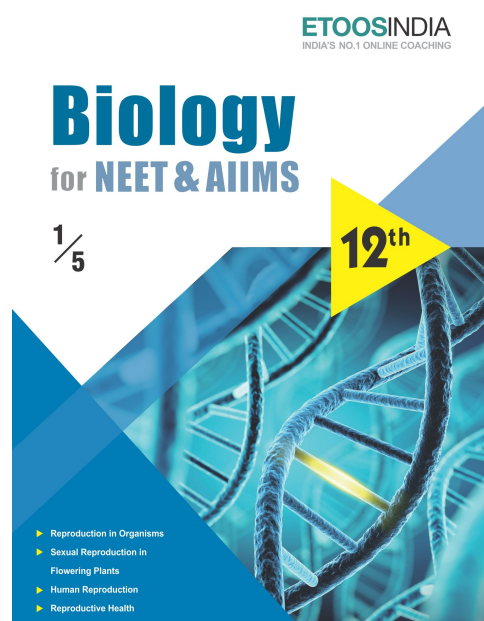
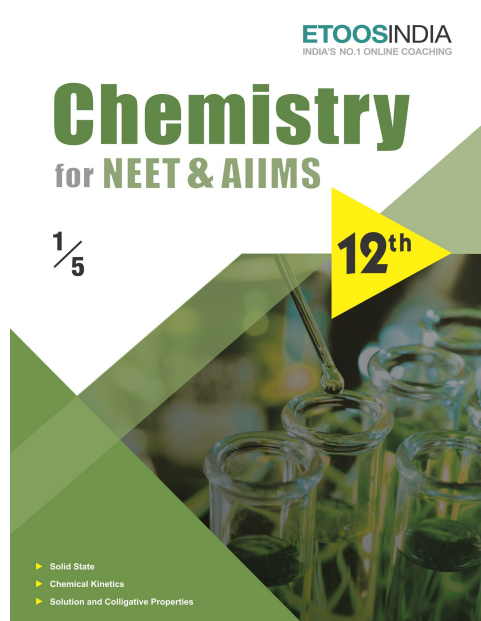
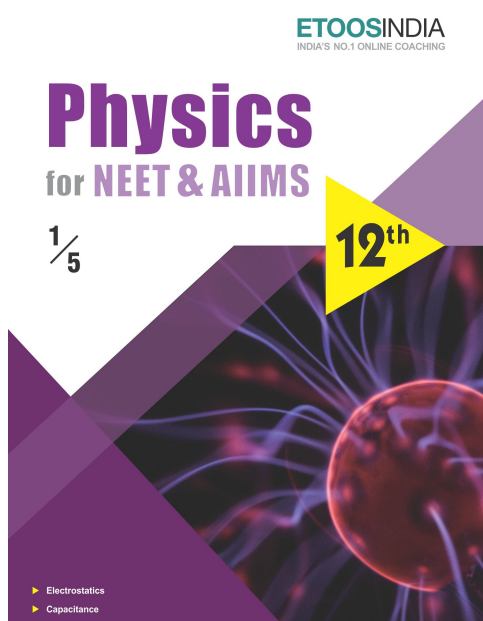
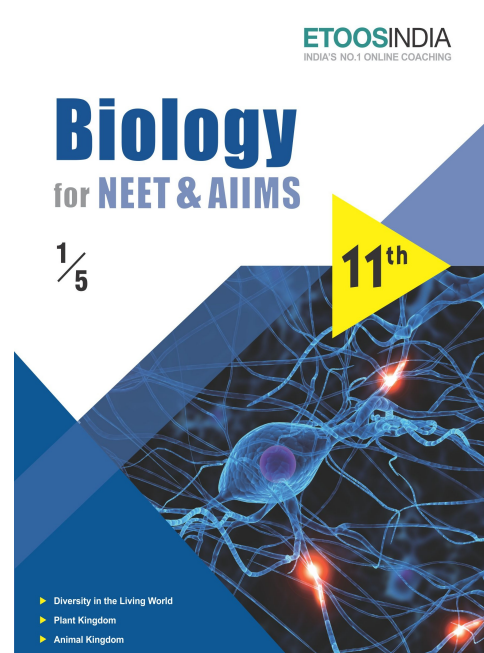
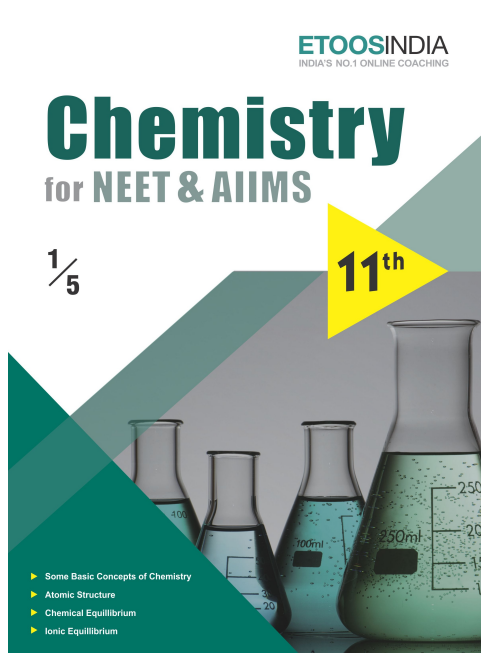
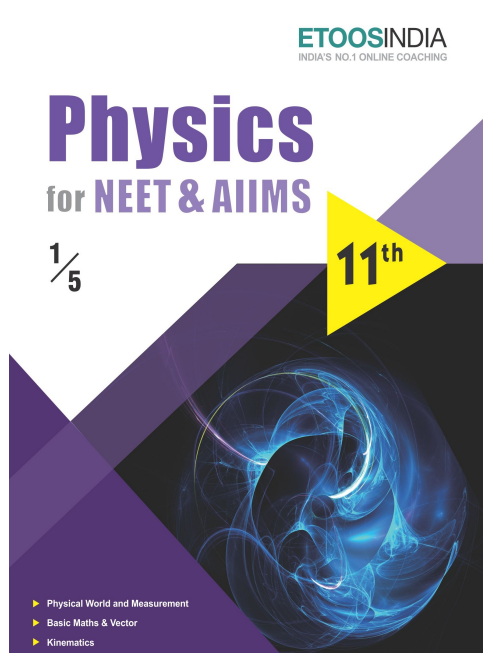


