Patterns of Inheritance

1. The first detailed and quantitative studies on inheritance were carried out by an Austrian monk whose name is, _____.

2. Traits that breed _____ can be passed onto future generations without alteration.

3. Mendel used the garden ___ plant for his studies on inheritance.

4. The phenotypic ratio for a testcross with a homozygous individual and a heterozygous individual is _____.

5. In modern terminology, Mendel's factors are equivalent to _____.

6. The _____ of an organism is the physical appearance resulting from the expression of the genes present.

7. Alternate forms of the same gene are called _____.

8. The Law of _____ states that alternative alleles for a trait separate from one another during meiosis in heterozygous individuals.

9. Mendel invented the ____ cross to determine whether an individual with a dominant phenotype was homozygous or heterozygous for the trait.

10. A genetic ___ contains the distances between the gene loci measured in terms of the frequency of recombination.

11. Of the 23 pairs of human chromosomes, 22 pairs are similar in the location of genes and are found in both males and females. These are called _____.

12. Traits that are carried on the X chromosome are said to be _____-_____.

13. An old idea that heredity occurs within species, which led some to believe that a leopard could be crossed with a camel with a resulting giraffe was called_____.

14. A fatal human disease in which the faulty gene codes for abnormal gland secretions leading to liver and lung failure is called _____ .

15. The clotting of blood depends upon a chain of reactions that involve many different proteins; a faulty gene for any one of these proteins gives rise to the disease called _____.

16. A diploid organism that has two identical alleles for the same trait is called _____ for that particular trait.

    A. homozygous
    B. heterozygous
    C. dominant
    D. recessive
    E. codominant

17. A gene for a particular trait that is only expressed in the presence of another gene of the same kind is called a(n)

    A. dominant gene
    B. codominant gene
    C. incompletely dominant gene
    D. recessive gene
    E. multiple allele

18. A set of red blood cell surface antigens that are responsible for serious interactions between a mother and her developing fetus are called the

    A. ABO antibody factors
    B. Barr body factors
    C. sex-linked antigens
    D. Rh factors
    E. X-factors

19. One of the general principles of biology that was accepted before much was known about genetics was that “like begets like” or

    A. heredity occurs within species, and species “breed true”
    B. hybrids can form occasionally from any two parents
    C. mythical monsters can no longer be found on earth
    D. traits are transmitted directly
    E. traits of both parents are blended in the offspring

20. Early geneticists demonstrated that some forms of an inherited trait

    A. can be masked in some generations, but subsequently reappear unchanged in future generations
    B. segregate among the offspring of a cross
    C. are more likely to be represented than their alternatives
    D. a, b, and c are true
    E. are lost forever all of a sudden

21. Knight followed up on attempts of English farmers to improve varieties of agriculture with his studies on garden peas. He found that when he crossed two true breeding varieties, an inherited trait

    A. can be masked in some generations but may show up in future
    B. may show up in some offspring only
    C. may be represented more often than the others
    D. is always present in every generation
    E. only a, b, and c are correct

22. Mendel chose the garden pea for his work on inheritance for all of the following reasons except

A. The monastery of which he was a monk ordered him to use it.
B. Earlier investigators had shown segregation among the offspring.
C. A large number of true breeding varieties were already available.
D. The generation time was short; many offspring can be grown easily.
E. He could choose to self- or cross-pollinate.

23. Mendel's experiments had three characteristics, which were

A. Pea plants were self-pollinated for several generations.
B. He always used only two plants for his work.
C. Hybrid plants with alternative forms of traits were produced.
D. Hybrid plants were self-pollinated for several generations.
E. Only a, c, and d are correct.

24. Mendel referred to the trait that was expressed in the hybrid, F_1 or first filial generation as

A. recessive
B. dominant
C. codominant
D. independent
E. epistatic

25. In a typical Mendel experiment on pea-seed color, if the dominant yellow seed-bearing plant was crossed with the recessive green seed-bearing plant, the F_2 generation will show what ratio of each kind?

