PREVIOUS YEAR QUESTIONS

(Chapterwise)

CHAPTER NAME: GENETICS - SOME BASIC FUNDAMENTALS

SUMMARY POINTS	

Q.NO.: 1	**A zygote which has Y chromosome inheritance develops into a _____.**	**YEAR [2024]**
ANS.:	Boy	
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Q.NO.: 2	**Four friends P, Q, R and S were discussing the examples of genetic disorders. The examples they quoted were as follows:** **P: Colour blindness and Malaria** **Q: Albinism and Cholera** **R: Haemophilia and Colour blindness** **S: Haemophilia and Albinism Who gave the correct examples?**	**YEAR [2024]**
ANS.:	R and S	
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Q.NO.: 3	**A male gorilla has 48 chromosomes in each of its body cells. How many chromosomes will each of the sperms have?**	**YEAR [2024]**
ANS.:	24	
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Q.NO.: 4	**Which is the dominant and recessive allele of the trait [shape of seeds]?**	**YEAR [2024]**
ANS.:	The dominant allele is round seeds and the recessive allele is wrinkled seeds.	
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Q.NO.: 5	**What does the ratio 3:1 in the F2 generation represent?**	**YEAR [2024]**
ANS.:	The 3:1 ratio represents the phenotypic ratio of the offspring. This means that for every four offspring, three will have round seeds and one will have wrinkled seeds. This ratio demonstrates Mendel's Law of Dominance, which states that out of a pair of contrasting alleles, only the dominant allele is expressed, while the recessive allele remains suppressed.	

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Q.NO.: 6	The sex chromosome in human ovum is _____.	YEAR [2023]
ANS.:	X chromosome	
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Q.NO.: 7	Haploid number of chromosomes are found in _____.	YEAR [2023]
ANS.:	Sperms	
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Q.NO.: 8	Name the following: A genetic disorder in which blood does not clot.	YEAR [2023]
ANS.:	Haemophilia	
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Q.NO.: 9	State Mendel's law of segregation.	YEAR [2023]
ANS.:	The two members of a pair of factors separate during the formation of gametes.	
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Q.NO.: 10	Define the term 'mutation'.	YEAR [2023]
ANS.:	A sudden change in one or more genes, or in the number or structure of chromosomes.	
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Q.NO.: 11	**A pure breeding red flower variety of pea plant (RR) is crossed with a pure breeding white flower variety of pea plant (rr). Draw a Punnett square to find out the phenotype of the progeny belonging to F2 generation. What is the phenotypic ratio and genotypic ratio?**	**YEAR [2023]**
ANS.:	The phenotypic ratio is 3:1, with three red flower varieties and one white flower variety. The genotypic ratio is 1:2:1, with one homozygous dominant (RR), two heterozygous (Rr), and one homozygous recessive (rr).	
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Q.NO.: 12	**The genotype who can not roll his tongue is _____.**	**YEAR [2021]**
ANS.:	rr	
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Q.NO.: 13	**The basic units of heredity are _____.**	**YEAR [2021]**
ANS.:	Genes	
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Q.NO.: 14	**A homozygous pea plant having purple flowers is crossed with a homozygous pea plant bearing white flowers. The phenotypic ratio obtained in F1 generation is _____.**	**YEAR [2021]**
ANS.:	3:1	
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Q.NO.: 15	**Explain the following terms:** **(a) Law of Dominance.** **(b) Mutation.**	**YEAR [2021]**
ANS.:	(a) Out of a pair of contrasting alleles present together, only the dominant allele is able to express itself while the recessive remains suppressed. (b) It is a sudden change in one or more genes in an organism's cells, which is heritable.	

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Q.NO.: 16	Mention the exact location of genes.	YEAR [2021]
ANS.:	Present on chromosomes	
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Q.NO.: 17	Explain the following terms: Phenotype	YEAR [2020]
ANS.:	The observable characteristics of an organism, which are genetically controlled.	
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Q.NO.: 18	In a human being, how many chromosomes are present in a nerve cell?	YEAR [2020]
ANS.:	46	
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Q.NO.: 19	Give the appropriate term for: A sudden change in one or more genes.	YEAR [2020]
ANS.:	Mutation	
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Q.NO.: 20	A homozygous tall plant with red flowers (TTRR) is crossed with a homozygous dwarf pea plant bearing white flowers (ttrr). (a) What is the phenotype and genotype of the F1 individuals? (b) Write the possible combination of gametes that can be obtained when two F1 hybrid plants are crossed.	YEAR [2020]

