



# BIOLOGY

## BOOKS - NTA MOCK TESTS

### PRINCIPLES OF INHERITANCE AND VARIATION TEST

#### Multiple Choice Questions

1. A man with blood group A marries AB blood group woman. Which type of progeny

indicates that the man is not homozygous?

A. AB

B. B

C. A

D. More than one option is correct

**Answer: B**



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2. When a tall plant was self pollinated, one-fourth of the progeny were dwarf. The genotypes of the parent and dwarf progenies are

A. TT, Tt

B. Tt, tt

C. Tt, Tt

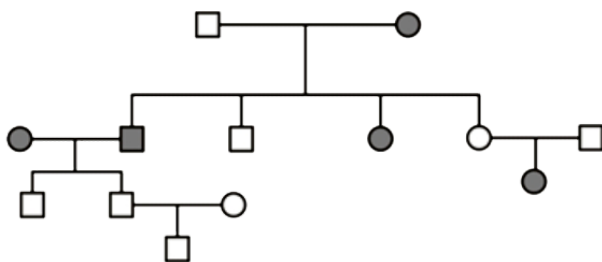
D. TT, TT

**Answer: B**



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3. The following family tree traces the occurrence of a rare genetic disease. The filled symbols signify the individuals with the disease, whereas the open symbols signify healthy individuals.



Based on this information, the disease is most likely to be

A. autosomal, dominant

B. autosomal, recessive

C. X-linked, recessive

D. X-linked, dominant

**Answer: B**



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**4.** A colour - blind girl is rare because she will be born only when:

A. A Her mother and maternal grandfather were colour blind.

B. Her father and maternal grandfather were colour blind.

C. Her mother is colour blind and father has normal vision.

D. Parents have normal vision but grandparents were colour blind.

**Answer: B**



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5. The law based on the fact that the alleles do not show blending also proposes that:

(a) A gamete receives only one of the two factors.

(b) Both the characters are recovered as such in  $F_2$  -generation.

A. Both (A) and (B) are incorrect

B. (A) is incorrect but (B) is correct

C. Both (A) and (B) are correct

D. (B) is incorrect but (A) is correct

**Answer: C**



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6. The phenomenon of independent assortment refers to:

A. Expression at the same stage of development.



B. When two pairs of traits are combined in a hybrid, segregation of one pair of character is independent of the other pair of character.

C. Independent location of genes from each other in an interphase cell

D. Association of genes on the same chromosome

**Answer: B**



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## 7. Test cross involves

- A. Crossing between two  $F_1$  hybrids
- B. Crossing the  $F_1$  hybrid with a double recessive genotype
- C. Crossing between two genotypes with dominant trait
- D. Crossing between two genotypes with recessive trait

**Answer: B**



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**8. Phenotype of an organism is the result of**

A. Cytoplasmic effects and nutrition

B. Environmental changes and sexual  
dimorphism

C. Genotype and environment interactions

D. mutations and linkage

**Answer: C**



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9. How many types of gametes will be produced by a plant having the genotype AABbcc?

A. Four

B. Nine

C. Two

D. Three

**Answer: C**



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**10.** In a typical Mendelian cross which is a dihybrid cross, one parent is homozygous for both dominant traits and another parent is homozygous for both recessive traits. In the  $F_2$  generation, both parental combinations and recombinations appear. The phenotypic ratio of parental combinations to recombinations is

A. 10:6

B. 12:4

C. 9:7

D. 15:1

**Answer: A**



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**11.** If a cross between two individuals produces offsprings with 50% dominant character (A)

and 50% recessive character (a), what are the genotypes of parents?

A.  $Aa \times Aa$

B.  $Aa \times aa$

C.  $AA \times aa$

D.  $AA \times Aa$

**Answer: B**



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12. Which ONE of the following Mendelian diseases is an example of X-linked recessive disorder?

