SCIENCE
WORKSHEET_180825
CHAPTER 08 HEREDITY

SUBJECT: SCIENCE **MAX. MARKS : 40**

CLASS : X **DURATION : 1½ hrs**

General Instructions:

(i). **All** questions are compulsory.

(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.

(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.

(iv). There is no overall choice.

(v). Use of Calculators is not permitted

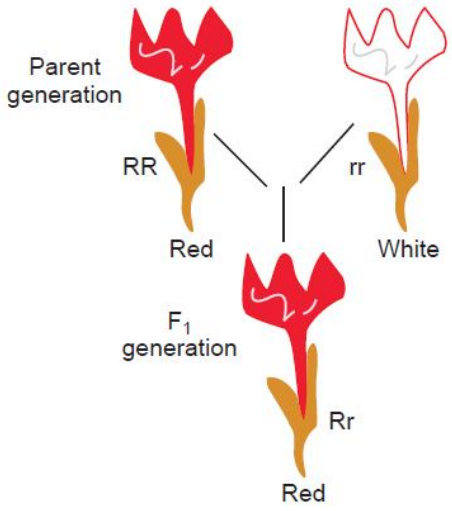
SECTION – A

Questions 1 to 10 carry 1 mark each.

1. In peas, a pure tall plant (TT) is crossed with a pure short plant (tt). The ratio of pure tall plants to pure short plants in F_2 generation will be:

(a) 1 : 3 (b) 3 : 1 (c) 1 : 1 (d) 2 : 1

2. The inheritance of colour trait in flower is shown below:



R and r denote two different genes for colour.

Which law of Mendel can be explained using the image?

(a) Only law of segregation

(b) Only Law of independent assortment

(c) Law of segregation and Law of dominance

(d) Law of segregation and Law of independent assortment

3. If a round, green-seeded pea plant (RRyy) is crossed with wrinkled, yellow–seeded pea plant (rrYY), the seeds produced in F_1 generation are:

(a) round and yellow (b) round and green

(c) wrinkled and green (d) wrinkled and yellow.

4. In human beings, the sex of the offspring in the zygote after fertilisation of the male and female gametes is determined by the sex chromosomes. A zygote which has an X chromosome inherited from the father will develop into a:

(a) boy (b) girl

(c) X chromosome does not determine the sex of a child (d) either boy or girl.

5. The statement that correctly describes the characteristic(s) of a gene is:
(a) In individuals of a given species, a specific gene is located on a particular chromosome.
(b) A gene is not the information source for making proteins in the cell.
(c) Each chromosome has only one gene located all along its length.
(d) All the inherited traits in human beings are not controlled by genes.

6. Consider the following statements:
(i) The sex of a child is determined by what it inherits from the mother.
(ii) The sex of a child is determined by what it inherits from the father.
(iii) The probability of having a male child is more than that of a female child.
(iv) The sex of a child is determined at the time of fertilisation when male and female gametes fuse to form a zygote.
The correct statements are:
(a) (i) and (iii) (b) (ii) and (iv) (c) (iii) and (iv) (d) (i), (iii) and (iv)

7. Which of the following cannot be an outcome of Mendel's experiment on crossing a tall pea plant with a short pea plant?
(a) 3 tall and 1 short plant (b) 4 tall plants and 1 medium height plant.
(c) 24 tall and 8 short plants (d) 9 tall and 3 short plants

8. A homozygous dominant guinea pig with black fur is crossed with a homozygous guinea pig with white fur. The F_1 generation is crossed with itself.
What percentage of F_2 generation is expected to show white fur coat?
(a) 25% (b) 50% (c) 75% (d) 100%

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** The sex of a child in human beings will be determined by the type of chromosome he/she inherits from the father.
Reason (R): A child who inherits the 'X' chromosome from his father would be a girl (XX), while a child who inherits a 'Y' chromosome from the father would be a boy (XY).

10. **Assertion (A):** Variations always provide a survival advantage to an organism.
Reason (R): Variations can be caused due to incorrect DNA copying.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. If a pure tall pea plant is crossed with a pure dwarf pea plant, then in F1 generation only tall plants appear. What happens to the traits of the dwarf plant?

