Shiksha Classes, Bhandara

Biology

Principles Of Inheritance And Variation

(1.) Genetics is the subject that deals with

(a.) inheritance
(b.) variation of characteristics
(c.) reproduction
(d.) both (a) and (b)

(2.) The basis of heredity is

(a.) variation
(b.) inheritance
(c.) mutation
(d.) linkage

(3.) Humans knew from as early as 8000–1000 BC that one of the causes of variation was hidden in

(a.) sexual reproduction
(b.) asexual reproduction
(c.) vegetative propagation
(d.) none of these

(4.) Choose the incorrect statement from the following.

(a.) Humans knew from very early that sexual reproduction is one of the causes of variation.
(b.) They exploited the variation to obtain plants and animals of desirable characters through selective breeding.
(c.) Sahiwal cows were obtained through artificial selection and domestication from ancestral wild cows.
(d.) Our ancestors were very well aware about the scientific basis of inheritance of characters and variation.

(5.) Which one from the following is the period for Mendel's hybridization experiments?

(a.) 1840–1850
(b.) 1857–1869
(c.) 1870–1877
(d.) 1856–1863

(6.) Who proposed the 'Laws of Inheritance' in living organisms?

(a.) Mendel
(b.) Morgan
(c.) de Vries
(d.) Correns

(7.) Match Column-I with Column-II and choose the correct answer from the codes given below.

Column-I	Column-II
(A) Genetics	**(1)** Process of passing characters from parent to offspring
(B) Inheritance	**(2)** Laws of inheritance
(C) Variation	**(3)** A branch of Biology
(D) Mendel	**(4)** Degree of difference of progeny from their parents

Codes	A	B	C	D		A	B	C	D

(a.)	1	4	2	3	(b.)	4	2	3	1
(c.)	3	1	4	2	(d.)	2	3	1	4

(8.) Mendel investigated characters in the garden pea plant that were manifested as two

(a.) linked traits (b.) opposing traits

(c.) similar traits (d.) none of these

(9.) How many pairs of contrasting characters in pea plants were studied by Mendel in his experiments?

(a.) Six (b.) Eight

(c.) Seven (d.) Four

(10.) Which contrasting trait was not studied by Mendel during his experiments?

(a.) Seed colour (b.) Leaf colour

(c.) Flower colour (d.) Stem height

(11.) Among the following, which one is not a dominating trait?

(a.) Axial position of flower (b.) Green colour of pod

(c.) Violet colour of flower (d.) Green colour of seed

(12.) A true-breeding line is one that

(a.) has undergone continuous self-pollination (b.) shows stable trait inheritance

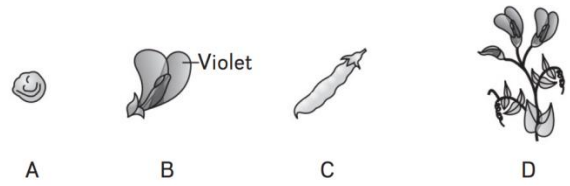
(c.) shows expressions of trait for several generations (d.) all of these

(13.) Match Column-I with Column-II and choose the correct option from the codes given below.

Column-I	Column-II
(A) Axial flower	**(1)** Undergone continuous selfpollination
(B) Terminal flower	**(2)** Father of genetics
(C) Mendel	**(3)** Dominant trait
(D) True-breeding line	**(4)** Recessive trait

Codes	A	B	C	D		A	B	C	D
(a.)	3	4	2	1	(b.)	4	3	1	2
(c.)	1	2	4	3	(d.)	2	1	3	4

(14.) Refer to the given figures (A–D) showing traits of pea plant studied by Mendel. Among these, choose the dominant trait.



(a.) B (b.) A

(c.) D (d.) C

(15.) Which technique was used by Mendel during his experiments on pea plant?

(a.) Artificial pollination (b.) Cross pollination

(c.) Self-pollination (d.) All of these

(16.) Choose the correct statement(s) from the following.

(I) During Mendel's investigation, statistical analysis and mathematical logic were applied to problems in Biology.

(II) Mendel investigated characters in the garden pea plant that were manifested as two opposing traits.

