

1).Radish flowers may be red, purple, or white. A cross between a red-flowered plant and a white-flowered plant yields all-purple offspring. The part of the radish we eat may be oval or long, with long being the dominant characteristic.

1) If true-breeding red long radishes are crossed with true breeding white oval radishes, the F1 will be expected to be which of the following?

- A) Red and long
- B) Red and oval
- C) White and long
- D) Purple and long
- E) Purple and oval

Answer: D

2) In the F2 generation of the above cross, which of the following phenotypic ratios would be expected?

- A) 9:3:3:1
- B) 9:4:3
- C) 1:1:1:1
- D) 1:1:1:1:1:1
- E) 6:3:3:2:1:1

Answer: E

3) The flower color trait in radishes is an example of which of the following?

- A) A multiple allelic system
- B) Sex linkage
- C) Codominance
- D) Incomplete dominance
- E) Epistasis

Answer: D

4) Tallness (T) in snapdragons 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, 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–dwarf and pink
- B) ttrr–dwarf and white
- C) TtRr–tall and red
- D) TtRr–tall and pink
- E) TTRR–tall and red

Answer: D

5) In cattle, roan coat color (mixed red and white hairs) occurs in the heterozygous (Rr) offspring of red (RR) and white (rr) homozygotes. Which of the following crosses would produce offspring in the ratio of 1 red : 2 roan : 1 white?

- A) red × white
- B) roan × roan
- C) white × roan
- D) red × roan
- E) The answer cannot be determined from the information provided.

Answer: B

Use the following information to answer the questions below.

A woman who has blood type A positive has a daughter who is type O positive and a son who is type B negative. Rh positive is a trait that shows simple dominance over Rh negative and is designated by the alleles R and r, respectively.

6) Which of the following is a possible partial genotype for the son?

- A) IBIB
- B) IBIA
- C) ii
- D) IBi
- E) IAIA

Answer: D

7) Which of the following is a possible genotype for the mother?

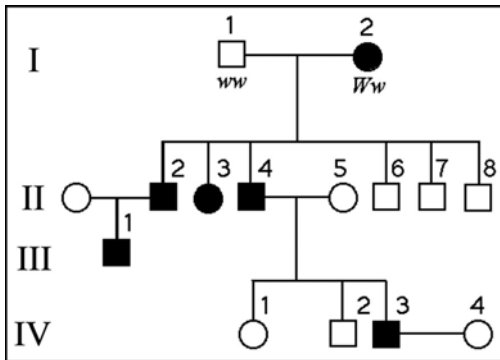
- A) I<sub>A</sub>I<sub>A</sub>
- B) I<sub>B</sub>I<sub>B</sub>
- C) ii
- D) I<sub>A</sub>i
- E) I<sub>A</sub>I<sub>B</sub>

Answer: D

8) Which of the following is the probable genotype for the mother?

- A) I<sub>A</sub>I<sub>A</sub>R<sub>R</sub>
- B) I<sub>A</sub>I<sub>A</sub>R<sub>r</sub>
- C) I<sub>A</sub>i<sub>r</sub>r
- D) I<sub>A</sub>iR<sub>r</sub>
- E) I<sub>A</sub>iR<sub>R</sub>

Answer: D



The following questions refer to the pedigree chart above for a family, some of whose members exhibit the dominant trait, wooly hair. Affected individuals are indicated by an open square or circle.

9) What is the genotype of individual II-5?

- A) WW
- B) Ww
- C) ww
- D) WW or ww
- E) ww or Ww

Answer: C

10) What is the likelihood that the progeny of IV-3 and IV-4 will have wooly hair?

- A) 0%
- B) 25%
- C) 50%
- D) 75%
- E) 100%

Answer: C

11) What is the probability that individual III-1 is Ww?

- A) 3/4
- B) 1/4
- C) 2/4
- D) 2/3
- E) 1

Answer: E

12) Which of the events described below agrees with the idea of catastrophism?

- A) The gradual uplift of the Himalayas by the collision of the Australian crustal plate with the Eurasian crustal plate
- B) The formation of the Grand Canyon by the Colorado River over millions of years
- C) The gradual deposition of sediments many kilometers thick on the floors of seas and oceans
- D) The sudden demise of the dinosaurs, and various other groups, by the impact of a large extraterrestrial body with Earth
- E) The development of the Galapagos Islands from underwater seamounts over millions of years

Answer: D

13) During a study session about evolution, one of your fellow students remarks, "The giraffe stretched its neck while reaching for higher leaves; its offspring inherited longer necks as a result." Which statement is most likely to be helpful in correcting this student's misconception?

- A) Characteristics acquired during an organism's life are generally not passed on through genes.
- B) Spontaneous mutations can result in the appearance of new traits.
- C) Only favorable adaptations have survival value.
- D) Disuse of an organ may lead to its eventual disappearance.
- E) Overproduction of offspring leads to a struggle for survival.

Answer: A

14) Darwin's mechanism of natural selection required long time spans in order to modify species. From whom did Darwin get the concept of Earth's ancient age?

