

CLASS X HEREDITY

MCQs

1. Humans have two different sex chromosomes, X and Y. Based on Mendel's laws, a male offspring will inherit which combination of chromosomes?
- (a) Both the X chromosomes from one of its parents
 - (b) Both the Y chromosomes from one of its parents
 - (c) A combination of X chromosomes from either of its parents
 - (d) A combination of X and Y chromosomes from either of its parents

Q2. Two pea plants, one with round green seeds (RR yy) and another with wrinkled yellow (rrYY) seeds, produce F₁ progeny that have round yellow (RrYy) seeds. When F₁ plants are self-pollinated, the F₂ progeny will have a new combination of characters.

Choose the new combinations from the following:

- (i) Round, yellow.
 - (ii) Round, green
 - (iii) Wrinkled, yellow.
 - (iv) Wrinkled, green
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- (a) (i) and (ii).
 - (b) (i) and (iv)
 - (c) (ii) and (iii).
 - (d) (i) and (iii)

3. Recessive genes can be expressed only in

- (a) homozygous condition
- (b) heterozygous condition
- (C) Both of the above conditions
- (d) None of the above conditions

4. Which part of the DNA provides information for a protein?

- (a) Chromosome
- (b) Mitochondria
- (C) RNA
- (d) Gene

5. Which chromosomes do not play any role in the determination of the sex of an individual?

- (a) Autosomes
- (b) Metacentric chromosomes
- (C) Acrocentric chromosomes
- (d) None of the above

Answer 1. (d). 2. (b). 3. A. 4. D. 5. A

6. When a new plant is formed as a result of cross-pollination from different varieties of a plant, the newly formed plant is called:

- (a) Dominant plant. (b) Mutant plant
- (C) Hybrid plant. (d) All of these

7. Germinal variations are those variations which

- (a) are inheritable
- (b) affect only somatic cells
- (C) are not inheritable
- (d) None of the above

Question 8. Which of the following can be inherited from parents to offspring?

- (a) Swimming technique. (b) Big nose
- (C) Sculpted body. (d) All of the above

Question.9. The genotype of the offspring formed from the cross depicted as $Tt \times tt$ will be

- (a) TT and tt . (b) Tt and tt
- (C) Only tt . (d) Only TT

Question 10. In humans, the sex Chromosomes comprises one pair of the total of 23 pairs of chromosomes. The other 22 pairs of chromosome are called:

- (a) autosome. (b) chromosomes
- (C) meiosis. (d) all of these

Question 11. The genotype of the offspring formed from the cross depicted as $Tt \times tt$ will be

- (a) TT and tt . (b) Tt and tt
- (C) Only tt . (d) Only TT

Question. 12. In humans, the sex Chromosomes comprises one pair of the total of 23 pairs of chromosomes. The other 22 pairs of chromosome are called:

- (a) autosomes. (b) chromosomes
- (c) meiosis. (d) all of these

Question 13. What, according to Mendel, was responsible for the inheritance of specific traits?

- (a) Genes. (b) Factors. (C) Chromosomes. (d) DNA

Question.14. The maleness of a child is determined by

- (a) the X-chromosome in the zygote.
- (b) the Y-chromosome in zygote.
- (c) the cytoplasm of germ cell which determines the sex.
- (d) sex is determined by chance.

6. A. 7: A. 8 : B. 9 : B. 10 - A. 11: B. 12. A. 13. B. 14. b

Question. 15. A pea plant with round and green seeds (RRyy) is crossed with another pea plant with wrinkled and yellow seeds (rrYY). What would be the nature of seeds in the first generation (F1 generation).

- (a) Round green. (b) Wrinkled green
- (c) Wrinkled yellow. (d) Round yellow

Question.16. When a gene exists in more than one form, the different forms are terms as

- (a) alleles. (b) heterozygotes
- (c) genotypes. (d) homozygotes

Question.17. There is an inbuilt tendency of variation during reproduction because of-

- (i) Errors in DNA copying
- (ii) Sexual reproduction

- (a) only (i) (b) only (ii)
- (c) both (i) and (ii). (d) none of them

Question.18. When a cross is made between two parents with respect to a single character, it is called a

- (a) dihybrid cross. (b) monohybrid cross
- (b) trihybrid cross. (d) None of these

Question.19. The sex of the child depends on the chromosomes present in the

- (a) egg of the female
- (b) sperm of the male
- (c) Both (a) and (b)
- (d) None of these

Question.20. A cross between a tall plant (TT) and short pea plant (tt) resulted in progeny that were all tall plants because:

- (a) tallness is the dominant trait.
- (b) shortness is the dominant trait.
- (b) tallness is the recessive trait.
- (d) height of pea plant is not governed by gene 'T' or 't'.

14: B. 15. D. 16. A. 17. B. 18. B. 19. B. 20. : A

Question.21. Which of the following can be called a characteristic?

- (a) Plants can photosynthesise
- (b) We have 2 eyes
- (c) Mango tree is multicellular
- (d) All of these

Question 22. A man with blood group A marries a woman having blood group O. What will be the blood group of the child?

- (a) O only. (b) A only. (c) AB
- (d) Equal chance of acquiring blood group A or blood group O.

Question.23. The number of pairs of sex chromosomes in the zygote of humans is:

- (a) 1. (b) 2. (b) 3. (d) 4

Question.24. In humans, sex determination is controlled by

- (a) allosomes. (b) autosomes
- (b) temperature. (d) All of the above

Question.26. 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

21. D. : 22. D. 23. A. 24: A. 26. C

Assertion/Reason

27. 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.

