

BCM SCHOOL BASANT AVENUE DUGRI ROAD, LUDHIANA

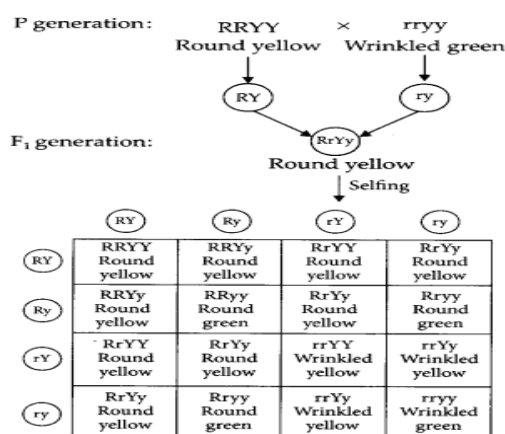
SCIENCE ASSIGNMENT (2023-2024)

CLASS – X (BIO/CHEMISTRY)

ANSWER KEY

- (a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).
- (a) Mendel carried out crosses with two traits to see the interaction and basis of inheritance between them. In a dihybrid cross given by Mendel, it was observed that when two pairs of characters were considered each trait expressed independent of the other.

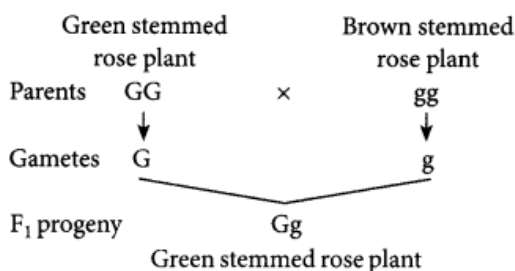
(b) For example, a cross between round yellow and wrinkled green parents.



In F₁ generation, all plants are with round yellow seeds. But in F₂ generation, we find all types of plants : Round yellow, Round green, Wrinkled yellow, Wrinkled green.

(c) F₂ generation ratio : Round-yellow = 9 : Round- green = 3 : Colour of stem in F₁ progeny Wrinkled- yellow = 3 : Wrinkled-green = 1

- (a) (i) Colour of stem in F₁ progeny:



The colour in the F₁ progeny is green stemmed as green stem colour is dominant.

(ii) F₁ progeny on self pollination:

$$Gg \times Gg$$

$$\downarrow$$

	G	g
G	GG	Gg
g	Gg	gg

F₂ generation Green stemmed : Brown stemmed

F₂ generation Green stemmed: Brown stemmed 1/4 or 25% of F₂ progeny are brown stemmed rose plant.

(iii) Ratio of GG and Gg in F₂ progeny:

Genotype of F₂ progeny – GG : Gg 1 : 2

(b) This is a monohybrid cross. This shows that out of two contrasting traits only one dominant trait appears in F₁ generation and the trait which does not express is recessive. On selfing the F₁ plants, both the traits appear in next generation but in a definite proportion.

4. (a) When a tall plant (TT) is crossed with a short tea plant (tt), only tall plants are obtained in F₁ progeny. It is because out of two contrasting traits only one appears in the progeny of first generation. This means that the trait which appears in F₁ generation is dominant and the trait which does not express is recessive. The character TT for tall plant is dominant, so all the plants are tall.

Parents	: TT	×	tt
	↓		↓
Gametes	: T		t
	└───┬───┘		
F ₁ progeny :	Tt		
	(Heterozygous tall)		

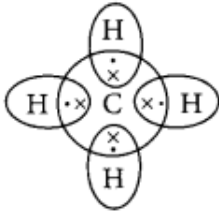
(b) On selfing F₁ progeny

F ₁ generation	Tt	×	tt
	Tt(Tall)		
	↓ Selfing		
		T	t
	T	TT	Tt
	t	Tt	tt
F ₂ generation	Tall : Dwarf		
	3 : 1		

In F₂ generation we obtained both tall and dwarf plants. Appearance of suppressed recessive trait in individuals of F₂ generation in Mendelian cross indicates that characters of recessive traits are not lost. When the F₁ generation plants were allowed to self-fertilise both the parental trait were expressed in definite proportion in F₂ generation.

(c) Above observation shows that only one dominant allele is expressed. This is called law of dominance. In a heterozygous individual, two dissimilar alleles remain together and do not get mixed up. At the time of gamete formation, they separate so that each gamete receives only one allele is always pure. This is called "law of purity of gametes".

5. Covalent bonds are those bonds which are formed by sharing of the valence electrons between two atoms. Electron dot structure of methane is shown in the figure.



Covalent compounds are generally poor conductors of electricity because they do not have free electrons or ions.

6. (i) As carbon has four valence electrons and it can neither lose nor gain four electrons thus, it attains noble gas configuration only by sharing of electrons. Thus, it forms covalent compounds.

(ii) In diamond, each carbon atom is bonded to four other carbon atoms forming a rigid three-dimensional structure. This makes diamond the hardest known substance. Thus, it has high melting point.

(iii) In graphite, each carbon atom is bonded to three other carbon atoms by covalent bonds in the same plane giving a hexagonal array. Thus, only three valence electrons are used for bond formation and hence, the fourth valence electron is free to move. As a result, graphite is a good conductor of electricity.

7. Ionic compounds are formed either by gaining or losing electrons from the outermost shells, but carbon which has four electrons in its outermost shell cannot form ionic bonds because

1. If carbon forms ionic bonds by gaining four electrons to attain a noble gas configuration then it would be difficult for six protons in the nucleus to hold ten electrons.

2. If carbon forms ionic bonds by loss of four electrons then it would require a lot of energy to remove these electrons from outermost shell.

Due to these reasons carbon forms covalent bonds by sharing the valence electrons.

Type of bonds formed in ionic compounds are called electrovalent bonds and the type of bonds formed in carbon compounds are called covalent bonds.

8. (a): The given compounds are members of homologous series of alcohol.

9. (i) (c) 1 and 3 only

(ii) (b) Rr x rr

(iii) (d) RR x rr

(iv) (a) 750, 250

(v) (b) dominant characters