- Y_B_ is green; yyB_ is blue; Y_bb is yellow; and yybb is white.

- 1. A green budgie is crossed with a blue budgie. Which of the following results is not possible?
- a. blue offspring
- b. white offspring
- c. yellow offspring
- d. green offspring
- e. all of the above are possible, but with different probabilities *

- 2. People with sickle-cell trait
- a. are heterozygous for the sickle-cell allele
- b. are usually healthy
- c. produce normal and abnormal hemoglobin
- d. have increased resistance to malaria
- e. all of the above *

- 3. In cattle, roan coat color (mixed red and white hairs) occurs in the heterozygous (Rr) offspring of red (RR) and white (rr) homozygotes. When two roan cattle are crossed, the phenotypes of the progeny are found to be in the ratio of 1 red:2 roan: 1 white. Which of the following crosses could produce the highest percentage of roan cattle?
- a. white x roan
- b. red x roan
- c. roan x roan
- d. red x white *
- e. all of the above crosses would give the same percentage of roan

- Use the following information to answer the question below. A woman who belongs to blood group A and is Rh positive has a daughter who is O positive and a son who is B negative. Rh positive is a simple dominant over Rh negative.
-
- 4. Which of the following is a possible genotype for the mother?
- a. I^AI^A
- b. I^AI^O *
- c. I^Ai
- d. I^AI^B
- e. I^A

- 5. Tallness (T) is dominant to dwarfness (t), while red (R) flower color is dominant to white (r). The heterozygous condition results in pink (Rr) flower color. A dwarf, homozygous red snapdragon is crossed with a plant homozygous for tallness and white flowers. What are the genotype and phenotype of the F1 individuals?
- a. TtRr – tall and pink *
- b. TtRr – tall and red
- c. ttrr – dwarf and white
- d. ttRr – dwarf and pink
- e. TTRR – tall and red

- 6. A 1:2:1 phenotypic ratio in the F2 generation of a monohybrid cross is a sign of
- a. polygenic inheritance
- b. complete dominance *
- c. multiple alleles
- d. incomplete dominance
- e. pleiotropy

-
- 7. A sexually reproducing animal has two unlinked genes, one for head shape (H) and one for tail length (T). Its genotype is HhTt. Which of the following genotypes is possible in a gamete from this organism?
- a. HhTt
- b. HT *
- c. Hh
- d. tt
- e. T

- Albinism is caused by a recessive autosomal allele. A man and a woman, both normally pigmented, have an albino child together.
-
- 8. The couple decides to have a second child. What is the probability that this child will be albino?
- a. ¼ *
- b. 0
- c. ¾
- d. ½
- e. 1

- 9. The probability that four coins will come up heads when flipped simultaneously is
- a. ½
- b. 1/16 *
- c. ¼
- d. 1/64
- e. 1/8

- 10. A 9 purple to 7 white phenotype in sweet peas in the F2 generation is most likely due to
- a. Epistasis *
- b. crossing over
- c. trisomy 21
- d. linkage
- e. pleiotropy

- 11. A 9:3:3:1 phenotypic ratio is characteristic of
- a. a dihybrid cross *
- b. linked genes
- c. a trihybrid cross
- d. a monohybrid cross
- e. C and D

- 12. Mendel's law of segregation was nearly impossible for most biologists to understand until there was a general understanding of
- a. Meiosis *
- b. mitosis
- c. dominance
- d. pleiotropy
- e. epistasis

- 13. Which of the following terms is LEAST related to the others?
- a. chorionic villus sampling
- b. pedigree
- c. karyotype
- d. amniocentesis
- e. Epistasis *

- 14. Two true-breeding stocks of garden peas are crossed. One parent had red, axial flowers and the other had white, terminal flowers; all F1 individuals had red, axial flowers. If 1,000 F2 offspring resulted from the cross, how many of them would you expect to have red, terminal flowers? (Assume independent assortment)
- a. 750
- b. 190 *
- c. 250
- d. 565
- e. 65

- 15. Which of the following is an example of polygenic inheritance?
- a. skin pigmentation in humans *
- b. sex linkage in humans
- c. white and purple color in sweet peas
- d. the ABO blood groups in humans
- e. pink flowers in snapdragons

- A woman and her spouse both show the normal phenotype for pigmentation, but both had one parent who was an albino. Albinism is an autosomal recessive trait.
-
- 16. What is the probability that their fourth child will have a homozygous genotype?
- a. ½
- b. 1
- c. ¼ *
- d. 0
- e. ¾

- 17. Roan color in cattle is the result of incomplete dominance between red and white color genes (Rr). How would one produce a herd of pure-breeding roan-colored cattle?
- a. cross roan with white
- b. cross roan with roan
- c. cross red with white *
- d. cross roan with red
- e. It cannot be done