- A) Georges Cuvier
- B) Charles Lyell
- C) Alfred Wallace
- D) Thomas Malthus
- E) John Henslow

Answer: B

15) As a young biologist, Charles Darwin had expected the living plants of temperate South America would resemble those of temperate Europe, but he was surprised to find that they more closely resembled the plants of tropical South America. The biological explanation for this observation is most properly associated with the field of

- A) meteorology.
- B) embryology.
- C) vertebrate anatomy.
- D) bioengineering.
- E) biogeography.

16) Natural selection is based on all of the following except

- A) genetic variation exists within populations.
- B) the best-adapted individuals tend to leave the most offspring.
- C) individuals who survive longer tend to leave more offspring than those who die young.
- D) populations tend to produce more individuals than the environment can support.
- E) individuals adapt to their environments and, thereby, evolve.

Answer: E

17) A biologist studied a population of squirrels for 15 years. During that time, the population was never fewer than 30 squirrels and never more than 45. Her data showed that over half of the squirrels born did not survive to reproduce, because of competition for food and predation. In a single generation, 90% of the squirrels that were born lived to reproduce, and the population increased to 80. Which inference(s) about this population might be true?

- A) The amount of available food may have increased.
- B) The number of predators may have decreased.
- C) The squirrels of subsequent generations should show greater levels of genetic variation than previous generations, because squirrels that would not have survived in the past will now survive.
- D) A and B only
- E) A, B, and C

Answer: E

18) Which of the following statements is an inference of natural selection?

- A) Subsequent generations of a population should have greater proportions of individuals that possess traits better suited for success in unchanging environments.
- B) An individual organism undergoes evolution over the course of its lifetime.
- C) Habitats do not generally have unlimited resources.
- D) Natural populations tend to reproduce to their full biological potential.
- E) Some of the variation that exists among individuals in a population is genetic.

Answer: A

19) DDT was once considered a "silver bullet" that would permanently eradicate insect pests. Today, instead, DDT is largely useless against many insects. Which of these would have been required for this pest eradication effort to be successful in the long run?

- A) Larger doses of DDT should have been applied.
- B) All habitats should have received applications of DDT at about the same time.
- C) The frequency of DDT application should have been higher.
- D) None of the individual insects should have possessed genomes that made them resistant to DDT.
- E) DDT application should have been continual.

Answer: D

20) Structures as different as human arms, bat wings, and dolphin flippers contain many of the same bones, these bones having developed from very similar embryonic tissues. How do biologists interpret these similarities?

- A) By identifying the bones as being homologous
- B) By the principle of convergent evolution
- C) By proposing that humans, bats, and dolphins share a common ancestor
- D) A and C only
- E) A, B, and C

Answer: D

21) Which of these makes determining the evolutionary relatedness of different species based on the amino acid sequence of homologous proteins generally less accurate than determinations of relatedness based on the nucleotide sequences of homologous genes?

- A) Silent mutations
- B) Gene duplications
- C) Translocation events that change gene sequences
- D) Crossing-over
- E) Independent assortment

Answer: A

A large population of laboratory animals has been allowed to breed randomly for a number of generations. After several generations, 25% of the animals display a recessive trait (aa), the same percentage as at the beginning of the breeding program. The rest of the animals show the dominant phenotype, with heterozygotes indistinguishable from the homozygous dominants.

22) What is the estimated frequency of allele A in the gene pool?

- A) 0.05
- B) 0.25
- C) 0.50
- D) 0.75
- E) 1.00

Answer: C

23) What proportion of the population is probably heterozygous (Aa) for this trait?

- A) 0.05
- B) 0.25
- C) 0.50
- D) 0.75
- E) 1.00

Answer: C

24) In a Hardy-Weinberg population with two alleles, A and a, that are in equilibrium, the frequency of allele a is 0.1. What is the percentage of the population that is heterozygous for this allele?

- A) 90
- B) 81
- C) 49
- D) 18
- E) 10

Answer: D

Use the following information to answer the next 2 questions below.

In a hypothetical population of 1,000 people, tests of blood-type genes show that 160 have the genotype AA, 480 have the genotype AB, and 360 have the genotype BB.

25) What is the frequency of the B allele?

- A) 0.001
- B) 0.002
- C) 0.100
- D) 0.400
- E) 0.600

Answer: E

26) If there are 4,000 children born to this generation, how many would be expected to have AB blood under the conditions of Hardy-Weinberg equilibrium?

- A) 100
- B) 960
- C) 1,920
- D) 2,000
- E) 2,400

Answer: C

27) Which of these should decline in hybrid zones where reinforcement is occurring?

- A) gene flow between distinct gene pools
- B) speciation
- C) the genetic distinctness of two gene pools
- D) mutation rate
- E) hybrid sterility

Answer: A

28) The most likely explanation for the high rate of sympatric speciation that apparently existed among the cichlids of Lake Victoria in the past is

- A) sexual selection.
- B) habitat differentiation.
- C) polyploidy.
- D) pollution.
- E) introduction of a new predator.

Answer: A

29) The most likely explanation for the recent decline in cichlid species diversity in Lake Victoria is

- A) reinforcement.
- B) fusion.
- C) stability.
- D) geographic isolation.
- E) polyploidy.

Answer: B