(III) Mendel conducted artificial pollination experiments using several true-breeding pea lines.

(IV) Mendel selected eight true-breeding pea plant varieties as pairs.

(a.) I and II (b.) III and IV

(c.) I, II and III (d.) All of these

(17.) The contrasting trait(s) selected by Mendel was/ were

(a.) smooth or wrinkled seed (b.) yellow or green seed

(c.) smooth or inflated pods (d.) all of these

(18.) **Assertion:** Mendel conducted hybridization experiments on garden pea plant.
Reason: He proposed laws of inheritance in living organisms.

(a.) Both assertion and reason are true and reason is the correct explanation of assertion. (b.) Both assertion and reason are true but reason is not correct explanation of assertion.

(c.) Assertion is true, but reason is false. (d.) Both assertion and reason are false.

(19.) **Assertion:** Mendel used contrasting traits for his studies.
Reason: He used Ocimum plant for his experiments.

(a.) Both assertion and reason are true and reason is the correct explanation of assertion. (b.) Both assertion and reason are true but reason is not correct explanation of assertion.

(c.) Assertion is true, but reason is false. (d.) Both assertion and reason are false.

(20.) **Assertion:** Mendel used true-breeding pea lines for his experiments.
Reason: A true-breeding line is one that has undergone continuous self-pollination.

(a.) Both assertion and reason are true and reason is the correct explanation of assertion. (b.) Both assertion and reason are true but reason is not correct explanation of assertion.

(c.) Assertion is true, but reason is false. (d.) Both assertion and reason are false

(21.) The first hybrid generation of Mendel's experiment is known as

(a.) Filial1 progeny (b.) F_1-generation

(c.) Father generation (d.) Both (a) and (b)

(22.) When Mendel crossed true-breeding tall and dwarf plants, in F_1-generation all tall plants were obtained. On self-crossing in the F_2 generation, he obtained

(a.) 1/4th dwarf and 3/4th tall plants (b.) 3/4th dwarf and 1/4th tall plants

(c.) 2/4th dwarf and 2/4th tall plants (d.) All dwarf plants

(23.) During the study of inheritance of one character in F_2 generation, Mendel obtained

(a.) 2 : 1 ratio (b.) 3 : 1 ratio

(c.) 1 : 2 : 1 ratio (d.) 1 : 1 : 1 : 1 ratio

(24.) The 'factors' of Mendel are today known as

(a.) genome (b.) gene

(c.) DNA (d.) allele

(25.) The slightly different forms of the same genes are called

(a.) genome (b.) DNA

(c.) allele (d.) cistron

(26.) Alleles are

(a.) true-breeding homozygotes (b.) different molecular forms of a gene

(c.) heterogyzotes (d.) different phenotype

(27.) What would be the phenotype of a plant that had a genotype 'Tt'? Here 'T' represent tall trait while 't' represents dwarf trait.

(a.) Tall (b.) Intermediate height

(c.) Dwarf (d.) None of these

(28.) In homozygous condition, a particular gene has

(a.) different alleles on homologous chromosomes. (b.) no alleles on homologous chromosomes.

(c.) same alleles on homologous chromosomes. (d.) none of these

(29.) Tall and dwarf are the two alleles of gene of height. The dominant trait is

(a.) dwarf (b.) tall

(c.) both are equally dominant (d.) both are recessive

(30.) Match Column-I with Column-II and choose the correct option from the codes given below.

Column-I	Column-II
(A) Genes	**(1)** Slightly different forms of the same gene
(B) Alleles	**(2)** Genetic composition of an organism
(C) Genotype	**(3)** Physical appearance of an organism
(D) Phenotype	**(4)** Unit of inheritance

	Codes	A	B	C	D
(a.)	4	1	2	3	
(b.)	1	4	3	2	
(c.)	3	2	4	1	
(d.)	2	3	1	4	

(31.) A cross that is performed for the study of a single character is

(a.) dihybrid cross
(b.) test cross
(c.) monohybrid cross
(d.) back cross

(32.) The given figure is the diagrammatic representation of a monohybrid cross. In the figure, some plants are mentioned as A and B. What will be the genotype of these plants?
Parental Tall F_1 generation F_2 generation Dwarf
(A) Dwarf Selfing Tall Tall Tall Tall Tall
(B)

(a.) A – tt, B – Tt
(b.) A – Tt, B – tt
(c.) A – TT, B – TT
(d.) A – Tt, B – Tt

(33.) Choose the incorrect statement about Mendel's monohybrid cross.