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PRINCIPLE OF INHERITANCE AND VARIATION

“If A denotes one of the two constant traits, for example, the dominating one, a the recessive, and the Aa the hybrid form in which both are united, then the expression: gives the series for the progeny of plants hybrid in a pair of differing traits.”

“GREGOR JOHANN MENDEL(1822-1884)”

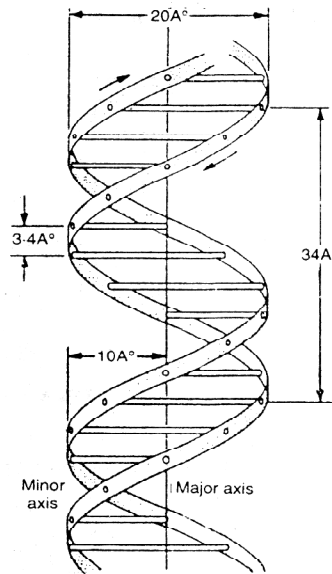
INTRODUCTION

As we have seen in earlier section, one of the most fundamental attributes of all living beings is reproduction. generally, Progeny receives the characters from parents in the form of egg and sperm. Because of this feature, progeny resembles its parents. This has been best summed up in the phrase ‘like begets like’. The transfer of characters from parents to offspring is known as **inheritance**. For example, a tiger always gives birth only to a baby cub (tiger) and not some other animal. Similarly a mango seed forms a mango plant and not any other plant.

Progeny produces resembles the parents closely but is not identical in all respects. The reason behind is **variation**. **Variation**, in biology, any difference between cells, individual organisms, or groups of organisms of any species caused either by genetic differences (genotypic variation) or by the effect of environmental factors on the expression of the genetic potentials (phenotypic variation). **Genetics** is the study of genes, genetic variation, and heredity in living organisms. It is generally considered a field of biology, but intersects frequently with many other life sciences and is strongly linked with the study of information systems.

BIOLOGY FOR NEET & AIIMS

- Gregor Johann Mendel - Father of Genetics.
- Bateson - Genetics term, gene, Genotype, Phenotype.
- Morgan - Father of Experimental genetics.
- Galton Eugenics - Father of Eugenics.
- Hugo De Varies, Carls correns Erik Von Tschermack - Re discovered Medle's work.
- Muller - Father of Actino Biology.
- Dr. Hurgovind Khurana - Synthesized First Artificial Gene



- (1) Father of modern genetics – **Bateson**. Genetics term was given by Bateson
Homozygous– Individual that have similar allele (factor) on Homologous chromosomes.
Heterozygous– Individual that have dissimilar factors called heterozygous.
Allele– (Belongs to each other) two alternate form of a gene is called Allele.
Allele– Factors that have opposite effect & present at same locus of homologous chromosome called Allele.
 - (2) Father of experimental genetics– **Morgan** experiments on Fruit fly (*Drosophila melanogester*).
 - (3) **Muller**– Father of actinobiology. (Actinobiology– Study of effect of radiation on living organism).
 - (4) Father of human Genetics **Garrod**. Book written by Garrod is “In Born error of metabolism”.
First genetic disorder in human being “Alkaptonuria” discovered by Garrod.
 - (5) Father of Eugenics– **Galton. Eugenics**– Improvement of man kind by applying laws of inheritance.
Euthenics – Improvement of man kind by improving the environment.
Euthenics – Medical engineering Include the treatment of genetic disorder.
 - (6) **Johanssen** – Give the term Gene, Genotype and phenotype.
 - (7) **Genetics** = Collective study of heredity & Variations.
 - (8) **Heredity** = Transmission of genetic characters from parent to offsprings.
 - (9) **Variation** = individuals of same species have some differences, these are called variation.
- History of researches in genetics.