- A. Haemophilia
- B. Phenylketonuria
- C. Sickle cell anaemia
- D. Beta-thalassaemia

**Answer: A**



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**13.** A husband and wife have normal vision, although both of their fathers are red green colour blind, which is inherited as an x-linked recessive trait.

What is the probability that their first child will be:

- A. A normal son
- B. A carrier daughter
- C. A colour blind son
- D. A colour blind daughter

$$\text{A. } A = \frac{1}{4}, B = \frac{1}{4}, C = \frac{1}{4}, D = \frac{1}{4}$$

B.  $A = \frac{1}{2}, B = \frac{1}{4}, C = \frac{1}{4}, D = \frac{0}{4}$

C.  $A = \frac{0}{4}, B = \frac{1}{2}, C = \frac{1}{4}, D = \frac{1}{4}$

D.  $A = \frac{1}{4}, B = \frac{1}{4}, C = \frac{1}{4}, D = 0$

**Answer: D**



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**14.** Which of the following is incorrect about Klinefelter's syndrome?

A. A chromosomal disorder

B. Karyotype of 44 + XXY

C. Gynaecomastia

D. Fertile males

**Answer: D**



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**15.** In a Mendelian dihybrid cross, the probability of getting seeds with genotype Rryy, RrYy, rrYy, and RrYY in  $F_2$  generation is respectively

A.  $\frac{2}{16} : \frac{4}{16} : \frac{1}{8} : \frac{1}{8}$

B.  $\frac{2}{16} : \frac{2}{16} : \frac{2}{16} : \frac{2}{16}$

C.  $\frac{4}{16} : \frac{4}{16} : \frac{2}{16} : \frac{2}{16}$

D.  $\frac{1}{8} : \frac{1}{4} : \frac{2}{8} : \frac{1}{16}$

**Answer: A**



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**16.** A cross was carried out between two individuals heterozygous for two pairs of genes was carried out. Assuming segregation

and independent assortment, the number of different genotypes and phenotypes obtained respectively would be

A. 4 and 9

B. 6 and 3

C. 9 and 4

D. 11 and 4

**Answer: C**



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17. Read the following statements and state true (T) or False (F):

A. T. H. Morgan worked with tiny fruit flies *Drosophila melanogaster*.

B. Morgan studied genes that were sex-linked.

C. Morgan observed that two genes did not segregate independently of each other and F2 ratio was deviated from 9: 3:3 : 1.

A. (A - T), (B - F), (C - T)

B. (A - T), (B - T), (C - T)

C. (A - T), (B - F), (C - F)

D. (A - F), (B - T), (C - T)

**Answer: B**



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**18.** A plant with genotype AABBCc is crossed with another plant with aabbcc genotype. How many different genotypes of pollens is possible in an  $F_1$  plant if these three loci follow an independent assortment?

A. 8

B. 4

C. 2

D. 1

**Answer: A**



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**19.** Phenylketonuria (PKU) is an inherited disease that refers to



A. Decrease in phenylalanine in tissue and blood

B. Increase in phenylpyruvic acid in tissue and blood

C. Elimination of sugar in urine

D. Elimination of homogentisic acid in urine

**Answer: B**



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**20.** Fill in the blanks and select the correct option:

(i) \_\_\_\_\_A\_\_\_\_\_ could trace a specific nuclear structure, all through spermatogenesis in a few insects.

(ii) Grasshopper is an example of \_\_\_\_\_B\_\_\_\_\_ type of sex determination.

(iii) Male bird is \_\_\_\_\_C\_\_\_\_\_

(iv) Rest of the chromosomes, except sex chromosomes, are known as \_\_\_\_\_D\_\_\_\_\_ .

A. (A - Henking), (B - XO), (C - Heterogametic), (D - Autosomes)

B. (A - Morgan), (B - XY), (C - Homogametic), (D - Autosomes)

C. (A - Hugo de Vries), (B - XO), (C - Heterogametic), (D - Autosomes)

D. (A - Henking), (B - Xo), (C - Homogametic), (D - Autosomes)

**Answer: D**



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21. If enough crosses are made between male flies of the genotype 'Aa' and the female flies of the genotype 'aa' to produce about 1000 offsprings. Which one of the following is the most likely distribution of genotypes in the offsprings?

