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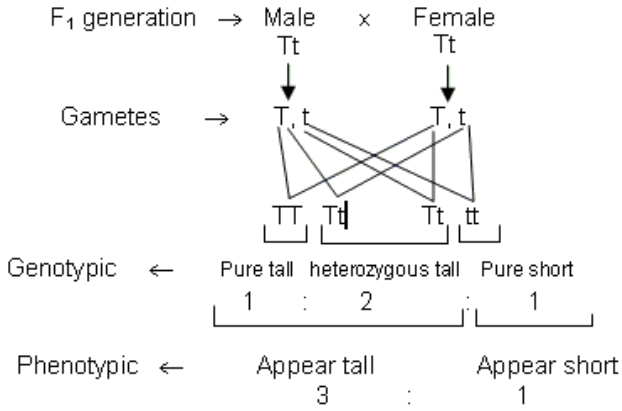
Class: X
Subject: Biology
Topic: How Do Organisms Reproduce?
No. of Questions: 20

Q1. What is the gene ratio of F_2 generation in a monohybrid cross?

(a) 3 : 1
(b) 1: 2 : 1
(c) 2 : 3
(d) 3 : 0

Sol. (b)

Considering the gene for tallness of plant, the monohybrid cross can be shown as



Thus, the correct answer is (1).

Q2. Which experimental plant was used by Mendel?

(a) Wild pea
(b) Edible pea
(c) Garden pea
(d) Chicken pea

Sol. Mendel conducted his experiments on the garden pea plant, i.e. *Pisum sativum*, which he could conveniently grow in the garden of his monastery.

Q3. The transmission of characters from one generation to the next is termed as _____.

(a) Variation
(b) Heredity
(c) Evolution
(d) Diversity

Sol. (b)

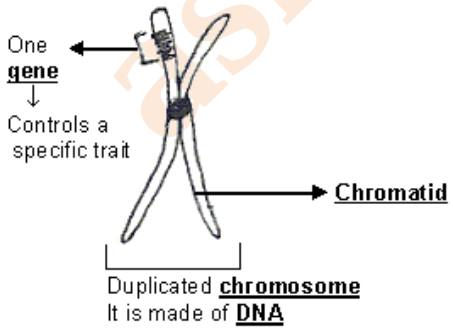
Transmission of characters is called heredity while the changes that occur during transmission are called variations. Due to variations, the organisms of a species differ from each other. This means that diversity is seen. Occurrence of variations and diversity over many generations leads to evolution.

Q4. The Mendelian "factors" are now known as _____

(a) Genes
(b) Chromosome
(c) DNA
(d) Chromatid

Sol. (a)

Mendelian "factors" were known to control specific traits of plants like height, colour of seeds etc. Now, we know that each trait is controlled by a small part of the chromosome and it is called gene. Gene is known as the heredity unit. A chromosome as a whole controls many traits. DNA is a biochemical entity. Chromatid, on the other hand, refers to one thread of genetic material present in a duplicated chromosome.



Q5. The differences in the traits among the individuals of a species are known as _____.

(a) Evolution
(b) Inheritance
(c) Heredity
(d) Variation

Sol. (d)

The traits of different individuals of same species differ from each other. This occurs due to small changes in the genetic makeup that occur during DNA copying or recombination during sexual millions of reproduction. These differences are called variations, and evolution is a result of variations occurring over generations.

On the other hand, inheritance and heredity are opposite to variations because they refer to the transmission of traits from one generation to the other.

Q6. What is the name given to the plants produced from cross–pollination of parent plants?

(a) F3 plants
(b) F1 plants
(c) F2 plants
(d) F4 plants

Sol. (b)

Cross pollination is done by the parents having opposite traits. Genetically pure parents are crossed together and the result of this cross is called as F1 generation. It should be noted that all other generations obtained thereafter, i.e. F2, F3 and F4 are produced by the self pollination of the members of previous generation.

For example:

Showing F_1, F_2, F_3, F_4 ⟶ Parent 1 × Parent 2
Cross pollination ↓
F_1
Selfing ↓
F_2
Selfing ↓
F_3
Selfing ↓
F_4

Q7. Which of the following traits always appears in two opposite forms?

(a) Contrasting
(b) Recessive
(c) Dominant
(d) Homoallelic

Sol. (a)

As the name suggests, a trait that appears in two opposite forms is called contrasting trait and its two forms are called recessive and dominant forms. Homoallelic refers to a condition when both the alleles are the same and not contrasting, i.e. (4) is also incorrect.

Q8. The plants produced from self–pollination of first generation plants constitute the _____.

(a) Parent plants
(b) F1 plants
(c) F2 plants
(d) F3 plants

Sol. (c)

First generation plants, i.e. F1 generation on self–pollination produce the next generation, which is referred as F2 generation.

F3 plants are produced by self–pollination of 2^{nd} generation plants, while parent plants are genetically pure and are not produced by any cross.

Q9. The human traits are influenced by DNA of _____.

(a) Mother
(b) Father
(c) Siblings
(d) Both (1) and (2)

Sol. (d)

Traits of any human depend on its genetic makeup, i.e. DNA, which is derived from both father (50%) and mother (50%). Siblings' DNA may be similar but they also depend on parents; and they do not affect each other. Thus, option (4) is correct.

Q10. How many pairs of contrasting traits were considered by Mendel in the pea plant?

(a) 6
(b) 7
(c) 8
(d) 9

Sol. (b)

Mendel studied seven traits of the pea plant viz. (i) height, (ii) flower colour, (iii) shape of seed, (iv) colour of seed coat, (v) pod colour, (vi) pod shape and (vii) flower position.