A. 1 yellow : 3 green
B. 1 yellow 1 green
C. 3 yellow 1 green
D. seeds with patches of green and yellow color
E. tall plants with yellow seeds and short plants with green seeds

26. Mendel's understanding of the inheritance of traits in peas, expressed in modern language, included all of the following except

A. Parents transmit information encoded in genes.
B. Each individual contains two genes for each trait.
C. Not all genes are identical; alternative forms (alleles) exist.
D. Each of the alleles present in an individual is discrete.
E. If a given allele is present, its effects will be seen in the individual.

27. Individuals carrying two “factors” for most traits are

A. haploid
B. diploid
C. eukaryotic
D. homozygous
E. heterozygous

28. When the two haploid gametes contain two different alleles of a given gene, the resulting offspring is called

A. discrete
B. a haploid
C. heterozygous
D. homozygous
E. a fused allele

29. In a heterozygous individual the allele being expressed is

A. recessive
B. masked
C. redundant
D. dominant
E. epistatic

30. An allele that is present but unexpressed is

A. redundant
B. dominant
C. functional
D. epistatic
E. recessive

31. The allelic make up of an individual is referred to as its

A. blueprint
B. genotype
C. phenotype
D. genetic pattern
E. allelotype

32. The observable outward manifestation of the genes of an individual is referred to as its

A. blueprint
B. genotype
C. phenotype
D. genetic map
E. allelotype

33. What is the name of the cross that involves the mating of a hybrid F_1 plant with a homozygous recessive plant for the same trait?

A. monohybrid cross
B. dihybrid cross
C. reciprocal cross
D. test cross
E. back cross

34. Yellow-seeded plants might be homozygous or heterozygous. We could find out which by crossing these plants with

A. true breeding yellow-seeded plants
B. true breeding green-seeded plants
C. heterozygous yellow-seeded plants
D. true breeding white-flowered plants
E. true breeding purple-flowered plants

35. Mendel's first law states that

A. alternative forms of trait are encoded by alternative alleles
B. alternative alleles segregate in gametes
C. either allele has equal probability to be passed on into the gamete
D. all genes found in an individual are not separable into gametes
E. only a, b, and c are correct

36. An individual possessing both kinds of alleles of two different traits is called

A. homozygote
B. monohybrid
C. dihybrid
D. true breed
E. diallelic

37. Let P = purple flowers and p = white, and T = tall plants and t = dwarf. What would be the appearance of a plant with the genotype PpTt?

A. purple flowers, tall
B. purple flowers, dwarf
C. white flowers, tall
D. white flowers, dwarf
E. pale purple flowers, intermediate height

38. Let P = purple flowers and p = white, and T = tall plants and t = dwarf. What combinations of gametes could be produced by a heterozygote for both the traits?

A. PpTt only
B. Pp, Tt
C. P, p, T, t
D. PT, Pt, pT, pt
E. infertile, no gametes produced

39. Let P = purple flowers and p = white, and T = tall plants and t = dwarf. Of the 16 possible gamete combinations in the dihybrid cross, how many would be the phenotype *white*, *tall*?

A. none
B. 1
C. 3
D. 9
E. 16

40. Mendel's observations that different pairs of genes assort independently of each other is known as Mendel's

A. First Law of Heredity
B. Pea Manifesto
C. Statement of Assortment Principle
D. Second Law of Heredity
E. Theory of Genetic Independence

41. One of the main reasons genes assort independent of one another is that

A. they produce unrelated traits
B. they produce related traits
C. they are on the same chromosome
D. they are different alleles
E. they are on different chromosomes

42. A single gene has 3 or more alternative forms. These are called

A. heterozygotes
B. multiple alleles
C. epistatic
D. homozygotes
E. multiple zygotes

43. Sometimes one gene pair will interact so as to control the expression of a second gene pair in an interaction called

A. dominance
B. gene regulation
C. recessiveness
D. pleiotropy
E. epistasis

44. If an individual allele has more than one effect on the phenotype it is said to be

A. pleiotropic
B. epistatic
C. recessive
D. dominant
E. homozygotic

45. The major objection to the theory of chromosomal inheritance was that the number of traits that assort independently often greatly exceeded the number of chromosome pairs existing in the organism. This objection was later ruled out based on results obtained on the phenomenon of