Etoos Tips & Formulas

- Genetics deals with the inheritance, as well as the variation of characters from parents to offsprings.
- Inheritance is the process by which characters are passed on from parent to progeny.
- Variation is the degree by which progeny differs from their parents.

1. GENETICAL TERMS:

- **Genes (Factors)** : They are the units of inheritance, which contain the information that is required to express a particular character, in an organism.
- **Alleles** : Genes which code for a pair of contrasting traits and present on a same locus on the homologous chromosome, are known as alleles. i.e. They are the slightly different forms of the same gene.
- **Homozygous (Pure)** : Identical pair of alleles (TT or tt)
- **Heterozygous (Hybrid)** : Dissimilar pair of alleles (Tt)
- **Phenotype** : External & morphological appearance of character.
- **Genotype** : Genetic make up of an organism.
- **Punnett square** : It is a graphical representation to calculate the probability of all possible genotypes of offspring in a genetic cross.

2. MENDELISM:

- Gregor Johann Mendel, conducted hybridization experiments on garden pea (*Pisum sativum*).
- He studied seven pairs of contrasting characters.

S. No.	Characters	Dominant/Recessive	Chromosome No.
1.	Seed/Cotyledon colour	Yellow / Green	1st
2.	Flower colour	Violet / White	1st
3.	Pod Shape	Inflated / Constricted	4th
4.	Flower position	Axial / Terminal	4th
5.	Stem length / Height	Tall / Dwarf	4th
6.	Pod colour	Green / Yellow	5th
7.	Seed shape	Round / Wrinkled	7th

- Mendel uses Emasculation, Bagging & Tagging technique for hybridization.
- Inheritance of one gene (Monohybrid Cross)
- Study of inheritance of one character at a time in an organism is called as monohybrid cross.
- Phenotypic / Mendelian Ratio = 3 : 1
- Genotypic / Real Ratio = 1 : 2 : 1

Conclusions of monohybrid cross :

(i) Postulate of Dominance :

- Characters are controlled by discrete units called factors .
- Factors occur in pairs .
- In a dissimilar pair of factors one member of the pair dominates the other .
- A dominant allele is wild type or unmodified allele, which produces normal enzyme/protein, that forms a character.
- A modified allele is a mutant allele, which could be responsible for the production of less-efficient enzyme or non-functional enzyme or no enzyme at all. Thus it will be a recessive allele.

(ii) Law of segregation (Law of purity of gametes) :

- This law is based on the fact that the alleles do not show any blending and that both the characters are recovered as such in the F₂ generation.

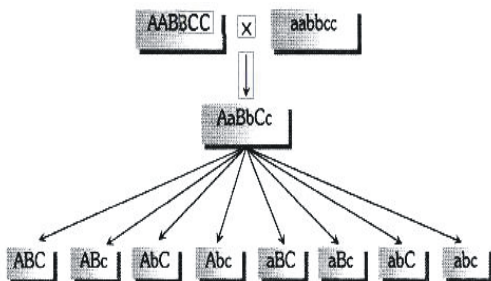
SOLVED EXAMPLE

Ex.1 The first great "geneticist" was
Or
Who is considered as father of genetics
(A) Engler (B) Mendel
(C) Schwann (D) Miller

Sol. (B) : Gregor Johann Mendel (1822-1884 Austria) is known as father of genetics, because he was the first to demonstrate the mechanism of transmission of character from one generation to the other.

Ex.2 How many types of gametes may be produced by genotype D/d : E/e : F/f
Or
How many types of gametes will be produced by individuals having genotype AaBbCc
(A) 27 (B) 8
(C) 9 (D) 6

Sol. (B) : Kinds of gametes may be calculated by following formula:
Number of gametes = $(2)^n$
n is number of alleles
Example : D/d : E/e : F/f have trihybrid cross i.e.,
n = 3 than
Kind of gametes = $(2)^3 = 2 \times 2 \times 2 = 8$



Ex.3 How many different kinds of gametes will be produced by a plant having the genotype MBbCC
(A) Nine (B) Two
(C) Three (D) Four

Sol. (B)

Ex.4 An organism with two identical alleles for a given trait is
(A) Homozygous (B) Segregating
(C) Dominant (D) A hermaphrodite

Sol. (A) : The homozygote is pure for the character and breeds true, that is, it gives rise to offspring having the same character on self breeding. e.g., TT or tt.