Q11. Which of the following options is not a variant in humans?

(a) Shapes of hair
(b) Number of forelimbs
(c) Attached ear lobes
(d) Rolling of tongue

Sol. (b)

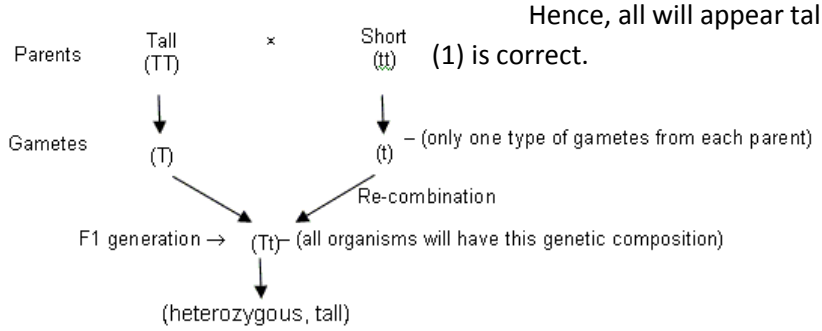
Variant means a feature that may be different in different organisms, but is fixed in a particular organism (i.e. it does not change in his life time). As we know, humans have curly or straight hair; attached or free ear lobes; and some may roll their tongues while others cannot. Thus, all these three are variants in humans. But number of forelimbs (i.e. two) is fixed and it does not vary genetically.

Q12. If Tall (TT) is cross breed with dwarf (tt). What will be the characteristics of F1 plants?

(a) All tall
(b) Both tall and short
(c) All short
(d) In between tall and short

Sol. (a)

We can show the cross between Tall (TT) and Short (tt) as



Hence, all will appear tall, because T is a dominant trait. So (1) is correct.

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Q13. There are _____ versions for each trait in an offspring.

(a) 2
(b) 3
(c) 4
(d) 5

Sol. (a)

One version of each trait is given to the progeny by each parent. Since two parents are involved in sexual reproduction, each organism has two versions of every trait. The two versions may be different or the same.

Q14. Variations cannot occur due to _____.

(a) Crossing over
(b) Mutation
(c) Effect of environment
(d) Asexual reproduction

Sol. (d)

Variations occur due to small changes in the genetic make up. These changes may be the result of small errors during copying, i.e. mutations as in asexual reproduction or due to mixing of DNA content during cross over, which occurs in sexual reproduction. Thus, (1), (2) and (3) can cause variations. But in asexual reproduction, offspring are the exact copy of their parents. Thus, it cannot cause variation.

Q15. If tall height (TT) is a dominant trait and short height is a recessive trait (tt) in the garden pea, which of the following statements is true?

(a) TT and tt will be tall plants.
(b) TT and Tt will be tall plants.
(c) TT and tt will be dwarf plants.
(d) tt will be tall plants

Sol. (b)

(T) is dominant while (t) is recessive. It means that when (T) and (t) are present together, the effect of (T) will hide the effect of (t). But in absence of (T), the effect of (t) will be visible. Thus, (TT) are tall, while (tt) are short. But in (Tt), the tall feature dominates short–height trait. So, only (2) is correct.

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Q16. Which of the following branches of science deals with heredity and variation. ?
(a) genetics
(b) zoology
(c) biotechnology
(d) botany

Sol. (b)
The science of heredity and variation is based on the study of our genetic material and is called genetics.
Biology is the study of living organisms, while botany is the study of plants. Biotechnology deals with manipulation of DNA of different organisms, disobeying the rules of heredity and variation.

Q17. The ratio of maternal DNA to the paternal DNA in the offspring is _____.
(a) 1 : 1
(b) 1 : 2
(c) 2 : 1
(d) 1 : 0

Sol. (a)
Both mother and father contribute their DNA to the progeny in the form of gametes. Both male and female gametes contain half the amount of DNA as compared to normal parent cell. They combine to produce zygote that has the same amount of DNA as parent. Thus, both maternal (from mother) and paternal (from father) DNA contribute 50% each, i.e. 50 : 50 which is equal to 1 : 1.

Q18. The differences in some of the traits of children from their parents are due to _____
(a) Heredity
(b) Variation
(c) Evolution
(d) Diversity

Sol. (b)
Some traits of children are different from parents due to small changes in their DNA. These changes are called variations. On the contrary, heredity simply refers to transmittance of traits and similarity between parents and offspring.
Evolution and Diversity are caused due to variations over millions of generations. Hence, the correct answer is (2).

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Q19. Who is considered to be the father of genetics?

(a) Mendel
(b) Darwin
(c) Sutton
(d) Morgan

Sol. (a)

Mendel is called the father of genetics because he pioneered the study of traits and their transmittance much before the others like Morgan and Sutton. Darwin has worked on the theory of evolution.

Q20. A crow can never give birth to an eagle due to the essence of _____.

(a) Evolution
(b) Heredity
(c) Diversity
(d) Variation

Sol. (b)

A crow can pass its features to its next generation, which will be a crow only because it has obtained the DNA and traits of being a crow only. This transfer of traits is called heredity. Hence, (2) is correct.

Crow may differ from its previous generation in size or any other feature due to variation and accumulation of such variations over generations will lead to evolution. As a result, we may see different kinds of crows and that will be called diversity.

Thus, (1), (3) and (4) refer to occurrence of changes and their effect on the whole population.