A. independent assortment
B. segregation
C. crossing over
D. epistasis
E. pleiotropy

46. The theory of chromosomal inheritance was first proposed by

A. Mendel
B. Morgan
C. Knight
D. Sutton
E. Stern

47. In Drosophila, the sex of an individual is influenced by the number of copies of which chromosome?

A. autosome
B. X
C. 1
D. 2
E. white

48. The white eye mutation in *Drosophila* was shown to be sex-linked and caused by a gene residing on chromosome

A. X
B. Y

C. 1
D. 2
E. autosome

49. The geneticist who discovered the white eye mutation in *Drosophila* and helped establish that genes are carried on chromosomes was

A. Mendel
B. Sutton
C. Sturtevant
D. Janssens
E. Morgan

50. Genetic exchange between two arms of a chromosome pair is more likely to occur if the distance between the genes is great. It is called

A. epistasis
B. pleiotropy
C. crossing over
D. allelic exchange
E. mutation

51. ABO blood group expression is an example of

A. epistasis
B. dominance
C. recessiveness
D. multiple alleles
E. pleiotropy

52. Occasionally, chromosomes fail to separate during meiosis, leading to a condition in which the diploid number is not normal. This phenomenon is called

A. epistasis
B. nondisjunction
C. disjunction
D. plelotropy
E. autosomy

53. Humans who have lost even one copy of an autosome are called

A. tetrasomics
B. trisomics
C. bisomics
D. monosomics
E. nullisomics

54. The most common condition of trisomy, in which three copies of a chromosome are present instead of the normal two, is of chromosome

A. X
B. 13
C. 15
D. 18
E. 21

55. If a human female has two Barr bodies, it is almost certain that

A. her father had at least one Barr body
B. her mother also had two Barr bodies
C. she developed from a fertilized egg with 3 X chromosomes
D. she is actually a male with female characteristics
E. she is genetically a normal fertile female

56. A human female with only one X chromosome is said to have a condition called

A. Alzheimer's disease
B. hemophilia
C. Turner syndrome
D. Kleinfelter syndrome
E. Down syndrome

57. If some alternative alleles with detrimental effects exist in significant proportions in populations, the condition is called

A. pleiotropy
B. syndrome
C. epistasis
D. genetic disorder
E. genetic imbalance

58. A person with type A blood might be either heterozygous or homozygous. One way to find out is to

A. count the type A red blood cells
B. test for type A sugars on red blood cells
C. test the offspring after the person mates with a B type
D. test the offspring after the person mates with an O type
E. test the offspring after the person mates with a homozygous type A

59. The most common fatal genetic disorder of Caucasians is

A. cholera
B. cystic fibrosis
C. hemophilia
D. sickle cellanemia
E. muscular dystrophy

60. In sickle cellanemia, the defective hemoglobin differs from the normal hemoglobin by

A. the color of the pigment
B. the size of the molecule
C. a single amino acid substitution
D. the total number of amino acids
E. the type of blood cell it is found in

61. Hemophilia is a

A. recessive condition
B. dominant condition
C. epistatic condition
D. codominant condition
E. condition that occurs with equal frequency in both sexes

62. A human hereditary disease that is caused by a dominant allele but does not show up in affected individuals until they are in their thirties is

A. cystic fibrosis
B. sickle cellanemia
C. Tay-Sachs disease
D. Huntington's disease
E. hemophilia

63. Amniocentesis is a procedure that is normally used

A. to reduce the risk of genetic disease
B. for gene therapy
C. to change the sex of the fetus
D. for diagnosis of genetic disorders
E. for nourishing the fetus

64. The classical assumptions of “Constancy of Species” and Direct Transmission of Traits, if taken together, produce a paradox. Which of the following best explains the reason for this paradox?

