



INDIAN SCHOOL AL WADI AL KABIR



Class: X	DEPARTMENT: SCIENCE 2022 -2023 SUBJECT: BIOLOGY	Date of completion: 24.11.2022
Worksheet No: 6 With Answers	Chapter: HEREDITY AND EVOLUTION	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

MULTIPLE CHOICE QUESTIONS

- The segment of DNA responsible for formation of traits:
(a) nucleotide (b) nucleoside (c) gene (d) chromosome
- The father of genetics is:
(a) Aristotle (b) Darwin (c) Morgan (d) Mendel
- Which among the given ones represent the genetic constitution of a normal sperm cell?
(a) 22A+XX (b) 22A+Y (c) 44AA+X (d) 44AA+Y

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 (a) (b), (c) and (d) as given below:

- (a) Both A and R are true and R is the correct explanation of the Assertion.
(b) Both A and R are true but R is not the correct explanation of the Assertion.
(c) A is true but R is false.
(d) A is false but R is true.
- Assertion: Sex determination in humans is genetical.
Reason: Sex chromosomes are the similar in all human ovum.
- Assertion: Traits are inherited independently.
Reason: Ribosomes are located in DNA.

ONE MARK QUESTIONS

- What is an allele?
- What is a dihybrid cross phenotypic ratio?
- State the interpretation of dihybrid cross.
- What are sex chromosomes?

TWO MARKS QUESTIONS

- What is the significance of a dominant gene?
- What are dominant traits and recessive traits?

12. What is the typical monohybrid and dihybrid phenotypic ratio?

THREE MARKS QUESTIONS

13. Round seeds are dominant over wrinkled seeds. If a cross is carried out between a plant with round seeds and wrinkled seeds. What will be the phenotypes of F1 generation and ratio of round seeded and wrinkled seeded plants in F2?

14. With the help of an example, explain how traits get expressed.

15. Explain the following:

i) Monohybrid cross

ii) Gene

iii) Heredity

FIVE MARKS QUESTIONS

16.i) With the help of a flow chart explain sex determination in humans.

ii) Why is sex determination banned by the Government?

17. A pea plant with violet flowers when crossed with white flowered plant produced all violet coloured flowers in F1 generation. On selfing, the plants produced 150 violet flowered and 50 white 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.

PREVIOUS YEAR BOARD QUESTIONS

18. Name the plant used by Mendel for his experiment. What type of progeny was obtained by Mendel in F1 generation when he crossed tall plant and short plants? (2)

19. Sex determination is also controlled by environmental factors. Is this statement true.

Justify your answer.

20. 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)

21. 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.

i) Identify the dominant and recessive trait. Give reason for your answer.

ii) Also, list any three contrasting characters, other than round seeds of pea plants that round seeds with one having wrinkled seeds. (5)

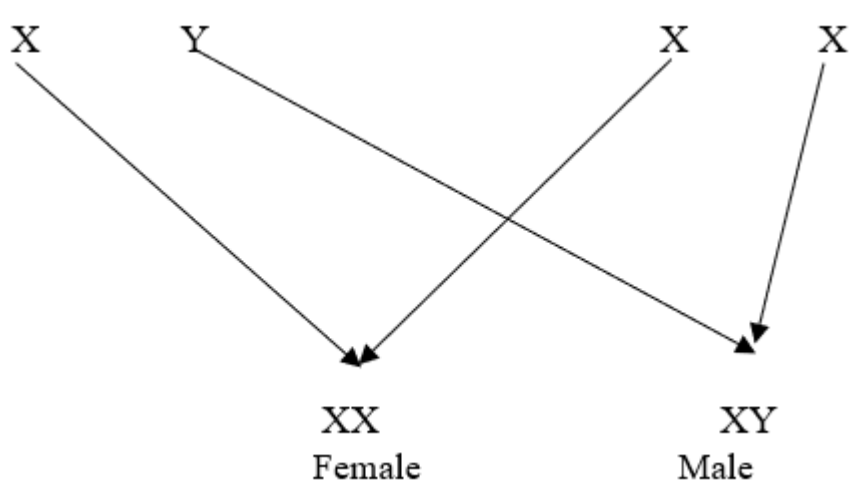
22.(a) "The sex of a new born child is a matter of chance and none of the parents may be considered responsible for it." Justify this statement with the help of a flow chart showing sex-determination in human beings.