	(c) Mention the phenotypic ratio of the progeny obtained in an F2 generation. **(d) State Mendel's law of independent assortment.**	
ANS.:	**(a)** The phenotype of F1 individuals is tall with red flowers. Their genotype is heterozygous for both tallness and red flower color (TtRr). **(b)** The possible gamete combinations are TR, Tr, tR, and tr. **(c)** The phenotypic ratio in the F2 generation is 9:3:3:1. **(d)** Mendel's law of independent assortment states that the distribution of alleles for one trait into gametes is independent of the distribution of alleles for other traits.	
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Q.NO.: 21	**Name the following: A pair of corresponding chromosomes of the same shape and size and carrying genes for the same characteristics, one from each parent.**	**YEAR [2019]**
ANS.:	Homologous chromosomes	
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Q.NO.: 22	**In a human being, how many chromosomes are present in the gamete of a human being?**	**YEAR [2019]**
ANS.:	23	
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Q.NO.: 23	**Give the appropriate term for: The condition in which a pair of chromosomes carry similar alleles of a particular character.**	**YEAR [2019]**
ANS.:	Homozygous chromosomes	
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Q.NO.: 24	**A pea plant which is homozygous for green pods which are inflated (GGII) is crossed with the homozygous for yellow pods which are constricted (ggii).**	**YEAR [2019]**

	Answer the following questions: **(1) Give the phenotype and genotype of the F1 generation. Which type of pollination has occurred to produce F1 generation?** **(2) Write the phenotypic ratio obtained from the dihybrid cross.** **(3) Write the phenotype ratio of the gametes that can be obtained if two F1 hybrid plants are crossed.** **(4) State Mendel's law of segregation of gametes.** **(5) What is the scientific name of the plant which Mendel used for his experiments on inheritance?**	
ANS.:	**(1)** The phenotype of the F1 generation is all plants will have green pods that are inflated. The genotype is heterozygous for both green pod color and inflated pod shape (GgIi). The type of pollination that occurred to produce the F1 generation is cross-pollination. **(2)** The phenotypic ratio obtained from the dihybrid cross is 9:3:3:1. **(3)** The possible gamete combinations are GI, Gi, gI, and gi. **(4)** Mendel's law of segregation states that during the formation of gametes, the two alleles responsible for a trait separate from each other so that each gamete contains only one allele for that trait. **(5)** The scientific name of the plant that Mendel used is *Pisum sativum*.	
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Q.NO.: 25	**Name the following: The exchange of chromatid parts between the maternal and paternal chromatids of a pair of homologous chromosomes.**	**YEAR [2018]**
ANS.:	Crossing over	
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Q.NO.: 26	**Identify from the following, the characteristics that are acquired and not inherited.**	**YEAR [2018]**
ANS.:	**(1) Size of the body** **(2) Haemophilia** The answer is size of the body. Hemophilia is a genetic disorder, meaning it is inherited, not acquired.	
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Q.NO.: 27	**In a homozygous plant round seeds (R) are dominant over wrinkled seeds (r).** **(i) What is the phenotype and genotype of the F1 generation, if a homozygous round seed plant is crossed with a homozygous wrinkled seed plant?** **(ii) Draw a Punnett square board to show the gametes and offspring when both the plants have heterozygous round seeds.** **(iii) Mention the Phenotype and Genotype ratio of the offsprings in F2 generation.**	**YEAR** **[2018]**
ANS.:	**(i)** The phenotype of the F1 generation is all plants will have round seeds. The genotype is heterozygous (Rr). **(ii)** The source provides a diagram with RR, Rr, Rr, and rr, indicating a Punnett square representing the cross between two heterozygous individuals (Rr). **(iii)** The phenotypic ratio is 3:1. Three plants will have round seeds, and one plant will have wrinkled seeds. The genotypic ratio is 1:2:1. One will be homozygous dominant (RR), two will be heterozygous (Rr), and one will be homozygous recessive (rr).	
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Q.NO.: 28	**Given below is a group of terms. In the group, the first pair indicates the relationship between the two terms.** **Redraw and complete the second pair on a similar basis.** **Oxygen : Inspiration :: Carbon dioxide : _____ TT : Homozygous :: Tt : _____**	**YEAR** **[2017]**
ANS.:	Oxygen : Inspiration :: Carbon dioxide : **Expiration** TT : Homozygous :: Tt : **Heterozygous**	
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Q.NO.: 29	**Give technical terms for the following:** **(i) The suppressed allele of a gene.** **(ii) A pair of corresponding chromosomes of the same shape and size and carrying genes for the same characteristics, one from each parent.**	**YEAR** **[2017]**
ANS.:	**(i)** Recessive **(ii)** Homologous chromosomes	
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Q.NO.: 30	**In pea plants, the axial flowers (A) are dominant over terminal flowers (a).**	**YEAR**