(a.) The recessive parental trait is expressed without any blending in F_2 generation.
(b.) The alleles of parental pair segregate from each other and both alleles are transmitted to a gamete.
(c.) The segregation of alleles is a random process.
(d.) There is a 50% chance of a gamete containing either allele.

(34.) The production of gametes by the parents the formation of zygotes, the F_1 and F_2 plants, can be understood by using

(a.) Wenn diagram
(b.) Pie diagram
(c.) A pyramid diagram
(d.) Punnett square

(35.) Select the correct statement.

(a.) Franklin Stahl coined the term 'linkage'.
(b.) Punnett square was developed by a British scientist.
(c.) Spliceosomes take part in translation.
(d.) Transduction was discovered by S Altman.

(36.) In the text cross, organism whose genotype is to be determined, is crossed with the

(a.) recessive parent
(b.) dominant parent
(c.) both parents one by one
(d.) none of these

(37.) On crossing two tall plants, in F_1-generation few dwarf offspring were obtained. What would be the genotype of the both the parent?

(a.) TT and Tt (b.) Tt and Tt

(c.) TT and TT (d.) TT and tt

(38.) Based on his observations of monohybrid cross, Mendel proposed which law of inheritance?

(a.) Law of dominance (b.) Law of segregation

(c.) Law of independent assortment (d.) Both (a) and (b)

(39.) According to Mendel, characters are controlled by discrete units called

(a.) genes (b.) factors

(c.) alleles (d.) allelomorph

(40.) Choose the incorrect statement about law of dominance.

(a.) It is used to explain the expression of only one of the parental characters in a monohybrid cross in F_1-generation.

(b.) It does not explain the expression of both parental characters in F_2-generation.

(c.) It also explains the proportion of 3 : 1 obtained in F_2-generation.

(d.) It states that characters are controlled by discrete units called factors.

(41.) Match Column-I with Column-II and choose the correct option from the codes given below.

Column-I	Column-II
(A) First law of inheritance	**(1)** Law of segregation
(B) Second law of inheritance	**(2)** 3 : 1
(C) Monohybrid cross	**(3)** Law of dominance
(D) Test cross	**(4)** 1 : 1

Codes	A	B	C	D
(a.)	3	1	2	4
(b.)	1	3	4	2
(c.)	2	3	1	4
(d.)	4	2	3	1

(42.) The second law of inheritance, i.e., law of segregation is based on the fact that

(a.) alleles do not show any blending.

(b.) both characters are recovered as such in F_2 generation.

(c.) one allele dominates the other allele.

(d.) Both (a) and (b)

(43.) The factor controlling any character is discrete and inpendent. It was concluded on the basis of

(a.) results of F_3-generation of a cross.

(b.) observations of a cross made between the plants having two contrasting traits

where offspring shows only one trait without any blending.

(c.) self-pollination of F_1-offspring.

(d.) cross pollination of parental generations.

(44.) In Antirrhinum (Snapdragon), a red flower was crossed with a white flower and in F_1 generation, pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red and pink flowers. Choose the incorrect statement from the following.

(a.) The experiment does not follow the principle of dominance.

(b.) Pink colour in F_1 is due to incomplete dominance.

(c.) Ratio of F_2 is ¼ (Red): 2/4 (Pink) : ¼ (white).

(d.) Law of segregation does not apply in this experiment.

