Supplemental Test Items to accompany OpenStax College *Concepts of Biology*. Note that not all chapters of OpenStax College *Concepts of Biology* have accompanying test items. Building on the community-oriented nature of OpenStax College resources, we invite you to submit items to be considered for future inclusion.

**Chapter 08: Patterns of Inheritance**

1. Johann Gregor Mendel’s work in genetics focused on traits that exhibit discontinuous variation. What kind of traits are these? (Outcome #IIIa) (DOK 1)
2. These are traits that are inherited in distinct patterns easily distinguishable among phenotypes.\*
3. These are traits that are controlled by many genes that each participate in subtle ways to produce a range of phenotypes.
4. These are traits that are controlled by individual genes that are “tempered” by neighboring genes to produce a range of phenotypes.
5. Mendel’s hybridizations may best be described as which of the following? (Outcome #IIIa) (DOK 1)
6. The matings of two true-breeding individuals that have similar forms of the trait of interest.
7. The matings of two true-breeding individuals that have different forms of the trait of interest.\*
8. The matings of offspring back to one or both of their parents.
9. Which best describes genotype and phenotype, respectively? (Outcome #IIIa) (DOK 1) (Paired Item 1)
10. the type of genetic makeup and the type of phenomena that the organism experiences-
11. the location of the alleles and the overall condition of the organism-
12. the structure of the alleles and the outward appearance of the organism\*
13. The genetic makeup of an organism and its physical appearance are its \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_, respectively. (Outcome #IIIa) (DOK 1) (Paired Item 2)
14. gender; sex
15. phenotype; genotype
16. genotype;phenotype\*
17. The process of crossover may be best defined as what? (Outcome #IIIa) (DOK 2)
18. A process of genetic recombination that occurs between non-sister homologous chromatids in meiotic prophase I.\*
19. A process of genetic recombination that occurs between sister chromatids in meiotic prophase II.
20. A process of genetic recombination that occurs between non-sister chromatids in meiotic prophase II.
21. In pea plants, the allele for round peas (*R*) is dominant to the allele for wrinkled peas (*r*). A gardener has a plant he got from his neighbor that produces round peas, but he does not know its genotype. What simple procedure could he do to determine the genotype of his new plant? (Outcome #IIIa) (DOK 2) (Paired Item 1)
22. Perform a dihybrid cross—if only 1 out of 16 offspring are wrinkled, then the new plant’s genotype is *RR*.
23. Perform a test cross with a plant that has wrinkled peas—if any offspring give wrinkled peas, then the new plant’s genotype is *Rr*.\*
24. Perform a test cross with a plant that has an Rr genotype—if all of the offspring give round seeds, then the new plant’s genotype is *Rr*.
25. A gardener received a pea plant from her neighbor, and she wants to know its genotype. The neighbor told her it produces round peas, which is a dominant trait (*R*) to wrinkled peas (*r*). The gardener performs a test cross and observes that half of the offspring plants produce wrinkled peas. What is the genotype of the plant she received from her neighbor? (Outcome #IIIa) (DOK 2) (Paired Item 2)
26. homozygous recessive, *rr*
27. homozygous dominant, *RR*\*
28. heterozygous, *Rr*
29. Trait A is dominant to trait a, and trait B is dominant to trait b. If an AaBB mother mates with an AaBb father, what percent of the offspring will have the aaBB genotype? (Outcome #IIIa) (DOK 2)
30. 18.75%
31. 25.0%
32. 12.5%\*
33. Huntington’s disease (HD) is a neurodegenerative genetic disorder involving an autosomal dominant mutant allele with high penetrance. If a father’s mother had HD, what is the probability that his first child will also have HD? (Outcome #IIIa) (DOK 3) (Paired Item 1)
34. it depends on whether the father has the allele.\*
35. 0.5 or 50%
36. 0.25 or 25%
37. A man’s mother died from having the neurodegenerative genetic disorder Huntington’s disease, which is caused by a dominant mutant allele that exhibits high penetrance. The man’s daughter wants to be tested for the mutant gene, and he tells her not to bother because her probability of having the disease is zero. Is he telling her the truth? Choose the most accurate answer. (Outcome #IIIa) (DOK 3) (Paired Item 2)
38. No, her probability of having the mutant allele is 0.5 or 50%
39. We do not know whether he is telling the truth or not based on the information given.\*
40. Yes, his probability of having the disease is only 0.05 or 5% and is diluted to almost zero in his daughter.
41. A gene can be best defined as which of the following? (Outcome #IIIb) (DOK 1)
42. a physical unit of inheritance\*
43. a conceptual unit of inheritance
44. a dated concept replaced by the meme
45. The modern theory that explains Mendelian inheritance is called what? (Outcome #IIIb) (DOK 1)
46. Hardy-Weinberg Theorem of Inheritance
47. Chromosome Theory of Inheritance\*
48. Evolutionary Theory of Inheritance
49. During meiosis I, homologous chromosomes undergo chiasma formation. Which of the following can happen now when the homologous chromosomes synapse or contact each other? (Outcome #IIIb) (DOK 1)
50. homologous chromosomes undergo a process by which random proteins are made via independent assortment
51. homologous chromosomes exchange arms with one another via DNA replication
52. homologous chromosomes exchange arms with one another via homologous recombination\*
53. The number and appearance of a cell’s chromosomes, including lengths, banding patterns, and centromere positions, are collectively called what? (Outcome #IIIb) (DOK 1)
54. a karyotype\*
55. a somatosome
56. a polyploidy
57. The average number of crossovers between two alleles is known as which of the following? (Outome #IIIb) (DOK 1)
58. mean crossovers
59. recombination frequency\*
60. linkage index
61. All of the following are disorders in chromosome number except: (Outcome #IIIb) (DOK 1) (Paired Item 1)
62. aneuploidy
63. trisomy
64. euploidy\*
65. Which of the following is not considered a chromosomal abnormality? (Outcome #IIIb) (DOK 1) (Paired Item 2)
66. diploid
67. haploid
68. polyploid\*
69. Hemophilia is not seen in individuals heterozygous for the hemophilia gene. Thus, the disease is: (Outcome #3) (DOK 2)
70. x-linked
71. dominant
72. recessive\*
73. The father of modern genetics was: (Outcome #3) (DOK 1)
74. Mendel\*
75. Darwin
76. Einstein
77. How could you determine the distance between two genes using experimental matings? (Outcome #3) (DOK 3)
78. Look for the incidence of mutations
79. Look for the frequency of crossing over between the genes\*
80. Look for the amount of non-disjunction in the cell
81. Two genes located near each other on the same chromosomes are said to be: (Outcome #3) (DOK 1)
82. nearby
83. at the same locus
84. linked\*