	(i) What is the phenotype and genotype of the F1 generation if a plant bearing pure axial flowers is crossed with a plant bearing pure terminal flowers? **(ii) Draw a Punnett square board to show the gametes and offsprings when both the parent plants are heterozygous for axial flowers.** **(iii) What is the phenotypic ratio and genotypic ratio of the above cross shown in (ii)?** **(iv) State Mendel's law of dominance.** **(v) Name two genetic disorders commonly seen in human males.**	**[2017]**
ANS.:	**(i)** The phenotype is all plants will bear axial flowers. The genotype is heterozygous for axial flowers (Aa). **(ii)** The source provides a diagram with AA, Aa, Aa, and aa, indicating a Punnett square representing the cross between two heterozygous individuals (Aa). **(iii)** The phenotypic ratio is 3:1. Three plants will bear axial flowers, and one will have terminal flowers. The genotypic ratio is 1:2:1. One will be homozygous dominant (AA), two will be heterozygous (Aa), and one will be homozygous recessive (aa). **(iv)** Out of a pair of contrasting characters present together, only one is able to express itself, while the other remains suppressed. The one that expresses is the dominant character, and the one that is unexpressed is the recessive character. **(v)** Two genetic disorders commonly seen in human males are color blindness and hemophilia.	
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Q.NO.: 31	**In the given set of terms given below, there is an odd one and cannot be grouped in the same category to which the other three belong. Identify the odd one and name the category to which the remaining three belong.** **Typhoid, Haemophilia, Albinism, Colour Blindness**	**YEAR [2016]**
ANS.:	The odd term is typhoid. The remaining three belong to the category of genetic disorders.	
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Q.NO.: 32	**Give scientific reasons for the following statements: Colour blindness is more common in men than in women.**	**YEAR [2016]**
ANS.:	Color blindness is an X-linked recessive trait. Males have only one X chromosome, whereas females have two. So, if a male inherits an X chromosome carrying the gene for color blindness, he will be colorblind. However, a female needs to inherit	

	two copies of the gene, one on each X chromosome, to be colorblind. Therefore, color blindness is more common in men.	
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Q.NO.: 33	**A homozygous tall plant with red flowers (TTRR) is crossed with a homozygous dwarf plant bearing white flowers (ttrr).** **(i) Give the genotype and phenotype of the plants of the F1 generation.** **(ii) Mention the possible combinations of the gametes that can be obtained from the F1 hybrid plant.** **(iii) State Mendel's law of independent assortment.** **(iv) Mention the phenotypes of the offsprings obtained in F2 generation.** **(v) What is the phenotypic ratio obtained from a dihybrid cross?**	**YEAR [2016]**
ANS.:	**(i)** The genotype is heterozygous tall with red flowers (TtRr). The phenotype is all the plants are tall with red flowers. **(ii)** The possible gamete combinations are TR, Tr, tR, and tr. **(iii)** Mendel's law of independent assortment states that during gamete formation, the segregation of alleles of one pair of traits is independent of the segregation of alleles of another pair of traits. **(iv)** The phenotypes of the offspring obtained in the F2 generation are: ● tall and red ● dwarf and red ● tall and white ● dwarf and white. **(v)** The phenotypic ratio obtained from a dihybrid cross is 9:3:3:1.	
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Q.NO.: 34	**Name the following:** **The cross between two parents having one pair of contrasting characters.**	**YEAR [2015]**
ANS.:	Monohybrid cross	
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Q.NO.: 35	**Redraw and complete the following sentence by inserting the correct word in the space indicated:** **_____ is the scientific name of garden pea, which Mendel used for his experiments.**	**YEAR** **[2015]**
ANS.:	*Pisum sativum*	
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Q.NO.: 36	**Briefly answer the following questions:** **(i) State Mendel's law of dominance.** **(ii) In a homozygous plant, round seeds are dominant over wrinkled seeds.** **(a) Draw a Punnett square to show the gametes and offspring when both the plants have heterozygous round seeds.** **(b) Mention the phenotype and genotype ratio of the offsprings in F2 generation.** **(iii) Name the sex chromosomes in human males and females.** **(iv) Briefly explain the term mutation.** **(v) What is the number of chromosomes in the gametes of human beings?**	**YEAR** **[2015]**
ANS.:	**(i)** Out of a pair of contrasting characters present together, only one is able to express itself, while the other remains suppressed. The one that expresses is the dominant character, and the one that is unexpressed is the recessive character. **(ii)(a)** The source provides a diagram with RR, Rr, Rr, and rr, indicating a Punnett square representing the cross between two heterozygous individuals (Rr). **(b)** The phenotype ratio is 3:1. Three plants will have round seeds, and one plant will have wrinkled seeds. The genotypic ratio is 1:2:1. One will be homozygous dominant (RR), two will be heterozygous (Rr), and one will be homozygous recessive (rr). **(iii)** The sex chromosomes in human males are XY, and the sex chromosomes in females are XX. **(iv)** Mutation is a sudden change in one or more genes, or in the number or in the shape or structure of chromosomes. Mutations alter the hereditary material of an organism's cells and result in changes to certain characters or traits in an entire species. These changes can persist for years. **(v)** Gametes in human beings have 23 chromosomes.	
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