A. If no variation enters into a group of organisms and future generations are a blend of their parent's variation, then eventually all members of that particular species would have the same appearance, which is not the case.
B. Since variations within organisms of the same species are only acted on by natural selection on the phenotype, Constancy of Species and Direct Transmission of Traits cannot happen.
C. Direct Transmission of Traits is counter to Constancy of Species because once a population expresses all of its variation nothing else could influence the transfer of genetic information and thus nothing new is transmitted to the next generations.
D. Constancy of Species contradicts Direct Transmission of Traits because if an organism is indeed a blend of its parents, then it cannot uphold the assumption of Constancy of Species.
E. Constancy of Species implies that all species that were first created have been maintained through time in their original form; furthermore, if direct Transmission of Traits does occur, it could only happen to populations with no variations.

65. When Mendel crossed dark purple-flowered pea plants with white-flowered pea plants, he never got any pea plants with light purple flowers. This was counter to the

A. idea of acquired characteristic inheritance
B. theory of blending inheritance
C. the assumption of direct transmission of traits
D. the law of dominance
E. the laws of probability

66. When Mendel crossed two purple-flowered pea plants with each other, he obtained a phenotypic ratio of 3:1 (purple-flowered pea plants to white-flowered pea plants). His results are consistent with which of the following sets of parents?

A. homozygous dominant purple pea plant and homozygous recessive white pea plant
B. homozygous dominant purple pea plant and heterozygous white pea plant
C. heterozygous purple pea plant and homozygous recessive white pea plant
D. heterozygous purple pea plant and homozygous dominant purple pea plant
E. heterozygous purple pea plant and heterozygous purple pea plant

67. Height and eye colors are two examples of continuous variation in humans. Whereas in pea plants the tall allele is dominant over the short allele, there are no intermediate heights in peas. Which of the following is the best explanation for the differences described above?

A. Humans are more advanced than pea plants; thus, the genetics of peas is much simpler than humans.
B. The intermediate size pea plant seeds are aborted within the seedpod and thus will never develop.
C. The intermediate size pea plant seeds have deleterious alleles that prevents them from germinating.
D. Many genes, rather than one gene for a characteristic, control some variations in species.
E. These variations in humans are affected by lack of dominance in the alleles that control these traits.

68. Children born in areas where proper nutrition is not available to them do not always realize their full growth potential. These children have the genes for normal growth of bones. Which of the following statements can best explain this situation?

A. There is a lack of dominance in the alleles for normal bone growth; as a result, the genotype is directly affected.
B. Since nutrition is necessary for proper development and is a part of the environment, it is a clear case of environmental effect on the phenotype.
C. Since nutrition is necessary for proper development and is a part of the environment, it is a clear case of environmental effect on the genotype.
D. There will always be examples that reflect this condition in human populations because of the continuous variation that exists for this characteristic.
E. The children's parents did not obtain the proper nutrients when they were young and thus were not able to pass on the alleles for normal growth and development.

69. Huntington's disease is caused by an autosomal dominant allele. It is a lethal disease, but it persists in the human population. Which of the following statements best describes why?

A. Huntington's disease is sex-linked and every human has at least one X chromosome; thus, the chances are extremely high for this allele to be maintained in the human population.
B. Huntington's disease presents symptoms that resemble cases reflecting a lack of dominance in some individuals; in those cases, the allele is passed on to the offspring.
C. While lethal to a parent, Huntington's disease will not be lethal to the offspring since it can skip a generation.
D. Huntington's disease presents symptoms in humans after many have already reproduced; therefore, they are unaware that they passed on Huntington's disease.
E. Huntington's disease can be treated in humans that are heterozygous for the condition, but individuals who are homozygous cannot receive treatments; thus, they pass on the alleles to their offspring.

70. Irene and William are having their first child. Irene knows her blood type is A, but William does not know his blood type. However, William knows that his mother and father were B. Their first child is a boy named Gregory. Gregory has type O blood. Of course, Irene and William do not understand how this happened. You could explain this to them using which of the following choices?

A. Irene's genotype is AA, and William's genotype is OO; thus, Gregory expresses the phenotype of O.
B. Irene's genotype is AO, and William's genotype is OO; thus, Gregory expresses the phenotype of O.
C. Because his parents were both type B, William could not be the father of Gregory.
D. Gregory's blood type will need to be checked after his first month of life if the parents want to know his blood type. It takes about a month for the blood type to develop in a newborn child.
E. Since Irene is type A, there had to be a mix-up in the lab report. Gregory should have been type A.