A. 250 Aa : 750 aa

B. 750 Aa : 250 aa

C. 243 AA: 517 Aa : 240 aa

D. 481 Aa : 519 aa

**Answer: D**



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**22.** In a monohybrid cross, 120 plants are obtained. What is the ratio of homozygous and heterozygous?

A. 40 : 80

B. 60 : 60

C. 20: 100

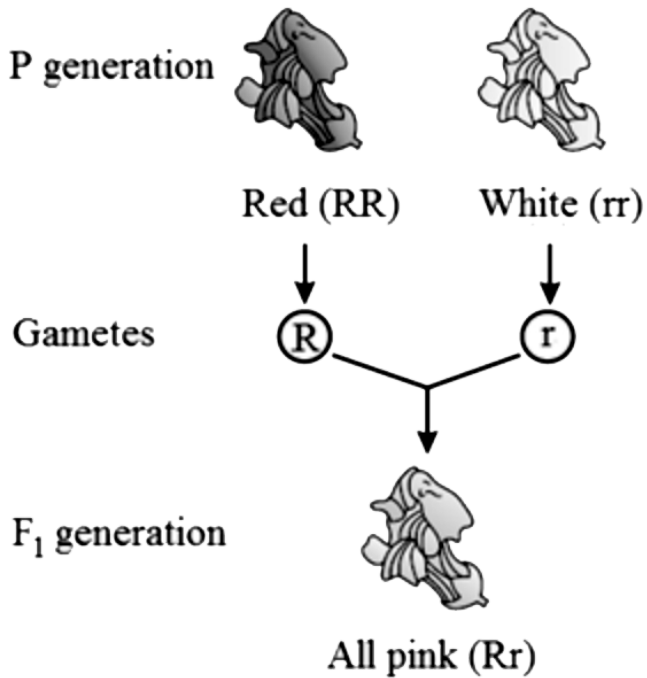
D. 10: 110

**Answer: B**



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**23.** The inheritance of flower colour in Antirrhinum (dog flower) is an example of



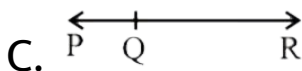
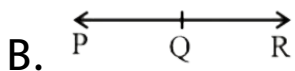
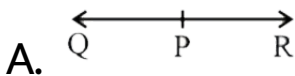
- A. incomplete dominance
- B. codominance
- C. multiple alleles
- D. linkage

**Answer: A**



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24. If map distance between genes P and Q is 4 units, between P and R is 11 units, and between Q and R is 7 units, the order of genes on the linkage map can be traced as follows:





D.  $\overset{\leftarrow}{P} \overset{\rightarrow}{Q} \overset{\leftarrow}{P} \overset{\rightarrow}{R} \overset{\leftarrow}{Q} \overset{\rightarrow}{R}$

**Answer: C**



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**25.** In his classic experiments on pea plants,

Mendel did not use:

A. Pod length

B. Seed shape

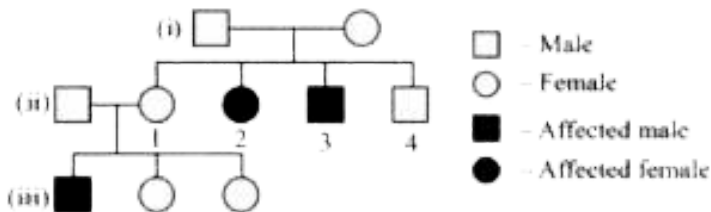
C. Flower position

## D. Seed colour

**Answer: A**

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**26.** Study the given pedigree chart for sickle-cell anaemia and select the most appropriate option for the genotypes.



A.