Ex.5 An exception to Mendel's law is
(A) Law of independent assortment
(B) Law of segregation
(C) Law of dominance
(D) Law of linkage

Sol. (D) : Linkage is the tendency of two or more genes to inherit together. Mendel's law are true only in absence of linkage and gene interaction.

Ex.6 Some of the dominant traits studied by Mendel were
(A) Round seed shape, constricted pod shape and axial flower position
(B) Green pod colour, inflated pod shape and axial flower position
(C) Yellow seed colour, violet flower colour and yellow pod colour
(D) Axial flower position, green pod colour and green seed colour

Sol. (B)

Ex.7 The colour based contrasting traits in seven contrasting pairs, studied by Mendel in pea plant were
(A) 1 (B) 2 (C) 3 (D) 4

Sol. (C)

Ex.8 F₂ generation in a Mendelian cross showed that both genotypic and phenotypic ratios are same as 1 : 2 : 1. It represents a case of
(A) Co-dominance
(B) Dihybrid cross
(C) Monohybrid cross with complete dominance
(D) Monohybrid cross with incomplete dominance

Sol. (D)

Ex.9 From a cross Aa BB × aa BB, following genotypic ratio will be obtained in F₁ generation
(A) 1 Aa BB: 1 aa BB (B) 1 Aa BB: 3 aa BB
(C) 3 Aa BB: 1 aa BB (D) All Aa BB: No aa BB

Sol. (A) : AaBB x aaBB
Gametes for F₁ = AB, aB and aB, aB
After crossing = AaBB, aaBB
Ratio= 1: 1

Ex.10 In Antirrhinum two plants with pink flowers were hybridized. The F₁ plants produced red, pink and white flowers in the proportion of 1 red, 2 pink and 1 white. What could be the genotype of the two plants used for hybridization. Red flower colour is determined by RR, and white by rr genes
(A) rrrr (B) RR
(C) Rr (D) rr

Exercise # 1

SINGLE OBJECTIVE

NEET LEVEL

1. Mendelism is related with
 - (A) Heredity in living beings
 - (B) Meiosis during sexual reproduction
 - (C) Mutation in living organisms
 - (D) None of the above
2. Mendel chose pea plants because
 - (A) They were cheap
 - (B) They were having seven pairs of contrasting characters
 - (C) They were easily available
 - (D) Of great economic importance
3. How many pairs of contrasting characters in pea pod were chosen by Mendel

(A) 2	(B) 3
(C) 4	(D) 7
4. When a gene exists in more than one form, the different forms are called
 - (A) Heterozygous
 - (B) Complementary genes
 - (C) Genotypes
 - (D) Alleles
5. The first law of Mendel
 - (A) Law of inheritance
 - (B) Law of variation
 - (C) Law of independent assortment
 - (D) Law of segregation
6. If in a garden pea plant, a cross is made between red flowered and white flowered plants. What will be the phenotypic ratio in F_2 generation

(A) 1 : 2 : 1	(B) 9 : 3 : 3 : 1
(C) 3 : 1	(D) 1 : 3
7. Mendel crossed a pure white-flowered recessive pea plant with a dominant pure red-flowered plant. The first generation of hybrids from the cross should show
 - (A) 50% white-flowered and 50% red-flowered plants
 - (B) All red-flowered plants
 - (C) 75% red-flowered and 25% white-flowered plants
 - (D) All white-flowered plants
8. In a plant, red fruit (R) is dominant over yellow fruit (r) and tallness (T) is dominant over shortness (t). If a plant with $RR Tt$ genotype is crossed with a plant that is $rrtt$.
 - (A) 75% will be tall with red fruit
 - (B) All the offspring will be tall with red fruit
 - (C) 25% will be tall with red fruit
 - (D) 50% will be tall with red fruit
9. Which is the functional unit of inheritance

(A) Cistron	(B) Gene
(C) Chromosome	(D) Intron
10. A double heterozygous tall plant with yellow colour (colour of cotyledon) is selfed the ratio of dwarf plants with green cotyledon is

(A) $\frac{1}{16}$	(B) $\frac{1}{4}$
(C) $\frac{1}{6}$	(D) $\frac{2}{16}$
11. In F_2 generation of monohybrid cross the cause of 1 : 2 : 1 phenotypic ratio is
 - (A) Epistatics
 - (B) Inhibition
 - (C) Quantitative inheritance
 - (D) Incomplete dominance
12. When an albino female plant of maize is crossed with normal green male plant, all plants in the progeny are albino because
 - (A) Plastids are inherited through maternal plants
 - (B) Albinism is dominant over green character
 - (C) The crossing results in structural changes in green plastids
 - (D) Green plastids of male parents become mutated
13. In *Mirabilis jalapa*, when homozygous red-flowered and white-flowered plants are crossed, all F_1 plants have pink-coloured flowers. In F_2 produced by selfing of F_1 individuals, red, pink and white flowered plants appear respectively in the ratio of or What will be the ratio in F_2 generation if red-flowered variety of *Mirabilis jalapa* is crossed with white-flowered variety

