



BIOLOGY

BOOKS - U-LIKE BIOLOGY (HINGLISH)

HEREDITY AND EVOLUTION

NCERT Questions

1. If a trait A exists in 10% of a population of an asexually reproducing species and a trait B

exists in 60% of the same population, which trait is likely to have arisen earlier.



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2. How does the creation of variations in a species promote survival ?



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3. How do Mendel's experiments show that traits may be dominant or recessive ?



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4. How do Mendel's experiments show that traits are inherited independently?



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5. A man with blood group A marries a woman with blood group O and their daughter has blood group O. Is this information enough to

tell you which of the traits - blood group A or O - is dominant. Why or why not ?



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6. How is the sex of the child determined in human beings ?



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7. What are the different ways in which individuals with a particular trait may increase

in a population ?



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8. Why are traits acquired during the life-time of an individual not inherited ?



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9. Why are the small numbers of surviving tigers a cause of worry from the point of view of genetics ?



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10. What factors could lead to the rise of a new species ?



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11. Will geographical isolation be a major factor in the speciation of a self-pollinating plant species? Why or why not ?



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12. Will geographical isolation be a major factor in the speciation of an organism that reproduces asexually. Why or why not ?



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13. Give an example of characteristics being used to determine how close two species are in evolutionary terms.



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14. Can the wing of a butterfly and the wing of a bat be considered homologous organs ?

Why or why not ?



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15. What are fossils ? What do they tell us about the process of evolution ?



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16. Why are human beings who look so different from each other in terms of size, colour and looks said to belong to the same species ?



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17. In evolutionary terms, can we say which among bacteria, spiders, fish and chimpanzees have a "better body design ? Why or why not?



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N C E R T Exercises

1. A Mendelian experiment consisted of breeding tall pea plants bearing violet flowers with short pea plants bearing white flowers. The progeny all bore violet flowers, but almost half of them were short. This suggests that the genetic make-up of the tall parent can be depicted as

A. TTWW

B. TTww

C. Ttww

D. TtWw

Answer: C



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2. An example of homologous organs is

A. our arm and a dog's fore-leg.

B. our teeth and an elephant's tusks.

C. potato and runners of grass.

D. all of the above.

Answer: D



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3. In evolutionary terms, we have more in common with

A. a Chinese school-boy.

B. a chimpanzee.

C. a spider

D. a bacterium.

Answer:



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4. A study found that children with light-coloured eyes are likely to have parents with light coloured eyes. On this basis, can we say anything about whether the light eye colour

trait is dominant or recessive ? Why or why not ?



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5. How are the areas of study - evolution and classification interlinked ?



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6. Explain the terms analogous and homologous organs with examples.



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7. Outline a project which aims to find the dominant coat colour in dogs.



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8. Explain the importance of fossils in deciding evolutionary relationships.



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9. What evidence do we have for the origin of life from inanimate matter ?

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10. Explain how sexual reproduction gives rise to more viable variations than asexual reproduction. How does this affect the evolution of those organisms that reproduce sexually ?

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11. Only variations that confer an advantage to an individual organism will survive in a population. Do you agree with this statement ? Why or why not ?



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12. How is the equal genetic contribution of male and female parents ensured in the progeny ?



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Case Based Source Based Integrated Question

1. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

Creation of diversity over succeeding generations. The original organism at the top will give rise to, say, two individuals, similar in body design, but with subtle differences. Each of them, in turn, will give rise to two individuals in the next generation. Each of the

four individuals in the bottom row will be different from each other. While some of these differences will be unique, others will be inherited from their respective parents, who were different from each other.



What kind of reproduction is shown in the given figure ?



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2. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

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inherited from their respective parents, who were different from each other.



What is the cause of differences in each generation ?



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3. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

Creation of diversity over succeeding

generations. The original organism at the top will give rise to, say, two individuals, similar in body design, but with subtle differences. Each of them, in turn, will give rise to two individuals in the next generation. Each of the four individuals in the bottom row will be different from each other. While some of these differences will be unique, others will be inherited from their respective parents, who were different from each other.