(45.) It was being observed that sometimes, the F_1 shows a phenotype that does not resemble either of the two parents and remains in between the two. It can be explained by

(a.) Law of dominance

(b.) Law of segregation

(c.) Law of incomplete dominance

(d.) None of these

(46.) The genotypic ratio obtained in incomplete dominance is

(a.) 3 : 1

(b.) 1 : 1 : 2

(c.) 2 : 1 : 1

(d.) 1 : 2 : 1

(47.) In case of co-dominance, the F_1 progeny

(a.) resembles either of the two parents

(b.) is in between of parents

(c.) resembles both the parents

(d.) none of these

(48.) A person of AB blood group has I^A and I^B genes. It is an example of

(a.) pleiotropy

(b.) segregation

(c.) co-dominance

(d.) None of these

(49.) In a marriage between male with blood group A and female with blood group B, the progeny had either blood group AB or B. What could be the possible genotype of parents?

(a.) I^Ai (Male); I^Bi (Female)

(b.) I^Ai (Male); I^BI^B (Female)

(c.) I^AI^A (Male); I^BI^B (Female)

(d.) I^AI^A (Male); I^Bi (Female)

(50.) A person has ‘O’ blood group. His mother has ‘A’ while father has ‘B’ blood group. What would be the genotype of mother and father?

(a.) Mother is homozygous for ‘A’ blood group and father is heterozygous for ‘B’ blood group.

(b.) Mother is heterozygous for ‘A’ blood group and father is homozygous for ‘B’ blood group.

(c.) Both mother and father are homozygous for ‘A’ and ‘B’ blood groups respectively.

(d.) Both mother and father are heterozygous for ‘A’ and ‘B’ blood groups respectively.

ANSWER

(1.)	d	**(2.)**	b	**(3.)**	a	**(4.)**	d	**(5.)**	d
(6.)	a	**(7.)**	c	**(8.)**	b	**(9.)**	c	**(10.)**	b
(11.)	d	**(12.)**	d	**(13.)**	a	**(14.)**	a	**(15.)**	d
(16.)	c	**(17.)**	d	**(18.)**	b	**(19.)**	c	**(20.)**	b
(21.)	d	**(22.)**	a	**(23.)**	b	**(24.)**	b	**(25.)**	c
(26.)	b	**(27.)**	a	**(28.)**	c	**(29.)**	b	**(30.)**	a
(31.)	c	**(32.)**	a	**(33.)**	b	**(34.)**	d	**(35.)**	b
(36.)	a	**(37.)**	b	**(38.)**	d	**(39.)**	b	**(40.)**	b
(41.)	a	**(42.)**	d	**(43.)**	b	**(44.)**	d	**(45.)**	c
(46.)	d	**(47.)**	c	**(48.)**	c	**(49.)**	b	**(50.)**	d

EXPLANATION

(1.) (d.) Genetics is a branch of biology. It deals with inheritance as well as variation of characteristics from parents to offspring. These two processes, i.e., inheritance and variation are the basis of heredity and degree of variation among progeny, respectively.

(2.) (b.) The basis of heredity is inheritance. It is the process by which characters are passed from parent to progeny. It is studied in a branch of biology called Genetics.

(3.) (a.) Humans knew from as early as 8000—1000 BC that one of the causes of variation was hidden in sexual reproduction. Variation is the degree by which progeny differ from their parents as well as from each other.

(4.) (d.) Our ancestors knew about the inheritance of characters and variation. However, they had very little knowledge about the scientific basis of these phenomena. They used their knowledge in obtaining plants and animals of desirable characters. They did it by selective breeding.

(5.) (d.) Mendel performed his hybridization experiments during 1856–1863. He conducted his experiments on garden pea plant. On the basis of his studies, he proposed the laws of inheritance in living organisms.

(6.) (a.) Gregor Mendel proposed the 'Laws of inheritance in living organisms'. He gave these laws on the basis of his experiments on garden pea plant. He is known as the father of genetics.

(7.) (c.) Genetics - A branch of Biology, Inheritance - Process of passing characters from parent to offspring, Variation - Degree of difference of progeny from their parents, Mendel - Laws of inheritance.

(8.) (b.) Mendel investigated characters in the garden pea plant that were manifested as two opposing traits, e.g., tall or dwarf plants, yellow or green seeds. He performed his experiments on garden pea plant to propose laws of inheritance.