(A) 1 : 1 : 1 : 1	(B) 1 : 2 : 1
(C) 2 : 1	(D) 3 : 1

Exercise # 2**SINGLE OBJECTIVE****AIIMS LEVEL**

1. In genetics, the use of checker board was done by
(A) Mendel (B) Correns
(C) Punnet (D) Darwin
2. Who has put forth Mendel's conclusions in the form of laws
(A) Bateson (B) Correns
(C) Punnet (D) Johanssen
3. In 1900 A.D. three biologists independently discovered Mendel's principles. They are
(A) De Vries, Correns and Tschermak
(B) Sutton, Morgan and Bridges
(C) Avery, McLeod and McCarthy
(D) Bateson, Punnet and Bridges
4. Preformation theory concerning transmission of characters was given by
(A) Swamerdom (B) Aristotle
(C) Wolf (D) Pythagorous
5. Which of the following has been used for genetic researches
(A) *Pisum* (B) *Neurospora*
(C) *E. coli* (D) All the above
6. Who out of the following was of the strong opinion that acquired characteristics are inherited
(A) Lamarck (B) Lysenko
(C) Mendel (D) Huxley
7. Who gave first experimental evidence of the polygenic concept of inheritance
(A) Galton (1883) (B) Malthus (1828)
(C) Nilsson Ehle (D) None of the above
8. Self sterility in "Nicotiana" was reported by
(A) Morgan (B) East
(C) Crick (D) Goldberg
9. A complete set of chromosomes inherited as a unit from one parent, is known as
(A) Karyotype (B) Gene pool
(C) Genome (D) Genotype
10. Dominant character in tomato is
(A) Red fruit (B) Rounded fruit
(C) Violet stem (D) All the above
11. Organism of pure line is that which produce individuals of
(A) Dominant characters (B) Recessive characters
(C) Its own characters (D) Intermediate type
12. For obtaining hybrid ratio which characters of the plant are taken into account
(A) Dominant characters (B) R e c e s s i v e characters
(C) New characters (D) All the above
13. Which of the following is regarded as *Drosophila* of the fungal world
(A) *Neurospora* (B) *Aspergillus*
(C) *Mucor* (D) *Penicillium*
14. What is the practical utility of genetics
(A) Improvement in qualities of pet animals
(B) Improvement in crop quality
(C) Improvement in qualities of man
(D) All the above
15. If an offspring shows any one of the characters of either of parents, the
(A) Character is said to be hereditary
(B) Offspring is hereditary
(C) The character is related with cytoplasm
(D) None of the above
16. Mendel is famous for his work on
(A) *Pisum* (B) *Drosophila*
(C) *Neurospora* (D) *Oenothera*
17. The F_2 dihybrid ratio 9 : 3 : 4 is explained on the basis of
(A) Epistatic gene
(B) Supplementary gene
(C) Allelic interaction
(D) Complementary gene interaction
18. The phenomenon of incomplete dominance was observed by
(A) De Vries (B) Correns
(C) Tschermak (D) None of the above
19. What is the other name for "incomplete dominance"
(A) Blending inheritance (B) Co-dominance
(C) Pseudo-dominance (D) All the above
20. In poultry, new comb colour appears by collaboration of two dominant gene is
(A) Walnut (B) Single
(C) Rose (D) Pea