71. Select the genotype that a person whose phenotype was A positive would not have.

A. A+A+
B. A+O-
C. A-A-
D. A+A-
E. A+O+

72. A person who has lost a large amount of blood but is still alive is found in a wrecked automobile under a highway bridge. Several people are helping the paramedics load the victim into the ambulance. After the ambulance has departed for the hospital, you overhear the following conversation from the persons who helped the paramedics. "I am certain that when that guy gets to the hospital, they will transfuse him with any blood that they have in the blood bank since he has lost so much blood." The other person says, "Yeah, I bet you're right!" Having had a biology course, you know which blood could be safely given to anyone. Select it below.

A. A positive
B. A negative
C. O positive
D. O negative
E. AB negative

73. In humans, the male has an X and Y sex chromosome. The human female has two X-chromosomes. In birds, the female has a Z and a W sex chromosome while the male has two Z chromosomes. Which of the following statements is accurate about which parent controls the gender of the offspring?

A. In humans and birds the male controls the gender of all the offspring.
B. In humans and birds the female controls the gender of all the offspring.
C. In humans the male controls the gender of the offspring, and in birds the female controls the gender.
D. In humans the female controls the gender of the offspring, and in birds the male controls the gender.
E. Control of the gender of any human or bird offspring is related to the environmental conditions at the time of conception.

74. Sickle cell anemia is caused by a defect in the

A. oxygen carrying pigment hemoglobin
B. protein makeup in the liver
C. sticky sides of the red blood cells
D. allele for the production of mucus in the lungs
E. vector for the transfer of the correct amino acid for the hemoglobin molecule

75. When the adenovirus was used as a vector, it

A. inserted its DNA directly into the cell membrane
B. inserted its DNA directly into the human chromosome at the exact same place every time
C. inserted its DNA directly into the human chromosome at random locations
D. inserted its DNA directly into the ribosomes and caused an allergic reaction
E. inserted its DNA directly into the jumping genes which had an effect on that gene's expression

76. A new promising vector that seems to work better than the adenovirus for gene therapy is called the adeno-associated virus (AAV). In order for the AAV to work property, it must

A. have the adenovuirus to replicate
B. activate its two genes before entering the cell
C. insert itself into the human DNA to prevent cancer causing mutations
D. be used only for anemia patients
E. be eliminated by the human immune system, however its metabolites will remain and transfer the necessary gene to their targeted area

77. The Y chromosome

A. has 78 genes
B. is much shorter than the X chromosome
C. was thought prior to January 2003 to be a good example of Muller Ratchet Hypothesis
D. Choices a and c

E. Choices a, b, and c

78. Match each of the following.

_____A. A diploid individual carrying two different alleles on its homologous chromosomes.	1. locus
_____B. The totality of the alleles present in an organism.	2. genotype
_____C. The observable expression of the genes present.	3. heterozygote
_____D. A diploid individual whose two copies of a given gene are the same.	4. homozygote
_____E. The position on a chromosome where a gene is located.	5. phenotype

Answer Key

No. on Test	Correct Answer
1	Mendel
2	true
3	pea
4	1:1
5	genes
6	phenotype
7	alleles
8	segregation
9	test
10	map
11	autosomes
12	sex-linked
13	Constancy of species
14	Cystic fibrosis
15	hemophilia
16	A
17	D
18	D
19	A
20	D
21	E
22	A
23	E
24	B
25	C
26	E
27	B
28	C
29	D
30	E
31	B
32	C
33	D
34	B

35	E
36	C
37	C
38	D
39	C
40	D
41	E
42	B
43	E
44	A
45	C
46	D
47	B
48	A
49	E
50	C
51	D
52	B
53	D
54	E
55	C
56	C
57	D
58	E
59	B
60	C
61	A
62	D
63	D
64	A
65	B
66	E
67	D
68	B
69	D
70	B

71	C
72	D
73	C
74	A
75	C
76	A
77	E
78	1-C, 2-B, 3-E, 4-D, 5-A