According to you, are there more similarities

or more differences in each generation and between each member ?



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4. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

Creation of diversity over succeeding generations. The original organism at the top will give rise to, say, two individuals, similar in body design, but with subtle differences. Each

of them, in turn, will give rise to two individuals in the next generation. Each of the four individuals in the bottom row will be different from each other. While some of these differences will be unique, others will be inherited from their respective parents, who were different from each other.



Are these differences of any advantage to the individuals/population ?

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5. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

Cellular DNA is the information source for making proteins in the cell. A section of DNA that provides information for one protein is called the gene for that protein. Let us take the example of tallness as a characteristic. We know that plants have hormones that can trigger growth. Plant height can thus depend on the amount of a particular plant hormone. The amount of the plant hormone made will depend on the efficiency of the process for

making it. Consider now an enzyme that is important for this process. If this enzyme works efficiently, a lot of hormone will be made, and the plant will be tall. If the gene for that enzyme has an alteration that makes the enzyme less efficient, the amount of hormone will be less, and the plant will be short. Thus, genes control characteristics or traits.

Based on the given passage, define a gene.



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Based on the information given, is there one or more genes on a chromosome ?



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Discuss the correlation between a gene and its physical expression.



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8. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

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How many genes are present for each character ?



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9. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

Different species use very different strategies for this. Some rely entirely on environmental cues. Thus, in some animals like a few reptiles, the temperature at which fertilised eggs are kept determines whether the animals developing in the eggs will be male or female. In other animals, such as snails, individuals can change sex, indicating that sex is not genetically determined. However, in human

beings, the sex of the individual is largely genetically determined. In other words, the genes inherited from our parents decide whether we will be boys or girls. But so far, we have assumed that similar gene sets are inherited from both parents.

Sexual reproduction involves participation of individuals of two sexes ? Explain.



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10. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

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beings, the sex of the individual is largely genetically determined. In other words, the genes inherited from our parents decide whether we will be boys or girls. But so far, we have assumed that similar gene sets are inherited from both parents.

How is the sex of a newborn individual determined in garden lizard ?



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beings, the sex of the individual is largely genetically determined. In other words, the genes inherited from our parents decide whether we will be boys or girls. But so far, we have assumed that similar gene sets are inherited from both parents.

Do snails also have two morphologically different individuals representing two sexes?



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12. Answer question numbers (a) - (d) on the basis of your understanding of the following paragraph and the related studied concepts :

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beings, the sex of the individual is largely genetically determined. In other words, the genes inherited from our parents decide whether we will be boys or girls. But so far, we have assumed that similar gene sets are inherited from both parents.

How is sex determined in human beings ?



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Multiple Choice Questions

1. Which of the following statement is incorrect ?

A. For every molecule of fat there is a gene.

B. For production of every enzyme there is a gene.

C. For every protein there is a gene.

D. For insulin hormone there is a gene.

Answer: A



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2. Genetic material is exchanged during

A. budding

B. sexual reproduction.

C. asexual reproduction

D. mitosis

Answer: B



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3. One tall pea plant and one dwarf pea plant on crossing resulted in 50% tall and 50% dwarf pea plant. The plants which were crossed were

A. $Tt \times Tt$

B. $T \times$

C. $Tt \times$

D. None of the above.

Answer: C



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4. A cross between a tall plant (TT) and short pea plant (tt) resulted in progeny that were all tall plants because

A. shortness is the dominant trait.

B. tallness is the recessive trait.

C. shortness is the recessive trait.

D. height of pea plant is not governed by fact T and t.

Answer: C



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5. If yellow seeded wrinkled pea plant (YYrr) is crossed with green seeded round pea plant (yyRR), the seeds produced in F_1 generation are

A. yellow and round.

B. green and round.

C. wrinkled and green

D. wrinkled and yellow.

Answer: A



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6. A zygote which has an X chromosome inherited from the father will develop into a

A. male

B. female

C. either male or female.

D. X chromosome does not determine sex of a child.

Answer: B



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7. In human males all the chromosomes are paired perfectly except

(i) 21 st chromosome. (ii) Y chromosome.