(b) Differentiate between dominant trait and recessive trait. (5)

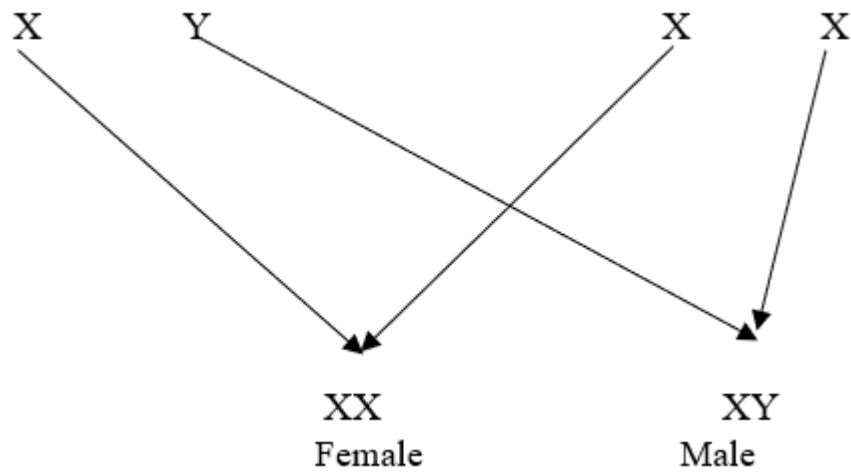
HINTS/SOLUTION

MULTIPLE CHOICE QUESTIONS		
1	(c) gene	1
2	(d) Mendel	1
3	(b) 22A+Y	1
ASSERTION-REASONING QUESTIONS		
4	(b)	1

5	(c)	1																		
	ONE MARK QUESTIONS																			
6	Different forms of a gene are called alleles	1																		
7	9:3:3:1	1																		
8	Dihybrid cross concludes that traits are inherited independently	1																		
9	Sex chromosomes are the chromosomes that determine the sex of the organism	1																		
	TWO MARK QUESTIONS																			
10	A dominant gene is responsible for a dominant trait and it expresses even in a heterozygous condition	2																		
11	Dominant traits are traits which expresses itself in F1 generation after crossing contrasting traits. Recessive traits are traits which are not expressed in F1 generation after crossing contrasting traits.	2																		
12	The typical monohybrid ratio is 3:1 and dihybrid phenotypic ratio is 9:3:3:1.	2																		
	THREE MARK QUESTIONS																			
13	<p>Round seeds are dominant over wrinkled seeds.</p> <p style="text-align: center;"> Round seeded x Wrinkle seeded RR rr </p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Gametes</td> <td style="text-align: center;">R</td> <td style="text-align: center;">R</td> </tr> <tr> <td style="text-align: center;">r</td> <td style="text-align: center;">Rr</td> <td style="text-align: center;">Rr</td> </tr> <tr> <td style="text-align: center;">r</td> <td style="text-align: center;">Rr</td> <td style="text-align: center;">Rr</td> </tr> </table> <p>All F1 are Round seeded</p> <p style="text-align: center;">F1 self-pollinated to get F2</p> <p style="text-align: center;"> Round seeded x Round seeded seeded Rr Rr </p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Gametes</td> <td style="text-align: center;">R</td> <td style="text-align: center;">r</td> </tr> <tr> <td style="text-align: center;">R</td> <td style="text-align: center;">RR</td> <td style="text-align: center;">Rr</td> </tr> <tr> <td style="text-align: center;">r</td> <td style="text-align: center;">Rr</td> <td style="text-align: center;">rr</td> </tr> </table> <p>Ratio of round seeded to wrinkle seeded is: 3:1</p>	Gametes	R	R	r	Rr	Rr	r	Rr	Rr	Gametes	R	r	R	RR	Rr	r	Rr	rr	3
Gametes	R	R																		
r	Rr	Rr																		
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Gametes	R	r																		
R	RR	Rr																		
r	Rr	rr																		
14	<p>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</p> <p>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.</p> <p>In this way, genes control traits in organisms.</p>	3																		