- (a) If both assertion and reason are true and reason is the correct explanation of assertion.
- (b) If both assertion and reason are true, but reason is not the correct explanation of assertion.
- (c) If assertion is true, but reason is false.
- (d) If assertion is false, but reason is true.

28. Assertion: Mendel was successful in his hybridisation experiments.

Reason: Garden pea proved as an ideal experimental material.

- (a) If both assertion and reason are true and reason is the correct explanation of assertion.
- (b) If both assertion and reason are true, but reason is not the correct explanation of assertion.
- (c) If assertion is true, but reason is false.
- (d) If assertion is false, but reason is true.

29. . Assertion: The sex of the children will be determined by chromosome received from the father.

Reason: A human male has one X and one Y chromosome.

- (a) If both assertion and reason are true and reason is the correct explanation of assertion.
- (b) If both assertion and reason are true, but reason is not the correct explanation of assertion.
- (c) If assertion is true, but reason is false.
- (d) If assertion is false, but reason is true.

27. B. 28. A. 29. . A

Cased Based Questions:

Read the passage carefully and answer the following questions from Inheritance is the acquiring of genetic characteristics or traits from parents by their offspring. In humans, both parents equally contribute to the inheritance of traits. In 1860, Gregor Mendel studied the rules of inheritance of traits. He conducted an experiment on pea plants for the same. He cultivated pea plants and observed their pattern of inheritance from one generation to the next generation. This observation resulted in the discovery of three laws of inheritance, famously known as Mendel's laws of Inheritance.

Question. The two versions of a trait which are brought in by the male and female gametes are situated on:

- (a) copies of the same chromosome.
- (b) two different chromosomes.
- (c) sex chromosomes.
- (d) any chromosomes.

Answer: A

(Alleles are specifically located on copies of the same chromosome, not on two different chromosomes.)

Question. If a round, green seeded pea plant (RRyy) is crossed with wrinkled, yellow seeded pea plant (rrYY), the seeds produced in F1 generation are:

- (a) round and yellow.
- (b) round and green
- (c) wrinkled and green.
- (d) wrinkled and yellow

Answer: A

Question. ____ is the observable set of characteristics of an organism

- (a) Phenotype.
- (b) Genes
- (c) DNA.
- (d) All of these

Answer: A

Question. Select the statements that describe characteristics of genes:

- (A) Genes are specific sequence of bases in a DNA molecule.
- (B) A gene does not code for proteins.
- (C) In individuals of a given species, a specific gene is located on a particular chromosome.
- (D) Each chromosome has only one gene.

- (a) (A), (B).
- (b) (A), (C)
- (c) (A), (D).
- (d) (B), (D)

Answer: B

Questions Answers

Questions. Study the given data and answer the questions following the data:

Parental plants cross fertilised and seeds collected	F1 First Generation offsprings	F2 Offsprings of self pollination of F1
Male parents always bare red flowers. Female parent always had white flowers.	330 seeds sown and observed. All 330 gave red flowers.	Out of 44 seeds 33 seeds gave plants with red flowers and 11 seeds gave plants with white flowers.

- What is the term for this type of cross?
- What does the data of the column marked F1 indicate?
- Express the gene type of the (a) parents (b) F1 progeny and (c) F2 progeny

Answer:

- Monohybrid cross
- Red colour of flower dominant over white flower
- Parents (RR) and (rr)
 - F1 progeny - Rr
 - F2 progeny - RR, Rr and rr

Question. (i) Will all organisms from a cross between two homozygous dominant organisms would have the same phenotype?

(ii) What proportion of offspring from BB x Bb would be BB?

(iii) What proportion of offspring from Cc x Cc would be cc?

(iv) What proportion of offspring from tt x Tt would be tt?

(v) What proportion of offspring from two homozygous recessive organisms would be homozygous recessive?

Answer: (i) True, all organisms from a cross between two homologous dominant organisms would have the same phenotype which would be homozygous dominant.

(ii) 50% of offspring would be BB (homozygous dominant) and the other 50% would be Bb (heterozygous).

(iii) One in four (25%) of offspring would be cc (homozygous recessive). Another 25% would be CC (homozygous dominant) and the final 50% would be Cc (heterozygous).

(iv) 50% of offspring would be tt (homozygous recessive) and the other 50% would be Tt (heterozygous).

(v) All offspring (100%) would be homozygous recessive. Without a dominant gene or genes offspring cannot result in heterozygous or homozygous dominant.

Question. If the sperm bearing Y-chromosome fertilizes the egg, the child born will not be entirely like his father. Why is it so?

Answer: It is so because the other sex chromosome, ie the X-chromosome will also have its effects and other autosomes of the egg will also show their characteristics.

Question. A normal pea plant bearing colored flowers suddenly start producing white flowers. What could be the possible cause?

Answer: The appearance of white flowers is due to mutation.

Question. What will be the percentage of ab gametes produced by Aa x Bb parent?

Answer: 25 percent

Question. Mendel crossed a pure white recessive pea plant with a dominant pure red flowered plant. What will be the first generation of hybrids?

Answer: All red

Question. What are the causes of variations in clones?

Answer: i. inaccuracies during DNA copying
ii. Effect of environment termed acquired variation.
iii. Mutations are sudden stable changes which are discontinuous inheritable as produced due to changes in genetic make-up.

Question. 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?

Answer: No, this information is not enough to find out which blood group is dominant. Blood group A can be represented as IAIA or IAIO which is the father's blood group. Blood group O is represented as IOIO which is the mother's blood group. The blood group of daughter is also O which might be inherited from her mother or father so it is difficult to assume which blood group is dominant.