(iii) small chromosome. (iv) X chromosome.

A. (i) and (ii)

B. (i) and (iii)

C. (iii) and (iv)

D. (ii) and (iv)

Answer: D



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8. Sex of a child is determined by

A. diet of mother.

B. cytoplasm of egg.

C. type of sperm fertilising the egg

D. health of mother.

Answer: C



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9. The maleness of a child is determined by

A. the Y chromosome.

B. the X chromosome.

C. the cytoplasm of germ cell.

D. sex is determined by chance.

Answer: A



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10. Select the incorrect statement.

A. Lean and thin parents may have fat progeny.

B. Traits which are not inherited over generations do not cause evolution.

C. Frequency of certain genes in a population changes after several generations.

D. Reduction in weight of the organism due to starvation is genetically controlled.

Answer: D



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11. New species may be formed if

(i) mating does not take place.

(ii) DNA undergoes significant changes in germ cells.

(iii) there is no change in genetic material.

(iv) chromosome number changes in gametes.

A. (i) and (iv)

B. (ii) and (iv)

C. (ii) and (iii)

D. (i) and (iii)

Answer: B



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12. The earlobe variants found in human population are

(i) free. (ii) curved (iii) round. (iv) attached.

A. (i) and (ii)

B. (iii) and (iv)

C. (ii) and (iv)

D. (i) and (iv)

Answer: D



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13. Two pea plants one with round green seeds ($RRyy$) and another with wrinkled yellow ($rrYY$) seeds produce F1 progeny that have round yellow ($RrYy$) seeds. When F1 plants are selfed, the F2 progeny will have new combination of characters. Choose the new combination from the following:

(i) Round, yellow (ii) Round, green

(iii) Wrinkled, yellow (iv) Wrinkled, green

A. (i), (ii) and (iii)

B. (i), (ii) and (iv)

C. (i), (iii) and (iv)

D. (i), (ii), (iii) and (iv)

Answer: D



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14. How many number of pairs of sex chromosome are present in human zygote?

A. Four

B. Three

C. One

D. Two

Answer: C



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15. A tall pea plant (Tt) is crossed with a dwarf pea plant (tt). What will be the ratio of tall and dwarf plant in the progeny ?

A. 1 : 3

B. 3 : 1

C. 2 : 2

D. 2 : 1

Answer: C



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16. Select the statements that describe characteristics of genes.

(i) Each chromosome has only one gene

(ii) Genes are located on a particular chromosome.

(iii) Genes are specific sequence of DNA.

(iv) Genes do not code for proteins.

A. (i) and (ii)

B. (i) and (iii)

C. (ii) and (iii)

D. (i) and (iv)

Answer: C



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17. From the list given below, select the characters which can be acquired but not inherited?

- A. Colour of skin
- B. Colour of eye
- C. Nature of hair
- D. Weight of body

Answer: D



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18. The two versions of a trait (character) which are brought together in zygote by male and female gametes are located on

- A. different chromosomes.
- B. copies of same chromosome.
- C. any chromosome.
- D. sex chromosomes.

Answer: B



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19. Which of the following statements are correct ?

(i) Dominant trait are expressed in both homozygous and heterozygous conditions.

(ii) Dominant traits cannot be expressed in heterozygous condition.

(iii) Recessive traits are always expressed in heterozygous condition.

(iv) Recessive traits are only expressed in homozygous condition.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iv)

D. (ii) and (iv)

Answer: C



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20. The genotype of green stemmed tomato plant is denoted by GG and that of purple stemmed tomato plant as gg. Hybrids of a cross between these two were selfed to obtain F₂ progeny, what will be the ratio of GG, Gg and gg in this progeny ?

A. GG² : Gg¹ : gg¹

B. GG³ : Gg¹ : gg⁰

C. GG¹ : Gg¹ : gg²

D. GG¹ : Gg² : gg¹

Answer: D



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21. On chromosomes certain bead like structure are arranged in a linear order these are

- A. Ribosomes
- B. Centromeres
- C. Centrioles
- D. Genes

Answer: D



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22. The chromosomal set up of a human female can be represented as

A. 44 - XX

B. 44 - XY

C. 22 - XX

D. 22 - XY

Answer: A



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23. The chromosomal set up in a human sperm can be represented as

A. 22 - XY

B. 22 - XX

C. 22 - X

D. 22 - X or 22 - Y

Answer: D



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24. Genetics is the study of

- A. heridity and variation.
- B. heridity and environment.
- C. differences among individuals.
- D. none of the above.