(9.) (c.) Seven pairs of contrasting characters in pea plants were studied by Mendel in his experiments. These characters were seed shape, seed colour, flower colour, pod shape, pod colour, flower position and stem height. He proposed laws of inheritance on the basis of his experiments.

(10.) (b.) The 'leaf colour' trait was not studied by Mendel during his experiments. He conducted hybridization experiments on garden peas for seven years. On the basis of his experiments he proposed laws of inheritance in living organisms.

(11.) (d.) Green colour of seed is a recessive trait, while yellow colour of seed is a dominant trait. Rest of the traits, i.e., axial position of flower, green colour of pod and violet color of flower are dominant traits.

(12.) (d.) A true-breeding line is one that has undergone continuous self-pollination, shows stable trait inheritance and expression for several generations. Mendel used true-breeding plants for his experiments. He conducted his experiments on garden pea plant.

(13.) (a.) Axial flower - Dominant trait, Terminal flower - Recessive trait, Mendel - Father of genetics, True-breeding line - Undergone continuous self-pollination.

(14.) (a.) In the given figure: A - wrinkled seed, B - violet flower, C - constricted pod, D - terminal flower. The violet colour of flower is dominant over white colour.

(15.) (d.) All the these types of pollination, i.e., artificial pollination, cross pollination and selfpollination were performed by Mendel during his experiments on pea plant. He selected 14 true-breeding pea plant varieties as pairs to perform his experiments. He took contrasting characters for the same.

(16.) (c.) Mendel selected 14 true-breeding pea plant varieties as pairs, which were similar except for one character with contrasting traits. During Mendel's investigations into inheritance

pattern, it was for the first time that statistical analysis and mathematical logic were applied to problems in Biology. His experiments had a large sampling size. It gave greater credibility to the data that he collected.

(17.) (d.) Mendel chose contrasting traits for his experiments. These were smooth or wrinkled seeds, yellow or green seeds, smooth or inflated pods, etc. These plants were true-breeding, i.e, have undergone continuous self-pollination. Such true-breeding plants show stable trait inheritance and expression for several generations.

(18.) (b.) Gregor Mendel conducted hybridization experiments on garden peas for seven years (1856– 1863). On the basis of results of his experiments, he proposed the laws of inheritance. He applied statistical analysis and mathematical logic for the biological problems. He used large sample size for the same.

(19.) (c.) Mendel conducted his experiments on garden pea plant. He investigated those characters in the garden pea plant that were manifested as two opposing traits, e.g., tall or dwarf plants. This allowed him to set up a basic framework of rules governing inheritance.

(20.) (b.) Mendel selected 14 true-breeding pea plant varieties as pairs which were similar except for one character with contrasting traits. He used true breeding lines because they show stable trait inheritance and expression for several generations

(21.) (d.) The first hybrid generation of Mendel's experiment is known as Filial1-progeny or F_1-generation. All F_1 progeny plants were like one of their parents. The trait of other parent was not seen in them. For example when he crossed tall and dwarf plants, in F_1-generation all tall plants were observed.

(22.) (a.) In F_2-generation, Mendel obtained 1/4th dwarf and 3/4th tall plants. The tall and dwarf traits were identical to their parental type and did not show any blending. Thus, all the offsprings were either tall or dwarf. None were of in between height.

(23.) (b.) During the study of inheritance of one character in F_2-generation Mendel obtained 3 : 1 ratio. The contrasting traits did not show any blending at either F_1 or F_2 stage.

(24.) (b.) The 'factors' of Mendel are today known as gene. These are the units of inheritance. They contain the information that is required to express a particular trait in an organism. They are responsible for transferring a particular trait from one generation to the next generation.

(25.) (c.) The slightly different forms of the same genes are called alleles. These alleles code for a pair of contrasting trait. For example, tall and dwarf are two forms of the gene of height.

(26.) (b.) Alleles are different molecular forms of a gene. They code for a pair of contrasting traits. In Tt, T (tall) and t (dwarf) are two contrasting traits of height.

(27.) (a.) The plant having 'Tt' genotype will be tall. 'T' and 't' are the contrasting traits of height. 'T' is dominant over 't'. Therefore the phenotype of that plant will be tall.