Genotypes of parents	Genotypes of 1 <sup>st</sup> and 3 <sup>rd</sup> child in F <sub>1</sub>
Hb <sup>A</sup> Hb <sup>S</sup> , Hb <sup>A</sup> Hb <sup>A</sup>	Hb <sup>A</sup> Hb <sup>A</sup> , Hb <sup>A</sup> Hb <sup>S</sup>

B.

Genotypes of parents	Genotypes of 1 <sup>st</sup> and 3 <sup>rd</sup> child in F <sub>1</sub>
Hb <sup>A</sup> Hb <sup>S</sup> , Hb <sup>A</sup> Hb <sup>S</sup>	Hb <sup>A</sup> Hb <sup>A</sup> , Hb <sup>A</sup> Hb <sup>A</sup>

C.

Genotypes of parents	Genotypes of 1 <sup>st</sup> and 3 <sup>rd</sup> child in F <sub>1</sub>
Hb <sup>A</sup> Hb <sup>A</sup> , Hb <sup>A</sup> Hb <sup>S</sup>	Hb <sup>A</sup> Hb <sup>A</sup> , Hb <sup>S</sup> Hb <sup>S</sup>

D.

Genotypes of parents	Genotypes of 1 <sup>st</sup> and 3 <sup>rd</sup> child in F <sub>1</sub>
Hb <sup>A</sup> Hb <sup>S</sup> , Hb <sup>A</sup> Hb <sup>S</sup>	Hb <sup>A</sup> Hb <sup>S</sup> , Hb <sup>S</sup> Hb <sup>S</sup>

**Answer: D**



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27. Match the terms in Column-I with their description in Column-II and choose the

correct option:

Column – I	Column – II
(a) Dominance	(i) Many genes govern a single character
(b) Codominance	(ii) In a heterozygous organism, only one allele expresses itself
(c) Pleiotropy	(iii) In a heterozygous organism, both alleles express themselves fully
(d) Polygenic inheritance	(iv) A single gene influences many characters

A.  $a - ii, b - i, C - iv, d - iii$

B.  $a - ii, b - iii, C - iv, d - i$

C.  $a - iv, b - i, C - ii, d - iii$

D.  $a - iv, b - iii, C - i, d - ii$

**Answer: B**



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**28.** Read the following statements with respect to thalassemia and state true (T) and false (F):

A. It is qualitative problem of synthesizing an incorrectly functioning globin.

B. Alpha thalassemia is due to mutation of

HBA1 and HBA2.

C. Beta thalassemia is controlled by a single gene HBB present on chromosome 11.

D. Caused by defects in the synthesis of globin polypeptide in RBC.

A. (A - F), (B - T), (C - T), (D - T)

B. (A - F), (B - F), (C - F), (D - T)

C. (A - T), (B - F), (C - T), (D - F)

D. (A - T), (B - T), (C - T), (D - F)

**Answer: A**



29. Match column I with column II and select the correct option.

	Column - I		Column - II
(A)	Sickle cell anaemia	(i)	Mental retardation
(B)	Down's syndrome	(ii)	Absence of sex chromosome
(C)	Klinefelter syndrome	(iii)	Point mutation
(D)	Turner's syndrome	(iv)	Trisomy of allosome

A.  $A(iv)$ ,  $B(ii)$ ,  $C(iii)$ ,  $D(i)$

B.  $A(iii)$ ,  $B(i)$ ,  $C(iv)$ ,  $D(ii)$

C.  $A(ii)$ ,  $B(iv)$ ,  $C(i)$ ,  $D(ii)$

D.  $A(iii)$ ,  $B(iv)$ ,  $C(ii)$ ,  $D(i)$

**Answer: B**



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**30.** Which ONE of the following is the most likely ratio of blood groups (A :B : AB) among the progeny from heterozygous parents with B and AB blood groups?

A.  $0.5 : 0.25 : 0.25$

B.  $0.25 : 0.25 : 0.5$

C.  $0.25 : 0.5 : 0.25$



D. 0 : 0.25 : 0.75

**Answer: C**



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