Answer: A



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True Or False

1. Each inherited trait is influenced by maternal DNA only.



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2. According to Mendel, the trait expressed in F1 is dominant.



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3. Each cell has a copy of each chromosome, from any one parent.



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4. In human beings, males produce similar gametes whereas females produce two types of gametes.



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5. Changes in non-reproductive tissues can be passed on to its progeny.



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Fill In The Blanks

1. _____ characters do not produce a change in genes of germ cells and thus are not inherited.



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2. Sex determination in certain animals can also be due to _____



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3. Cellular DNA is the information source for making _____ in the cell.



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Assertion Reason Questions

1. Assertion (A) : In individuals of a given species, a specific gene is located on a particular chromosome.

Reason (R) : A gene does not code for a protein.

A. Both (A) and (R) are true and (R) is 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.

Answer: C



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2. Assertion (A) : In human beings, the statistical probability of getting either a male or a female child is 50 : 50.

Reason (R) : The gametes of the male parents are of two types, and decide the sex of the child.

- A. Both (A) and (R) are true and (R) is 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.

Answer: A



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3. Assertion (A): Variation is minimum in asexual reproduction.

Reason (R) : All variations in a species have equal chance of survival.

A. Both (A) and (R) are true and (R) is 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.

Answer: C



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Very Short Answer Questions

1. What is the effect of DNA copying which is not perfectly accurate on the reproduction process ?



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2. Define heredity.



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3. Define mutation.



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4. Write the sex of the baby that inherits Y chromosome from the father.



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5. Give common and scientific names of the plant on which Mendel experimented.



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6. Give an example where sex determination is regulated by environmental factors.



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7. What is the phenotypic ratio of a dihybrid cross in F₂ generation.



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8. In human beings there are only 23 pairs of chromosomes but there are unlimited characteristic features. Justify.



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9. Mendel took tall pea plants and short pea plants and produced F1 progeny through crossfertilisation. What did Mendel observe in the F1 progeny



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Short Answer Questions

1. How did Mendel explain that it is possible that a trait is inherited but not expressed in

an organism ?



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2. Name the organism Mendel used for his experiment. Explain about F1 and F2 progeny obtained by Mendel when he bred the tall and the short varieties of the organism he experimented with.



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3. Write the full form of DNA. Name the part of the cell where it is located. Explain its role in the process of reproduction of the cell.



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4. How can we say that change in genes can be brought about by change in DNA ?



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5. In the following crosses, write the characteristics of the progeny :

$RrYy \times RrYy$



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6. In the following crosses, write the characteristics of the progeny :

$rryy \times rryy$



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7. In the following crosses, write the characteristics of the progeny :

RRYY × rryy



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8. Mention the factor which is mainly responsible for inherited traits. State the two outcomes of Mendel's experiments.



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9. How do Mendel's experiments show that traits are inherited independently ? Depict with the help of a cross.



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10. In a monohybrid cross pink coloured flowers are dominant over white coloured flowers. If parents belong to pure breeding dominant trait and pure breeding recessive trait, what will be the phenotype or morphological feature of F1 generation ? If F1

plants are self-pollinated, what would be the phenotypic ratio, or how many dominant and recessive traits will be produced in the progeny? Explain with illustration.



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11. Study the given data and answer the questions that follow:



What is the term given to this type of cross ?



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12. Study the given data and answer the questions that follow:



What does the data in column 2 indicate ?



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13. In fruit flies the sex chromosomes in males are XY and in females are XX.

Does a male fly inherit X chromosome from his mother or father ?



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14. In fruit flies the sex chromosomes in males are XY and in females are XX.

How many types of gametes can a female fly produce ?