Exercise # 3

PART - 1

MATRIX MATCH COLUMN

1. Match the genetic phenomena with their respective ratios
- | | |
|---------------------------------------|---------------------------------------|
| Column - I | Column - II |
| A. Inhibitory gene ratio | 1. 9 : 3 : 4 |
| B. Complementary gene ratio | 2. 1 : 1 : 1 : 1 |
| C. Recessive epistasis ratio | 3. 12 : 3 : 1 |
| D. Dihybrid test cross ratio | 4. 13 : 3 |
| E. Dominant epistasis ratio | 5. 9 : 7 |
| (A) A - 5; B - 4; C - 3; D - 2, E - 1 | (B) A - 4; B - 5; C - 1; D - 2, E - 3 |
| (C) A - 1; B - 2; C - 4; D - 3, E - 5 | (D) A - 2; B - 1; C - 4; D - 5, E - 3 |
| (E) A - 5; B - 4; C - 1; D - 2, E - 3 | |
2. Match column I with column II and select the correct option
- | | |
|--------------------------------|--------------------------------|
| Column - I | Column - II |
| A. Ophioglossum | 1. 23 |
| B. Rice | 2. 24 |
| C. Potato | 3. 12 |
| D. Man | 4. 630 |
| (A) A - 1, B - 2, C - 3, D - 4 | (B) A - 2, B - 3, C - 4, D - 1 |
| (C) A - 3, B - 4, C - 2, D - 1 | (D) A - 4, B - 3, C - 2, D - 1 |
| (E) A - 4, B - 3, C - 2, D - 1 | |
3. Match the numbers of genes given in Column - I with names of organisms in Column - II and choose the correct alternatives
- | | |
|---------------------------------------|---------------------------------------|
| Column - I | Column - II |
| A. 450 to 700 genes | 1. Escherichia coli |
| B. 4000 genes | 2. Drosophila melanogaster |
| C. 13,000 genes | 3. Mycoplasma |
| D. 32, 000 to 50, 000 genes | 4. Homo sapiens |
| E. 35, 000 to 45, 000 | 5. Oryza sativa |
| (A) A - 2; B - 1; C - 5; D - 3; E - 4 | (B) A - 3; B - 1; C - 2; D - 5; E - 4 |
| (C) A - 3; B - 2; C - 1; D - 5; E - 4 | (D) A - 2; B - 3; C - 1; D - 5; E - 4 |
| (E) A - 1; B - 3; C - 2; D - 5; E - 4 | |
4. Match the following
- | | |
|---|------------------------|
| Column - I | Column - II |
| A. XX - OX, method of sex determination | (i) Heterogametic |
| B. 1.5 X/A ratio | (ii) Turner's syndrome |
| C. Karyotype 45 | (iii) Hemiptera |
| D. ZW - ZZ method of sex determination | (iv) Metafemale |
- | | | | |
|-----------|----------|----------|----------|
| A | B | C | D |
| (A) (i) | (iv) | (iii) | (ii) |
| (B) (iii) | (iv) | (ii) | (i) |
| (C) (iv) | (i) | (ii) | (iii) |
| (D) (i) | (iv) | (ii) | (iii) |

Exercise # 4

PART - 1

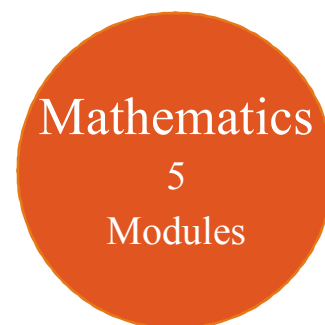
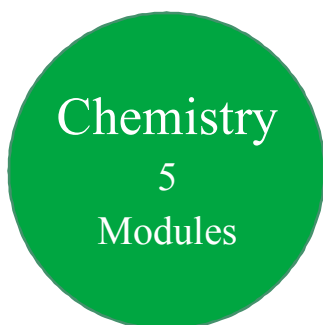
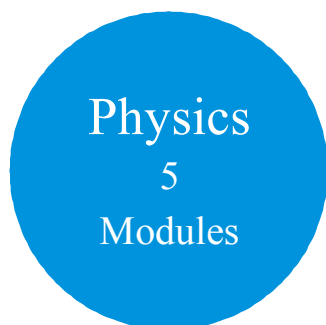
PREVIOUS YEAR (NEET/AIPMT)