- 18. P – purple and pp – white. The offspring of a cross of two heterozygous purple-flowering plants (Pp x Pp) results in
- a. all purple-flowered plants
- b. all white-flowered plants
- c. two types of white-flowered plants: PP and Pp
- d. all pink-flowered plants
- e. purple-flowered plants and white-flowered plants *

- Albinism is caused by a recessive allele. A man and woman, both normally pigmented, have an albino child together.
-
- 19. The mother is now pregnant for a third time, and her doctor tells her she is carrying fraternal twins. What is the probability that both children will have normal pigmentation?
- a. ¼
- b. 1/16
- c. 16/16
- d. 9/16 *
- e. ¾

- 20. In birds, sex is determined by a ZW chromosome scheme. Males are ZZ and females are ZW. A lethal recessive allele that causes death of the embryo occurs on the Z chromosome in pigeons. What would be the sex ratio in the offspring of a cross between a male heterozygous for the lethal allele and a normal female?
- a. 1:1 male to female *
- b. 4:3 male to female
- c. 1:2 male to female
- d. 2:1 male to female
- e. 3:1 male to female

- 21. The statement "The X and Y chromosomes determines sex" is inaccurate and misleading. Which of the following statements is most accurate?
- a. Genes on the X chromosome that are not present on the Y determine sex.
- b. A variety of genes on the X and/or Y chromosomes play various roles in determining sex, and the activity of those genes is controlled by a small number of genes on other chromosomes. *
- c. Genes on the X and Y chromosomes determine sex.
- d. Genes on the Y chromosome that are not present on the X determine sex.
- e. A variety of genes on other chromosomes play various roles in determining sex, and the activity of those genes is controlled by a small number of genes on the X and/or Y chromosomes.

- 22. New combinations of linked genes are due to
- a. crossing over *
- b. independent assortment
- c. environmental changes such as temperature extremes
- d. mixing of sperm and egg
- e. nondisjunction

- 23. Which of these syndromes afflicts mainly males?
- a. Down Syndrome
- b. Prader-Willi Syndrome
- c. Cry of the Cat Syndrome
- d. color-blindness *
- e. Turner Syndrome

- An achondroplastic dwarf man with normal vision marries a color-blind woman of normal height. The man's father was six feet tall and both the woman's parents were of average height. Achondroplastic dwarfism is autosomal dominant and red-green colorblindness is X-linked recessive.
-
- 24. How many of their male children would be color-blind and normal height?
- a. all
- b. Half *
- c. three out of four
- d. none
- e. one out of four

- 25. The following is a list of chromosomal alterations. Which one of these would automatically cause two of the others?
- a. reciprocal translocation *
- b. nonreciprocal translocation
- c. duplication
- d. deletion
- e. inversion

- 26. In cats, black color is caused by an X-linked allele; the other allele at this locus causes orange color. The heterozygote is tortoiseshell. What kinds of offspring would you expect from this cross of a black female and an orange male?
- a. black female; orange male
- b. orange female; black male
- c. tortoiseshell female; black male *
- d. orange female; orange male
- e. tortoiseshell female; tortoiseshell male

- 27. In humans, male-pattern baldness is controlled by a gene that occurs in two allelic forms. Allele Hn determines nonbaldness and allele Hb determines pattern baldness. The interaction of these two alleles in the heterozygote condition is of special interest because in the presence of male hormone, allele Hn is dominant over Hb. If a man and woman both with genotype HnHb have many children, approximately what percentage of their male children would be expected eventually to be bald?
- a. 50%
- b. 100% *
- c. 75%
- d. 25%
- e. 33%

- 28. If a pair of homologous chromosomes fails to separate during anaphase of meiosis I, what will be the chromosome number (n) of the four resulting gametes?
- a. n+1; n+1; n-1; n-1 *
- b. n-1; n-1; n; n
- c. n+1; n-1; n-1; n-1
- d. n+1; n+1; n; n
- e. n+1; n-1; n; n

- 29. People who have red hair usually have freckles. This can best be explained by
- a. reciprocal translocation
- b. independent assortment
- c. sex-influenced inheritance
- d. Linkage *
- e. nondisjunction

- 30. Vermillion eyes is a sex-linked recessive characteristic in fruit flies. If a female having vermillion eyes is crossed with a wild-type male, what percentage of the F1 males will have vermillion eyes?
- a. 100% *
- b. 50%
- c. 25%
- d. 75%
- e. 0%

- 31. If a human interphase nucleus of a person contained three Barr bodies, it can be assumed that the person
- a. is a male
- b. is a hemophiliac
- c. has 4 X chromosomes *
- d. has Down Syndrome
- e. has Turner Syndrome

- 32. What do all human males inherit from their mother?
- a. mitochondrial DNA
- b. an X chromosome
- c. the gene for normal gonad development (SRY)
- d. A and B
- e. A,B, and C *