12. In a pea plant, the trait of flowers bearing violet colour (PP) is dominant over white colour (pp). Explain the inheritance pattern of F_1 and F_2 generations with the help of a cross following the rules of inheritance of traits. State the visible characters of F_1 and F_2 progenies.

13. What is DNA? Where is DNA found in a cell?

14. In an asexually reproducing species, if a trait X exists in 5% of a population and trait Y exists in 70% of the same population, which of the two trait is likely to have arisen earlier? Give reason.

OR

Mustard was growing in two fields- A and B. While Field A produced brown coloured seeds, field B produced yellow coloured seeds.
It was observed that in field A, the offsprings showed only the parental trait for consecutive generations, whereas in field B, majority of the offsprings showed a variation in the progeny.
What are the probable reasons for these ?

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. In humans, there is a 50% probability of the birth of a boy and 50 % probability that a girl will be born. Justify the statement on the basis of the mechanism of sex-determination in human beings.

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

17. What is the probability of a girl or a boy being born in a family? Justify your answer.

OR

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

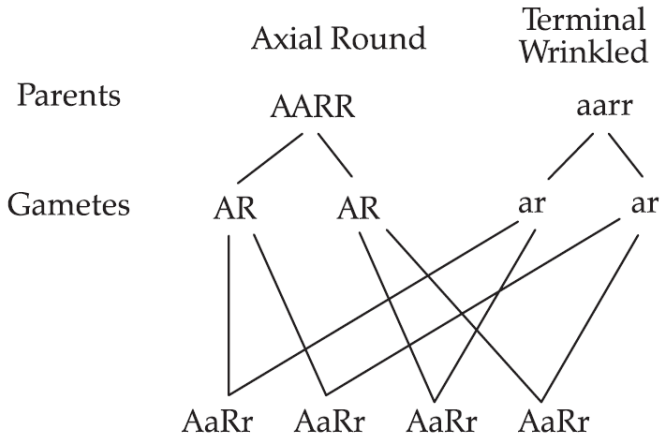
SECTION – D

Questions 18 carry 5 marks.

18. (a) Why did Mendel choose garden pea for his experiments? Write two reasons.
(b) List two contrasting visible characters of garden pea, Mendel used for his experiment.
(c) Explain in brief how Mendel interpreted his results to show that the traits may be dominant or recessive.

OR

Given below is a schematic diagram showing Mendel's experiment on sweet pea plants having axial flowers with round seeds (AARR) and terminal flowers with wrinkled seeds (aarr). Study the same and answer the questions that follows:



(i) Give the phenotype of F_1 progeny.
(ii) Give the phenotype of F_2 progeny produced upon by the self-pollination of F_1 progeny.
(iii) Give the phenotypic ratio of F_2 progeny.
(iv) Name and explain the law introduced by Mendel on the basis of the above observation.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Mendel worked out the rules of heredity by working on garden pea using a number of visible contrasting characters. He conducted several experiments by making a cross with one or two pairs of contrasting characters of pea plant. On the basis of his observations, he gave some interpretations which helped to study the mechanism of inheritance.

Read the above passage carefully and give the answer of the following questions:

(a) When Mendel crossed pea plants with pure tall and pure short characteristics to produce F_1 progeny, which two observations were made by him in F1 plants?

(b) Write one difference between dominant and recessive trait.

(c) (i) In a cross with two pairs of contrasting characters.

RRYY × rryy

(Round Yellow) (Wrinkled Green)

Mendel observed 4 types of combinations in F2 generation. By which method did he obtain F_2 generation? Write the ratio of the parental combinations obtained and what conclusions were drawn from this experiment.

OR

(ii) Justify the statement: ‘‘It is possible that a trait is inherited but may not be expressed.’’

20. Sahil performed an experiment to study the inheritance pattern of genes. He crossed tall pea plants (T T) with short pea plants (tt) and obtained all tall plants in F_1 generation.

Read the above passage carefully and give the answer of the following questions:

(a) What will be set of genes present in the F_1 generation?

(b) Give reason why only tall plants are observed in F1 progeny.

(c) When F_1 plants were self-pollinated, a total of 800 plants were produced. How many of these would be tall, medium height or short plant? Give the genotype of F_2 generation.

OR

When F_1 plants were cross-pollinated with plants having tt genes, a total of 800 plants were produced. How many of these would be tall, medium height or short plants? Give the genotype of F_2 generation.