1. Which one of the following characters studied by Mendel in garden pea was found to be dominant ?
[CBSE AIPMT 2000]
(A) Green seed colour
(B) Terminal flower Position
(C) Green Pod colour
(D) Wrinkled seed
2. Mutation generally Produces [CBSE AIPMT 2000]
(A) recessive genes (B) lethal genes
(C) polygenes (D) dominant genes
3. Drosophila flies with XXY genotype femals, but human beings with such genotype are abnormal males. It shows that [CBSE AIPMT 2000]
(A) Y-chromosome is essential for sex determination in Drosophila
(B) Y-chromosome is female determining in Drosophila
(C) Y-chromosome is male determining in human beings
(D) Y-chromosome has no role in sex determination either in Drosophila or in human beings
4. During the organ differentiation in Drosophila, an organ is modified to another organ (such as wings may be replaced by legs). Genes responsible for such metamorphosis are called [CBSE AIPMT 2000]
(A) double dominant genes
(B) plastid genes
(C) complementary genes
(D) homeotic genes
5. Ratio of complementary genes is [CBSE AIPMT 2001]
(A) 9 : 3 : 4 (B) 12 : 3 : 1
(C) 9 : 3 : 3 : 4 (D) 9 : 7
6. A and B genes are linked. What shall be the genotype of progeny in a cross between AB/ab and ab/ab ? [CBSE AIPMT 2001]
(A) AAbb and aabb (B) AaBb and aabb
(C) AABB and aabb (D) None of these
7. Two non-allelic genes produce the new phenotype when present together but fail to do so independently, it is called [CBSE AIPMT 2001]
(A) epistasis
(B) polygene
(C) non-complementary gene
(D) complementary gene
8. Male XX and female XY sometime occur due to [CBSE AIPMT 2001]
(A) deletion
(B) transfer of segments in X and y-chromosomes
(C) aneuploidy
(D) hormonal imbalance
9. Number of Barr bodies in XXXX female [CBSE AIPMT 2001]
(A) 1 (B) 2
(C) 3 (D) 4
10. Extranuclear inheritance occurs in [CBSE AIPMT 2001]
(A) Killer Paramecium (B) Killer Amoeba
(C) Euglena (D) Hydra
11. Which of these do not follow independent assortment ? [CBSE AIPMT 2001]
(A) Genes on non-homologous chromosomes and absence of linkage
(B) Genes on homologous chromosomes
(C) Linked genes on same chromosome
(D) Unlinked genes on same chromosome
12. In his experiment, Mendel obtained wrinkled pea. The wrinkling was due to deposition of sugar instead of starch. This happened due to the enzyme [CBSE AIPMT 2001]
(A) amylase
(B) invertase
(C) diastase
(D) absence of starch-branching enzyme
13. A plant of F₁-generation has genotype 'AABbCC'. On selfing of this plant, the phenotypic ratio in F₂-generation will be [CBSE AIPMT 2002]
(A) 3 : 1
(B) 1 : 1
(C) 9 : 3 : 3 : 1
(D) 27 : 9 : 9 : 9 : 3 : 3 : 3 : 1
14. Change in the sequence of nucleotide in DNA is called as [CBSE AIPMT 2002]
(A) mutagen (B) mutation
(C) recombination (D) translation
15. Pleiotropic gene is [CBSE AIPMT 2002]
(A) haemophilia (B) thalassemia
(C) sickle-cell anaemia (D) colour blindness

MOCK TEST

- Among the seven pairs of contrasting traits in pea plant as studied by Mendel, the number of traits related to flower, pod and seed respectively were
(A) 2,2,2 (B) 2,2,1 (C) 1,2,2 (D) 1,1,2
- In Mendel's seven contrasting traits of pea total number of colours tested by him was
(A) 2 (B) 3 (C) 4 (D) 5
- Mendel conducted hybridisation experiments on garden peas for
(A) 7 years (B) 6 years (C) 5 years (D) 4 years
- Mendel selected *Pisum sativum* for his experimental investigations among various plants available in the Monastery garden, Which of the following can be a reason for this ?
(A) It has a short life cycle.
(B) It has distinctive, contrasting traits like tall and dwarf plant.
(C) It easily undergoes self pollination
(D) All of these
- The experimental material in Mendel's experiment was
(A) *Pisum sativum* (B) *Oryza sativa*
(C) *Mirabilis jalapa* (D) None of these
- In his classic experiments on pea plants. Mendel did not use
(A) seed shape (B) flower position
(C) seed colour (D) pod length.
- A tall true breeding garden pea plant is crossed with a dwarf true breeding garden pea plant. When the F_1 plants were selfed the resulting genotypes were in the ratio of
(A) 3 : 1 :: Tall : Dwarf (B) 3 : 1 :: Dwarf : Tall
(C) 1 : 2 : 1 :: Tall homozygous : Tall heterozygous (D) 1 : 2 : 1 :: Tall heterozygous : Tall homozygous : Dwarf
- If 'A' represents the dominant gene and 'a' represents its recessive allele, which of the following would be the most likely result in the first generation offspring when Aa crossed with aa?
(A) All will exhibit dominant phenotype.
(B) All will exhibit recessive phenotype.
(C) Dominant and recessive phenotypes will be 50% each.
(D) Dominant phenotype will be 75%
- In rabbits, the gene for grey fur (G) is dominant over that for black fur (g). In a litter, If 50% rabbits are grey, then the possible parental cross combination is
(A) GG × Gg (B) GG × GG (C) gg × gg (D) Gg × gg
- Two pink flowered snapdragon plants (Rr) are self-pollinated. The probability of the offsprings to have white flowers are
(A) 25% (B) 50% (C) 75% (D) 2.5%
(E) 2.5%