15	i) Monohybrid cross - A cross which involves a single pair of contrasting traits is called a monohybrid cross. ii) Gene - Functional segment of DNA that are responsible for traits. iii) Heredity - The process of transmission of characters from one generation to another	3
FIVE MARKS QUESTIONS		
16	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 XY. In females, the two sex chromosomes are similar and represented as XX. <div style="text-align: center; margin: 10px 0;"> Male: XY Female: XX  </div> <p>In humans, the sex of the child is determined by the type of sperm that fuses with the ovum.</p> 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.	5
17	i) Parental plants are – violet is RR and white is rr. F1 all are heterozygous violet. Rr (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 violet flowered plants and so it indicates violet is dominant over white.	5
PREVIOUS YEARS' BOARD QUESTIONS		
18	The plant used by Mendel for his experiments was garden pea plant (<i>Pisum sativum</i>). All F1 plants were tall (heterozygous tall)	2
19	True. In some reptiles, the temperature at which the fertilised egg is incubated plays a role in determining the sex of the offspring. If the	3

	temperature is high in some lizards the egg hatches out to be a male. This shows that sex can be determined by environmental factors also.																			
20	<p>Violet flowers white flowers</p> <p style="margin-left: 40px;">BB x bb</p> <table border="1" style="margin-left: 40px; margin-bottom: 10px;"> <tr> <td style="padding: 5px;">gametes</td> <td style="padding: 5px;">B</td> <td style="padding: 5px;">b</td> </tr> <tr> <td style="padding: 5px;">b</td> <td style="padding: 5px;">Bb</td> <td style="padding: 5px;">Bb</td> </tr> <tr> <td style="padding: 5px;">b</td> <td style="padding: 5px;">Bb</td> <td style="padding: 5px;">Bb</td> </tr> </table> <p>All the F1 plants will be violet flowered F1 selfed to get F2</p> <p style="margin-left: 40px;">Violet x Violet</p> <p style="margin-left: 40px;">Bb x Bb</p> <table border="1" style="margin-left: 40px; margin-bottom: 10px;"> <tr> <td style="padding: 5px;">gametes</td> <td style="padding: 5px;">B</td> <td style="padding: 5px;">b</td> </tr> <tr> <td style="padding: 5px;">B</td> <td style="padding: 5px;">BB</td> <td style="padding: 5px;">Bb</td> </tr> <tr> <td style="padding: 5px;">b</td> <td style="padding: 5px;">Bb</td> <td style="padding: 5px;">bb</td> </tr> </table> <p>In F2 generation There will be: 3 Violet flowers: 1 white flower Percentage of white flowered plant is 25% (1/4)</p>	gametes	B	b	b	Bb	Bb	b	Bb	Bb	gametes	B	b	B	BB	Bb	b	Bb	bb	3
gametes	B	b																		
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gametes	B	b																		
B	BB	Bb																		
b	Bb	bb																		
21	<p>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.</p> <p>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</p>	5																		
22	<p>(a) 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.</p> <p>In females, the two sex chromosomes are similar and represented as XX. Male: XY Female: XX</p>	5																		



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

(b)

Dominant trait	Recessive trait
Dominant trait is the trait which gets expressed in the F1 generation and more in number in F2 generation.	Recessive trait is the trait which does not get expressed in the F1 generation and are expressed less in number in F2 generation.
Dominant trait is controlled by dominant gene which expresses itself even in the presence of a recessive allele.	Recessive trait is controlled by a recessive gene which fails to express its effect in the presence of a dominant allele.

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