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15. In fruit flies the sex chromosomes in males are XY and in females are XX.

How many types of gametes can a male fly produce?



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16. Explain the method of sex determination in humans.



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17. "Only father is responsible for the sex of a new born child." Explain with the help of a

neat illustration.



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18. "It is a matter of chance whether a couple will give birth to a boy or a girl" Justify the statement and support your answer with a neat illustration.



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19. The genotype of a round seeded pea plant is denoted as RR and that of wrinkled seeded plants as rr. When cross between them occurs: What will be the phenotype expected in F1 generation ?



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20. The genotype of a round seeded pea plant is denoted as RR and that of wrinkled seeded plants as rr. When cross between them occurs:

Give the % age of wrinkled seeded plants if F1 plants are self-pollinated.



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21. The genotype of a round seeded pea plant is denoted as RR and that of wrinkled seeded plants as rr. When cross between them occurs: In which ratio do you find RR, Rr and rr in F2 progeny ?



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22. The gene for blue eyes (b) is recessive to gene for brown eyes (B). The given figure shows both brown and blue eyes.



Write the symbol of the mother (genotype).



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23. The gene for blue eyes (b) is recessive to gene for brown eyes (B). The given figure shows both brown and blue eyes.



What is the genotype of grandmother and grandfather ?



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24. The gene for blue eyes (b) is recessive to gene for brown eyes (B). The given figure shows both brown and blue eyes.



What is the percentage of individuals with brown and blue eyes respectively ?



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25. In a monohybrid cross between tall pea plants denoted by TT and short pea plants denoted by tt , Preeti obtained only tall plants denoted by Tt in the F_1 generation. However, in F_2 generation she obtained both tall and short plants. Using the above information explain the law of dominance.



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26. Mention the information source of making proteins in the cell. What is the basic event in reproduction ?



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Long Answer Questions

1. Green and red colour of seeds are recessive and dominant traits respectively. Out of F1 and F2, in which generation will the green seed

appear, if both parents are not hybrid. Explain giving reason.



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2. Dead remains of two species A and B were buried. Later only A's body was found to be a fossil but not B's. Give reason to explain it.



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3. Species A shares ten characteristics with B species, species C shares fifteen characteristics with D. Which of the two pairs share closer relation ?



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4. After the death of two insects, one of the insects was buried in hot mud and the other in usually found mud. Which of the two is more likely to be preserved better and why ?





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5. Define the gene of a particular protein.



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6. How may speciation take place ?



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7. The gene for red hair is recessive to the gene for black hair. What will be the hair colour of a person if he inherits a gene for red hair from his mother and a gene for black hair from his father ? Form the flow chart of this cross.



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8. Mendel crossed a pea plant having inflated green pod with a constricted yellow pod.

What type of a cross is it ?



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9. Mendel crossed a pea plant having inflated green pod with a constricted yellow pod.

What type of plants are obtained in F1 ?



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10. Mendel crossed a pea plant having inflated green pod with a constricted yellow pod.

In F₂ generation the phenotype ratio is 9 : 3 : 3 : 1. State the rule for the inheritance of traits observed by Mendel.



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11. Why do we say that homozygous plants produce pure progeny ?



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12. Define heterozygous.



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13. Explain how the process of speciation takes place.



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14. "A trait may be inherited, but may not be expressed." Justify this statement with the help of suitable example.



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15. What are Chromosomes ? Explain how in sexually reproducing organisms the number of chromosomes in the progeny is maintained.



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16. If we cross-bred tall (dominant) pea plant with pure-bred dwarf (recessive) pea plant, we will get plants of F1 generation. If we now self-cross the pea plant of F1 generation, we

obtain pea plants of F2 generation.

What do the plants of F1 generation look like ?



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State the ratio of tall plants to dwarf plants in F2 generation.



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18. If we cross-bred tall (dominant) pea plant with pure-bred dwarf (recessive) pea plant, we will get plants of F1 generation. If we now self-cross the pea plant of F1 generation, we obtain pea plants of F2 generation.

State the type of plants not found in F1 generation but appeared in F2 generation.

Write the reason for the same.



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