

• Heredity and Evolution:



1. Mention any two points of difference between acquired and inherited traits. If the tail of a mouse is cut for twenty one generations, will the tail occur in the twenty second generation of that mouse? Give reason to support your answer.
(CBSE 2013, 2016, 2017, 2022, 2021)
2. Two pea plants- one with round yellow seeds (RRYY) and another with wrinkled green (rryy) seeds produce F1 progeny that have round, yellow (RrYy) seeds. When F1 plants are self-pollinated, which new combination of characters is expected in F2 progeny? How many seeds with these new combinations of characters will be produced when a total 160 seeds are produced in F2 generation? Explain with reason.
(CBSE 2018, 2020, 2022)
3. List difference between dominant traits and recessive traits. What percentage of the plants in the F2 generation were round, in Mendel's dihybrid cross between round yellow and wrinkled green pea plants ?
(CBSE 2016, 2015, 2019)
4. Sahil performed an experiment to study the inheritance pattern of genes. He crossed tall pea plants (TT) with short pea plants (tt) and obtained all tall plants in F1 generation.
 - a. What will be the set of genes present in the F1 generation?
 - b. Give reason why only tall plants are observed in F1 progeny.
(CBSE 2016, 2021, 2022)
5. In an asexually reproducing species, if a trait X exists in 5% of a population and trait Y exists in 70% of the same population, which of the two traits is likely to have arisen earlier? Give reason.
(CBSE 2019, 2021)

Solutions

1. **Inherited trait:** Inherited traits are those that are passed down from parents to children. An individual's inherited traits are determined by their genes.

1. Characters are passed down from generation to generation.

2. These characteristics are caused by changes in genes or DNA.

3. Human inherited traits include hair, skin, eye color, body type, height, and susceptibility to certain diseases.

Acquired trait: An acquired trait is a personality trait that develops in a person as a result of environmental influences.

1. Characters are not passed down from generation to generation

2. These characteristics emerge in response to their surroundings or lifestyle.

3. These characteristics are not encoded by a living organism's DNA and thus cannot be passed down to future generations. The mouse will continue to have information for presence of tail in its DNA. So, it will- continue to have a tail because absence of tail is an acquired trait

2. Two pea plants, one with round green seeds ($RRyy$) and another with wrinkled yellow ($rrYY$) seeds produce F1 progeny that has round, yellow ($RrYy$) seeds. When F1 plants are selfed, the F2 progeny will have a new combination of characters, the combination will be round, yellow and wrinkled green.

3. Dominant traits are always expressed when the connected allele is dominant, even if only one copy of the dominant trait exists. Recessive traits are expressed only if both the connected alleles are recessive. If one of the alleles is dominant, then the associated characteristic is less likely to manifest.

4. (a) Dominant trait is tallness which is represented by TT and recessive trait is dwarfness which is represented by tt. Thus, on crossing the dominant trait with dwarf trait, Tt will be obtained. Hence, Tt will be the set of genes present in the F1 Generation.

(b) According to Mendel's law of monohybrid inheritance and law of segregation, if a single pair of contrasting characteristics were cross-bred by self-pollination, then, in F1 progeny, plants with dominant traits are produced. Thus only tall plants are observed in the F1 Progeny because T are called dominant traits and they express themselves.

5. In asexual reproduction, DNA is copied as it is from one generation to another, there is no mating or mixing of genes. Asexual reproduction results in offspring with identical genetic information. There is very little genetic variation between parent and offspring. It takes large amount of time for different trait to develop in case of asexual reproduction. Hence, if a trait exist in 70% of population, it would have arisen earlier as it would have been replicated over more number of generations.