



INDIAN SCHOOL AL WADI AL KABIR



Class: X	DEPARTMENT: SCIENCE 2021 -2022 SUBJECT: BIOLOGY	Date of completion: 27.02.2022
Worksheet No: 5 With Answers	Chapter: HEREDITY AND EVOLUTION	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

OBJECTIVE TYPE QUESTIONS

MULTIPLE CHOICE QUESTIONS

1. Which of the following is heterozygous?
(a) TTRR (b) ttrr (c) TT (d) Tt
2. Genetics is the study of:
a) Inheritance b) Cytology c) physiology d) Evolution
3. What determines the sex of a child?
a) Chromosome content of the ovum b) Chromosome content of sperm c) Number of days between ovulation and fertilisation d) Number of days between fertilisation and implantation

ASSERTION-REASONING QUESTIONS

For the following questions, two statements are given-one labelled Assertion (A) and the other labelled Reason(R). Select the correct answer to these questions from the options (i) , (ii), (iii) and (iv) as given below:

- (i) Both A and R are true and R is the correct explanation of the Assertion.
- (ii) Both A and R are true but R is not the correct explanation of the Assertion.
- (iii) A is true but R is false.
- (iv) A is false but R is true.

1. Assertion: Sex determination in humans is genetical.
Reason: Sex chromosomes are the same in all human ovum.
2. Assertion: Dominant allele is an allele whose phenotype expresses even in the presence of another allele of that gene.
Reason: It is represented by a capital letter, e.g. T.

TWO MARK QUESTIONS

1. (a) On what rules inheritance is based?
(b) Is each trait influenced by both paternal and maternal DNA?
2. What are dominant traits and recessive traits?
3. If YYRR is yellow and round, what do the following represent? Yyrr, yyRR

THREE MARK QUESTIONS

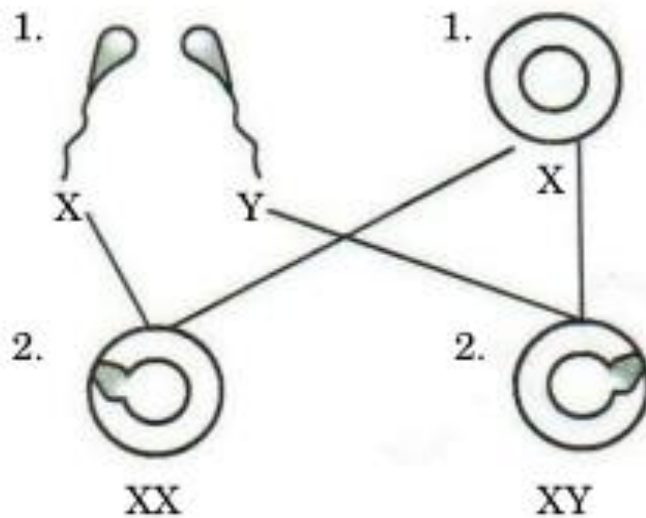
1. Tall plants are dominant over dwarf plants. If a cross is carried out between a Tall plant and dwarf plant. What will be the phenotypes of F1 generation and ratio of Tall plant and dwarf plants in F2?
2. With the help of an example, explain how traits get expressed.
3. Explain the following:
 - i) Dihybrid cross
 - ii) Heterozygous alleles
 - iii) Heredity

FIVE MARK QUESTIONS

1. i) With the help of a flow chart explain sex determination in humans.
ii) Why is sex determination banned by the Government?
2. A pea plant with purple flowers when crossed with pink flowered plant produced all purple coloured flowers in F1 generation. On selfing, the plants produced 150 purple flowered and 50 pink flowered plants.
 - i) Give the genotypes of the parental plants and the F1 generation plants.
 - ii) What is the phenotypic ratio obtained in F2 generation?
 - iii) Explain the genetic mechanism responsible for the above result.
3. How do Mendel's experiment show that traits are inherited independently?

PREVIOUS YEAR BOARD QUESTIONS

- 1) Define the term Heredity? (2021 compartment exam) (1)
- 2) (a) Label (1) and (2) in the given diagram showing sex determination in human beings.
(b) If a child inherits- X-chromosomes from the father what will be his/her gender? (1 + 1)



(2021 compartment exam)

- 3) A Mendelian experiment consisted of breeding pea plants BB, bearing violet flowers with pea plants bb, bearing white flowers. What will be the result in F1 and F2 progeny? What will be the percentage of white flowers in F2 generation? (3)
- 4) Mendel, in one of his experiments with pea plants, crossed a variety of pea plant having round seeds with one having wrinkled seeds. All the F1 plants obtained were round seeded.
- Identify the dominant and recessive trait. Give reason for your answer.
 - Also, list any three contrasting characters, other than round seeds of pea plants that round seeds with one having wrinkled seeds. (5)
- 5) What is the law of dominance of traits? Explain with an example (3)

ANSWERS FOR THE WORKSHEET QUESTIONS

OBJECTIVE TYPE QUESTIONS
MULTIPLE CHOICE QUESTIONS

1. (d)Tt 2. a) Inheritance 3. b) Chromosome content of sperm

ASSERTION-REASONING QUESTIONS

- 1.ii) 2.ii)

TWO MARK QUESTIONS

1. (a) The rules of inheritance are based on the fact that the traits in the progeny are carried out by DNA's of both the parents (mother and father). These rules are known as 'Mendel's Laws of Inheritance' The rules are:

- (i) Law of dominance,
- (ii) Law of segregation, and
- (iii) Law of independent

(b) Yes, it is true that each trait is influenced by both paternal and maternal DNA.