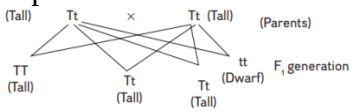
(28.) (c.) In homozygous condition, a particular gene has same alleles on homologous chromosomes. It is represented by two capital letters (XX) for a dominant trait and two lowercase letters (xx) for a recessive trait. An allele represents one particular form of a gene.

(29.) (b.) Tall and dwarf are the two alleles of gene of height. The dominant trait is 'Tall'. It was expressed by all the plants of F_1 generation in Mendel's cross. The genotype of all the plants of F_1 generation was "Tt', where 'T' represents tall, while 't' represents dwarf trait.

(30.) (a.) Genes - Unit of inheritance, Alleles - Slightly different forms of the same gene, Genotype - Genetic composition of an organism, Phenotype - Physical appearance of an organism.

(31.) (c.) A cross that is performed for the study of a single character is called Monohybrid cross. It determines the allele combinations of offspring for one particular gene only. Thus, monohybrid cross is a mating between two organisms that possess variations at one genetic chromosome of interest.

(32.) **(a.)** The given cross is a monohybrid cross. In the cross two true breeding tall (TT) and dwarf (tt) plants
(A) were crossed. In F_1 generation, all tall (Tt) plants
(B) were obtained. On selfing, in F_2 generation, tall and dwarf plants were obtained in the ratio of 3 : 1.
(33.) **(b.)** From the observations of monohybrid cross, it can be concluded that the pairs of parental pair segregate from each other. It occurs by the process of meiosis. In this process, only one allele is transmitted to a gamete. It is a random process so there is a 50% chance of a gamete containing either allele.
(34.) **(d.)** The production of gamets by the parents, the formation of zygotes, the F_1 and F_2 plants, can be understood by using Punnet square. It was developed by a British geneticist, Reginald C. Punnet to calculate the probability of all possible genotypes of offspring in a genetic cross.
(35.) **(b.)** Punnett square was developed by a British geneticist, Reginald C Punnett. It is a geographical representation. It is used to calculate the probability of all possible genotypes of offspring in a genetic cross. The possible gametes are usually written on the top row and left columns. All possible combinations are represented in boxes below in the squares. It generates a square output form.
(36.) **(a.)** In the text cross, organism whose genotype is to be determined, is crossed with the recessive parent. The progenies of test cross are then analyzed to predict the genotype of the test organism. Thus, it is helpful in determining the genotype of an organism.
(37.) **(b.)** In the given case, the genotype of both the parents will be Tt and Tt. It can be explained as follows:

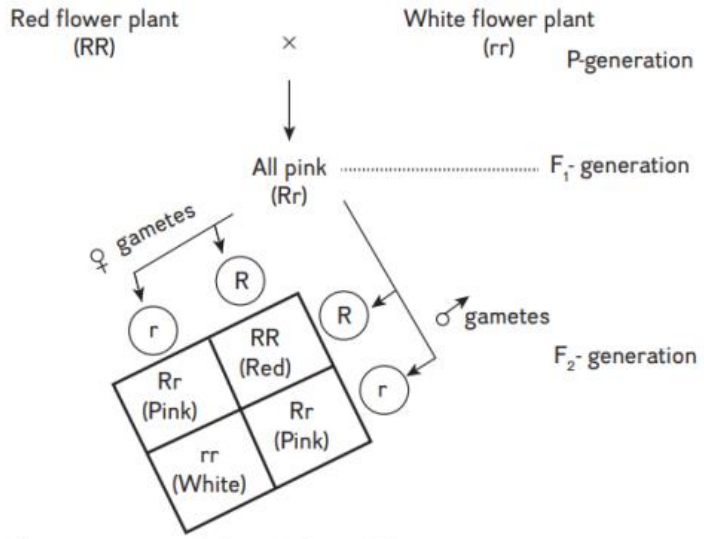


(38.) **(d.)** Based on his observations of monohybrid cross, Mendel proposed two laws of inheritance. These are law of dominance and law of segregation. First law states that only dominant character appears in the F_1 generation. On the other hand, second law, i.e., law of segregation tells that alleles do not show any blending and both traits are recovered as such in F_2 generation.
(39.) **(b.)** According to Mendel's characters are controlled by discrete units. These units were called factors by Mendel. Nowadays, these factors are known as genes. These genes are the unit of inheritance. They transfer characters from one generation to the next generation.
(40.) **(b.)** The law of dominance is based on the results of Mendel's monohybrid cross. It states that characters are controlled by factors which occur in pairs. In a dissimilar pair of factors one dominates the other. It explains the expression of only one character in F_1 generation as well as expression of both parental characters in F_2-generation.
(41.) **(a.)** First law of inheritance - Law of Dominance, Second law of inheritance - Law of segregation, Monohybrid cross - 3 : 1, Test cross - 1 : 1
(42.) **(d.)** The second law of inheritance, i.e., the law of segregation is based on the fact that alleles do not show any blending. Both the characters are recovered as such in F_2-generation, though one of three is not seen in F_1-generation. Parents contain both allele which segregate during gamete formation and a gamete receives only one of the two factors.
(43.) **(b.)** The factor controlling any character is discrete and inpendent. It was concluded on the basis of observations of a cross. This cross was made between the plants having two contrasting traits. In the F_1-generation only dominant trait, and in F_2-generation the other trait, i.e., recessive one also appeared along with dominant trait. It shows that alleles do not show any blending. They segregate at the time of gamete formation. It is known as law of segregation.

(44.) **(d.)** Among the given statements, statement **(d.)** is incorrect. Law of segregation is applicable in this experiment also. In this experiment, two alleles (red and white) do not show blending and appear as such in F_2 generation along with pink coloured flowers. Rest of the statements are correct about incomplete dominance.

(45.) **(c.)** The given situation can be explained on the basis of law of incomplete dominance. This law states that no allele expresses itself completely in the F_1 generation. An incomplete dominance is observed in this situation, e.g., pink coloured flowers of snapdragon obtained in F_1 generation on crossing pure red and white coloured flower plants.

(46.) **(d.)** In incomplete dominance, the phenotypic ratio of 1 : 2 : 1 is obtained. It can be explained with the help of following cross:



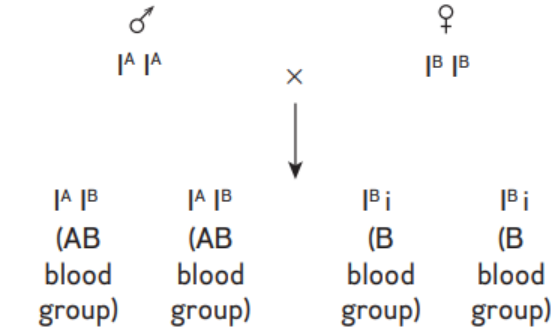
Phenotypic ratio -	Red	:	Pink	: White
	1	:	2	: 1
Genotypic ratio -	RR	:	Rr	: rr
	1	:	2	: 1

(47.) **(c.)** In case of co-dominance, the F_1-generation resembles both parents. For example, ABO blood grouping in humans. ABO blood groups are controlled by the gene I. The gene I has three alleles; I^A, I^B and i. I^A and I^B are completely dominant over i. When I^A and i are present only I^A expresses. Likewise when I^B and i are present only I^B expresses. However, when I^A and I^B are present together, both are expressed. It is known as co-dominance.

(48.) **(c.)** It is an example of co-dominance because I^A and I^B both genes are expressed in the person having AB blood group. I^A and I^B both genes are dominant and expressed equally when present together. In case of incomplete dominance, the progeny is in-between the two parents. Segregation occurs in gamete formation. Genes are segregated in F_2-generation without any blending. Pleiotropy occurs when one gene
Codes And controls the expression of several different and unrelated traits.

(49.) **(b.)** In the given situation, the possible genotype for male and female will be as follows:

Male – I^Ai
Female – I^BI^B
This can be understood by the following cross



(50.) **(d.)** In the given case, both father and mother will be heterozygous for 'B' and 'A' blood group, respectively. It can be explained by the following cross: