitchhiker’s thumb or straight thumb
  3. Punnet Square and Probability
     1. Used to \_\_\_\_\_\_\_\_\_\_\_\_ the possible gene makeup of offspring – Punnett Square
  4. Sex Determination
     1. People – \_\_\_\_\_ chromosomes or \_\_\_\_\_ pairs
     2. 22 pairs are homologous (look alike) – called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – determine body traits
        1. 1 pair is the sex chromosomes – determines sex (male or female)
     3. Females – sex chromosomes are homologous (look alike) – label \_\_\_\_\_
     4. Males – sex chromosomes are different – label \_\_\_\_\_
  5. Incomplete and Codominance
     1. When one allele is NOT completely dominant over another (they blend) – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        1. Example: In carnations, the color red (R) is incompletely dominant over white (W). The hybrid color is pink.
     2. When both alleles are expressed – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        1. Example: In certain chickens black feathers are codominant with white feathers.
        2. Heterozygous chickens have black and white speckled feathers.
  6. Sex-Linked Traits
     1. Genes for these traits are located only on the \_\_\_\_\_ chromosome (NOT on the Y chromosome)
     2. X linked alleles always show up in \_\_\_\_\_\_\_\_\_ whether dominant or recessive because males have only one X chromosome
     3. Examples of recessive sex-linked disorders:
        1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ – inability to distinguish between certain colors
        2. hemophilia – blood won’t \_\_\_\_\_\_\_\_\_\_