2. Dominant traits are traits which express themselves in F1 generation after crossing contrasting traits.

Recessive traits are traits which are not expressed in F1 generation after crossing contrasting traits.

3. yyrr – green and wrinkled
 yyRR - green and round

THREE MARK QUESTIONS

1. Round seeds are dominant over wrinkled seeds.

Tall plants Dwarf plants
 TT x tt

Gametes	T	T
T	TT	Tt
t	Tt	Tt

All F1 are Tall plants

F1 self pollinated to get F2

Tall Plants Tall Plants
 Tt x Tt

Gametes	T	t
T	TT	Tt
t	Tt	tt

Ratio of Tall plants to dwarf plants is: 3:1

2. Gene is the segment of DNA which provides information for synthesis of a protein and this protein is responsible for a trait. For example: The height in plants

Plant hormones control the height in plants. If the gene is dominant, more enzyme will be produced which in turn will help in increasing the hormone production. As a result, the plant will be tall. If the gene changes, protein(enzyme) is formed in less quantity, hormone will be less and in turn the plant will be short.

In this way, genes control traits in organisms.

3.i) Dihybrid cross - A cross which involves a two pair of contrasting traits is called a dihybrid cross. Example yellow and round seeds, green and wrinkled seeds

ii) Heterozygous alleles - While individual organisms bearing different alleles (Rr) are known as heterozygous.

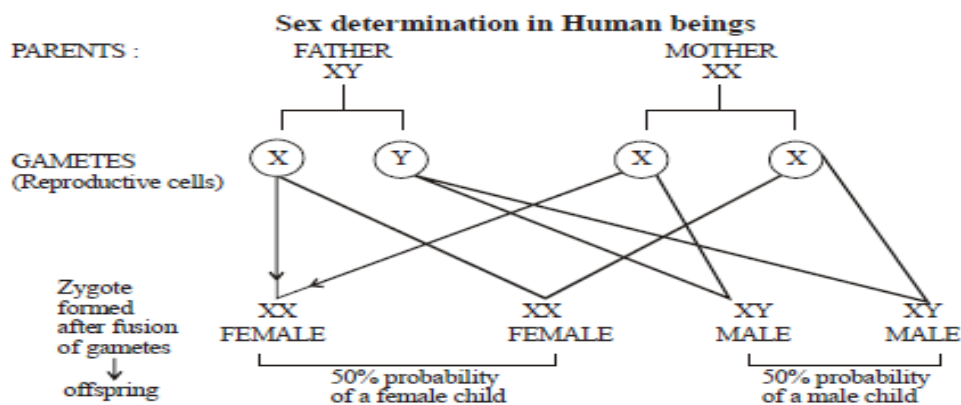
iii)Heredity - The process of transmission of characters from one generation to another

FIVE MARK QUESTIONS

1. i) Sex in humans is determined at the time of fertilization, when the male and female gametes fuse together. Humans have 46 chromosomes in their normal cells. 44 of them are called autosomes and are responsible for general body features. The remaining two are called sex chromosomes ,which determine the sex of the offspring.

In males, the two sex chromosomes are dissimilar and represented as X Y.

In females, the two sex chromosomes are similar and represented as XX.



In humans, the sex of the child is determined by the type of sperm that fuses with the ovum.

ii)In many parts of India, on knowing the sex of the foetus abortion is done if it is found to be a girl. So, sex determination is banned by the government to reduce female foeticide.

2. i) Parental plants are – purple is PP and white is pp.

F1 all are heterozygous purple. Pp (can use any letter)

ii)The ratio is 150:50 ie,3:1.

iii)As the F2 ratio is 3:1, it is a Mendelian monohybrid cross. F1 is represented only by Purple flowered plants and so it indicates purple is dominant over pink.

3. When a cross was made between a tall pea plant with round seeds and a dwarf plant with wrinkled seeds, the F1 progeny plants are all tall and round seeds. This indicates that tallness and roundness are the dominant traits.

When the F1 plants are self-pollinated, the F2 progeny consists of some tall plants with round seeds and some dwarf plants with wrinkled seeds which are the parental traits. There were also some new combinations like the tall plants with wrinkled seed and dwarf plants with round seeds. Thus it may be concluded that tall and dwarf traits and round and wrinkled seed traits have been inherited independently.

PREVIOUS YEAR BOARD QUESTIONS

1) It is the branch of biology which deals with the study of transmission of characters genetically from one generation to the next.

2) (a) Label 1 sperm (male gamete) and Ovum/egg (female gamete)

Label 2 zygote formed after fusion of gametes XX female and XY male with a probability of 50% in each case.

(b) If a child inherits- X-chromosomes from the father her gender will be female.

3)

	Violet flowers BB	x	white flowers bb
gametes	B		B
b	Bb		Bb
b	Bb		Bb

All the F1 plants will be violet flowered

F1 selfed to get F2

	Violet Bb	x	Violet Bb
gametes	B		b
B	BB		Bb
b	Bb		bb

In F2 generation There will be:

3 Violet flowers: 1 white flower

Percentage of white flowered plant is 25% (1/4)

4)i) Round seed is the dominant trait as it is the only trait expressed in F1 generation and Wrinkle seed is the recessive trait as it is not getting expressed in F1 generation.

ii) Three contrasting characters, other than round seeds of pea plants that Mendel used in his experiments:

Height of the plant-tall and short

Colour of the flower-violet and white

Position of the flower-axial and terminal

5) Dominant genes are the genes that are expressed in offspring whether they are present in a heterozygous form (Tt) or homozygous (TT) form.

For example, in the height of the plant, 'T' denotes tallness and 't' denotes dwarfness of the plant. T is dominant over t in the pea plant.

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