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Question: 1

Based on the provided information, what was most likely the flower color phenotype distribution of the snapdragons in the F1 generation?

- A. Half red and half white
- B. All red
- C. All white
- D. All pink

Answer: D

Explanation:

All pink is the correct answer. In the F1 generation, only a red flower and a white flower were crossed. Based on the distribution of phenotype for the F2 generation, this is an example of incomplete dominance. Therefore, heterozygous plants would show the pink phenotype, and since the F1 generation is only a cross between red and white, the most likely outcome would be a pink phenotype for the offspring. All other choices are incorrect since choice D is the only possible correct choice.

Question: 2

Which phenotypic dominance pattern can be observed from the phenotype distribution of the F2 generation?

- A. Complete dominance
- B. Codominance
- C. Incomplete dominance
- D. Blending inheritance

Answer: C

Explanation:

Incomplete dominance is the correct answer. Incomplete dominance occurs when a dominant allele does not entirely mask the recessive allele. Therefore, there are different phenotypes for homozygous dominant, homozygous recessive, and heterozygous offspring. Choice A, complete dominance, is incorrect because heterozygous flowers would display the same phenotype as homozygous dominant flowers. Choice B, codominance, is incorrect because heterozygous codominant species display both the dominant and recessive phenotypes. In this case, that would be plants with white and red flowers. Choice D, blending inheritance, is incorrect because it is a theory of inheritance that was disproven by Gregor Mendel's inheritance studies.

Question: 3

What would the phenotype of the heterozygous snapdragons be if they showed complete dominance?

- A. White
- B. Red
- C. Pink
- D. Cannot determine

Answer: D

Explanation:

Choice D is correct because there was no information in the passage stating which color phenotype corresponds to the dominant allele. Choices A and B, white and red, are incorrect because the passage does not say whether either is the dominant allele. Choice C, pink, is incorrect because it can only be observed in heterozygous plants with incomplete dominance.

Question: 4

What would be the phenotype distribution of the F1 generation if snapdragons showed a codominant dominance pattern?

- A. All white and red
- B. All pink
- C. Half pink and half white and red
- D. All white

Answer: A

Explanation:

All white and red is the correct answer. Heterozygous species that are codominant display both the recessive and dominant traits equally. Therefore, a cross between a homozygous dominant snapdragon and a homozygous recessive snapdragon would yield all heterozygous species showing mixed white and red flowers in the F1 generation. Choice B, all pink, is incorrect because it would be the result of the F1 generation when snapdragons show incomplete dominance. Choice C, half pink and half white and red, is incorrect because it is not a possible result. Choice D, all white, is incorrect because it would be an example of complete dominance if the white flower were considered the dominant trait.

Question: 5

If a white snapdragon and a pink snapdragon from the F2 generation were crossed to yield an F3 generation, what would you expect to be the result?

- A. Lighter pink flowers

- B. Half white flowers, half pink flowers
- C. All white flowers
- D. All pink flowers

Answer: B

Explanation:

Half white flowers and half pink flowers is the correct answer because, with incomplete dominance, when a heterozygous pink snapdragon is crossed with a homozygous white snapdragon, half of the offspring are heterozygous and the other half are homozygous for the white phenotype. Choice A, lighter pink flowers, is incorrect because blending inheritance, the even mixture of two traits, was disproven and does not occur. Choice C, all white flowers, is incorrect because that would only occur if snapdragons were completely dominant for the allele that codes for white flowers. Choice D, all pink flowers, is incorrect because that could only occur if a white snapdragon were crossed with a red snapdragon.

Question: 6

What is the dominant allele that codes for snapdragon flower color?

- A. The allele coding for white is dominant.
- B. The allele coding for red is dominant.
- C. Neither allele is dominant.
- D. It cannot be determined which allele is dominant.

Answer: C

Explanation:

Choice C is correct because this is an example of incomplete dominance, where neither allele is dominant over the other. This is determined by the presence of the hybrid pink color. Choices A and B, allele coding for white and allele coding for red, are incorrect because for one of the alleles to be dominant, a complete dominance pattern would be necessary. Choice D is incorrect because it can be determined that neither allele is dominant, due to the pink hybrid's presence.

Question: 7

Why might a fetus require fetal hemoglobin instead of adult hemoglobin?

- A. Fetuses need more oxygen than adults.
- B. Fetal hemoglobin can take oxygen from the mother's blood. Correct
- C. Fetuses require less oxygen than adults.
- D. Fetuses are smaller than adults.

Answer: B

Explanation:

Choice B is the correct answer; fetal hemoglobin can take oxygen from the mother's blood. The mother's blood does not mix with the fetus's blood, so the only way a fetus can get oxygen is through its transfer from the maternal hemoglobin to the fetal hemoglobin. This is possible because the affinity for oxygen is higher in fetal hemoglobin than in adult hemoglobin. Choices A and C are incorrect because fetuses do not need more or less oxygen than adults. Choice D, fetuses are smaller than adults, is incorrect because the organism's size does not dictate a cell's affinity for oxygen.

Question: 8

Which of the following has the lowest affinity for oxygen?

- A. Adult hemoglobin
- B. Fetal hemoglobin
- C. Myoglobin
- D. Adult hemoglobin, fetal hemoglobin, and myoglobin all have the same affinity for oxygen.

Answer: A

Explanation:

Adult hemoglobin is the correct answer because, based on information provided in the passage, it is saturated by oxygen less easily than fetal hemoglobin and myoglobin. Choice B, fetal hemoglobin, is incorrect because it has a higher affinity for oxygen than adult hemoglobin. Choice C, myoglobin, is incorrect because it has the highest affinity for oxygen. This also makes it the least likely to dissociate its oxygen. This is because myoglobin is used for storing oxygen, typically in muscles. Choice D, that they all have the same affinity for oxygen, is incorrect because each of the other options has a unique affinity for oxygen, due to their different functions.

Question: 9

Where is hemoglobin made in a human body?

- A. Liver
- B. Spleen
- C. Heart
- D. Bone marrow

Answer: D

Explanation:

Bone marrow is the correct answer because it is the location where erythrocytes are made. Hemoglobin is present in the cytoplasm of erythrocytes, meaning that hemoglobin is made where erythrocytes are made. Hemoglobin is not made in the liver, spleen, or heart, so choices A, B, and C are incorrect.

Question: 10

How many subunits does hemoglobin have?

- A. 1
- B. 2
- C. 3
- D. 4

Answer: D

Explanation:

Four subunits is the correct answer because hemoglobin is a tetrameric protein. The prefix tetra- means four. Therefore, a tetramer is a complex with four subunits.

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