Topic 4, Lesson 1 "Patterns of Inheritance"

Guiding Questions
How did Gregor Mendel advance the fields of genetics and inheritance?
How are inherited alleles related to an organism's traits?
How is probability related to inheritance?

1. As in Figure 1, cardinals pass their traits to their offspring. What are traits?

2. In the 1800's a European monk, Gregor Mendel, began to study heredity of pea plants in his garden. What is heredity?

3. Mendel's experiments are considered important because he was one of the first to quantify his results. Which are examples of quantitative data? Circle all that apply.
    a. 7 peas per pod
    b. Yellow seeds
    c. Wrinkled seeds
    d. Pea plants that 8 inches tall

4. Mendel is often called the "father of modern _____".

5. Pollen is the microscopic grain from the flower that contains the male gamete (sperm) of the plant. The pollen fertilizes
    the female ovule to produce an offspring in sexual reproduction of a plant. Describe what is meant by Mendel's "cross pollination" experiment
    where he crossed a tall pea plant with a short pea plant.

6. Why did Mendel call the offspring in the cross-pollination experiment F_1 and F_2?

7. Why did Mendel conclude that round, yellow pea seeds were "dominant" traits?

8. True or False. During 1800's when Mendel was performing his heredity experiments, scientists knew about DNA.

9. Mendel used the term "factor" to refer to the material that carried a trait. Today the term "factor" has been replaced
    with _____ or _____.

10. What is the difference between a gene and an allele?

11. True or False. A trait like seed color is determined by the combination of two alleles, one from each parent.

12. What would be the likely phenotype (appearance of the trait) of offspring if one parent has a genotype of two dominant alleles for seed shape and the other parent has a genotype of one dominant and one recessive allele for seed shape?

13. Scientists who study patterns of inheritance are called _____.

14. Capital letters are used to represent a dominant allele and lower-case letters are used to represent recessive alleles. GG and gg would be examples of genotypes that represent offspring called _____ while a Gg would be an example of a _____.

15. Mendel's findings that some traits appeared in the F_2 generation but not in the F_1 proved (circle all that apply)
    a. the traits of each parent have no effect on the offspring's traits
    b. the traits of the offspring are not a just mixture of the parent's traits
    c. the organism's traits are carried on what he called "factors"
    d. it is impossible to predict the traits of offspring

16. What is probability?

17. The probability of flipping a coin to heads is the same probability as one parent passing a certain allele on to their offspring (1 out of 2). Why?

18. When using a Punnett square to determine probability of a trait occurring in offspring between two hybrid genotypes, the dominant purebred occurs _____ (fraction) of the time; the recessive purebred occurs _____ (fraction) of the time; and the hybrid occurs _____ (fraction) of the time.

19. Label each example with a "P" if it represents a phenotype or "G" if it represents a genotype.
    a. ___ yellow seed
    b. ___ a pair of alleles
    c. ___ GG
    d. ___ tall pea plants
    e. ___ a recessive allele from father and a recessive allele from mother
    f. ___ pink flowers
    g. ___ gg