11th Class Modules Chapter Details



PHYSICS	CHEMISTRY	BIOLOGY
<p>Module-1</p> <ol style="list-style-type: none"> 1. Physical World & Measurements 2. Basic Maths & Vector 3. Kinematics <p>Module-2</p> <ol style="list-style-type: none"> 1. Law of Motion & Friction 2. Work, Energy & Power <p>Module-3</p> <ol style="list-style-type: none"> 1. Motion of system of particles & Rigid Body 2. Gravitation <p>Module-4</p> <ol style="list-style-type: none"> 1. Mechanical Properties of Matter 2. Thermal Properties of Matter <p>Module-5</p> <ol style="list-style-type: none"> 1. Oscillations 2. Waves 	<p>Module-1(PC)</p> <ol style="list-style-type: none"> 1. Some Basic Concepts of Chemistry 2. Atomic Structure 3. Chemical Equilibrium 4. Ionic Equilibrium <p>Module-2(PC)</p> <ol style="list-style-type: none"> 1. Thermodynamics & Thermochemistry 2. Redox Reaction 3. States Of Matter (Gaseous & Liquid) <p>Module-3(IC)</p> <ol style="list-style-type: none"> 1. Periodic Table 2. Chemical Bonding 3. Hydrogen & Its Compounds 4. S-Block <p>Module-4(OC)</p> <ol style="list-style-type: none"> 1. Nomenclature of Organic Compounds 2. Isomerism 3. General Organic Chemistry <p>Module-5(OC)</p> <ol style="list-style-type: none"> 1. Reaction Mechanism 2. Hydrocarbon 3. Aromatic Hydrocarbon 4. Environmental Chemistry & Analysis Of Organic Compounds 	<p>Module-1</p> <ol style="list-style-type: none"> 1. Diversity in the Living World 2. Plant Kingdom 3. Animal Kingdom <p>Module-2</p> <ol style="list-style-type: none"> 1. Morphology in Flowering Plants 2. Anatomy of Flowering Plants 3. Structural Organization in Animals <p>Module-3</p> <ol style="list-style-type: none"> 1. Cell: The Unit of Life 2. Biomolecules 3. Cell Cycle & Cell Division 4. Transport in Plants 5. Mineral Nutrition <p>Module-4</p> <ol style="list-style-type: none"> 1. Photosynthesis in Higher Plants 2. Respiration in Plants 3. Plant Growth and Development 4. Digestion & Absorption 5. Breathing & Exchange of Gases <p>Module-5</p> <ol style="list-style-type: none"> 1. Body Fluids & Its Circulation 2. Excretory Products & Their Elimination 3. Locomotion & Its Movement 4. Neural Control & Coordination 5. Chemical Coordination and Integration

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12th Class Modules Chapter Details

Physics
5
Modules

Chemistry
5
Modules

Mathematics
5
Modules

PHYSICS	CHEMISTRY	BIOLOGY
<p>Module-1</p> <ol style="list-style-type: none"> 1. Electrostatics 2. Capacitance <p>Module-2</p> <ol style="list-style-type: none"> 1. Current Electricity 2. Magnetic Effect of Current and Magnetism <p>Module-3</p> <ol style="list-style-type: none"> 1. Electromagnetic Induction 2. Alternating Current <p>Module-4</p> <ol style="list-style-type: none"> 1. Geometrical Optics 2. Wave Optics <p>Module-5</p> <ol style="list-style-type: none"> 1. Modern Physics 2. Nuclear Physics 3. Solids & Semiconductor Devices 4. Electromagnetic Waves 	<p>Module-1(PC)</p> <ol style="list-style-type: none"> 1. Solid State 2. Chemical Kinetics 3. Solutions and Colligative Properties <p>Module-2(PC)</p> <ol style="list-style-type: none"> 1. Electrochemistry 2. Surface Chemistry <p>Module-3(IC)</p> <ol style="list-style-type: none"> 1. P-Block Elements 2. Transition Elements (d & f block) 3. Co-ordination Compound 4. Metallurgy <p>Module-4(OC)</p> <ol style="list-style-type: none"> 1. HaloAlkanes & HaloArenes 2. Alcohol, Phenol & Ether 3. Aldehyde, Ketone & Carboxylic Acid <p>Module-5(OC)</p> <ol style="list-style-type: none"> 1. Nitrogen & Its Derivatives 2. Biomolecules & Polymers 3. Chemistry in Everyday Life 	<p>Module-1</p> <ol style="list-style-type: none"> 1. Reproduction in Organisms 2. Sexual Reproduction in Flowering Plants 3. Human Reproduction 4. Reproductive Health <p>Module-2</p> <ol style="list-style-type: none"> 1. Principles of Inheritance and Variation 2. Molecular Basis of Inheritance 3. Evolution <p>Module-3</p> <ol style="list-style-type: none"> 1. Human Health and Disease 2. Strategies for Enhancement in Food Production 3. Microbes in Human Welfare <p>Module-4</p> <ol style="list-style-type: none"> 1. Biotechnology: Principles and Processes 2. Biotechnology and Its Applications 3. Organisms and Populations <p>Module-5</p> <ol style="list-style-type: none"> 1. Ecosystem 2. Biodiversity and Conservation 3. Environmental Issues

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