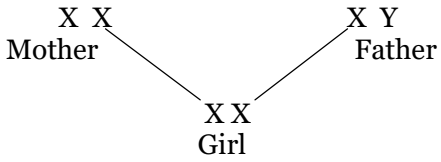
Heredity and Evolution

70. A normal baby girl receives her X chromosome form who: mother, father, both mother and father, or either from mother or father?

2014/2015 [1 Mark]

From both mother and father.



71. What indication do we get by the reappearance of dwarf plant in F_2 generation?

2012/2014/2015 [1 Mark]

After obtaining progeny in F_2 generation in a dihybrid cross, Mendel concluded that when two pairs of traits are combined in a hybrid, one pair of character segregates independently of the other pair of character.

72. Mendel observed a contrasting trait in relation to position of flowers. Mention that trait.

2014/2015 [1 Mark]

Terminal and Axial
↓ ↓
Recessive Dominant

73. It was observed that in a family, a woman has only daughters. Analyse on the basis of genetics and give an explanation.

[3 Marks]

It was a matter of chance only that a woman has only daughters. In fact at the time of reproduction, the sex of future progeny is determined by the chromosome inherited from the male parent (father). If it is X chromosome each time from the male parent then the sex of the child will be female.

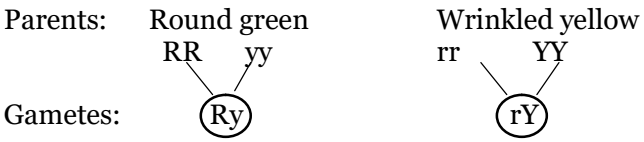
74. How do Mendel's experiments show that traits are inherited independently? Depict with the help of a cross.

2011/2012 [3 Marks]

When a pea plant with round green seeds was crossed with a pea plant with wrinkled yellow seeds, the F_1 progeny were all plants with round, yellow seeds. It means that round and yellow seeds are dominant traits while wrinkle and green seeds are recessive traits.

When the F_1 plants were self-pollinated, there were four types of plants obtained in the F_2 generation.

(i) Round yellow seeds (ii) Round green seeds
(iii) Wrinkled yellow seeds (iv) Wrinkled green seeds



F_1progeny : RrYy (Round, yellow)
Selfing : RrYy × RrYy
F_2 progeny : RRYY, RRyy, rrYY, rryy

$F_2 \rightarrow$	Round yellow	-	9
	Round green	-	3
	Wrinkled yellow	-	3
	Wrinkled green	-	1

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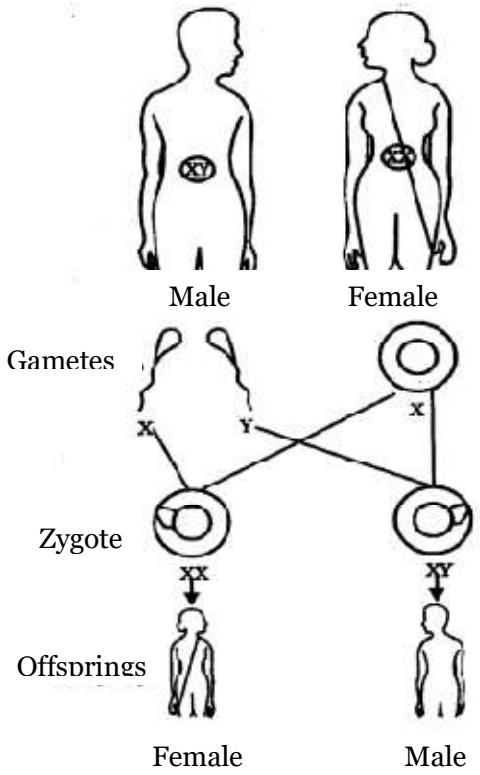
75. "It is a matter of chance whether a couple will give birth to a boy or a girl." Justify this statement and support your answer with a neat illustration.
2012/2015 [3 Marks]

⇒ Male possess XY combination of sex chromosomes while females have one pair of X chromosome (XX) as sex chromosomes. The male gamete (sperms) can have their gamete (egg) only contains X chromosome.
⇒ When a sperm carrying X-chromosome fertilizes an egg, the zygote (XX) will develop as a girl.
⇒ When a sperm carrying Y-chromosome fertilizes an egg, the zygote (XY) will develop as a boy.
Thus, it is only the father or male who is responsible for the sex of a new born child.



Sex determination in human beings.

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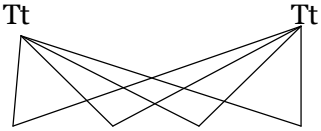
76. (a) When a pesticide is sprayed on a population of insects, all insects do not get killed but few of them survive. Give reason.
(b) When is a recessive trait capable of expressing itself? Write its expression with respect to height of plant (genotype).
2014/2015 [5 Marks]

(a) The insects, who survive, have developed the resistance against the pesticide by generating variations in their DNA in comparison to the other insects. The insects which did not have variation in their DNA, and so could not develop resistance against the pesticide, got killed.
(b) A recessive trait is capable of expressing itself only when it is in homozygous recessive state *i.e.*,both the chromosomes have the gene representing the trait.
e.g.,

Parents – Tt Tall × Tt Tall (Male and female) Self-pollinated

Tt × Tt (Self-pollinated)



TT	Tt	Tt	tt	← (Homozygous state)
Tall	Tall	Tall	Dwarf	Recessive trait in

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77. Explain giving reasons for the following:
In a group of organisms if:
(a) Predators are more in the group.
(b) Organisms survive accidently.
(c) Organisms are not able survive in changing environmental conditions
2013/2014/2015 [3 Marks]

(a) In a group of organisms, if predators are more in number then the number of prey will be decreased at very fast rate and ultimately the entire population of prey as well as predators will be destroyed.
(b) Organisms which survive accidently have new adaptations and have better chance to continue their race and increase their population.
(c) Organisms which are not able to survive in changing environmental conditions are eliminated and the population becomes extinct.

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78. Give reasons why acquired characters are not inherited. Explain with the help of example of mice
2012/2014/2015 [5 Marks]

The acquired characters are not inherited because they do not bring/cause any damage in DNA.
A group of mice was allowed to breed to give rise to their progeny. All the members of the group have tails. This tail was cut by surgery for several generations, but none of the offspring in successive generation was tailless. It was so because the trait of having no tail (removed by surgery) has not brought any change in the DNA of germ-cells of mice and so no tailless mice was produced in next generation.
Other examples: woman's ear piercing does not produce a girl or boy having ear pierced. A wrestler does not produce his progeny already with developed musculature, etc.

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79. Give differences:
(a) Heredity and variation
(b) Dominant and recessive traits
(c) Natural and artificial selection
2014/2015 [5 Marks]

(a) The phenomenon of transmission of character from parents to their offspring *i.e.,* from one generation to the next generation is called heredity.
Variations: The differences in the traits shown by the individuals of species or by the offsprings of the same parents are called variations.
(b) When cross between two contrasting traits is done, only one of these two will be able to express itself in first generation and other remains hidden. The trait which is expressed is called dominant and the other is called recessive.
(c) The formation of new species by gradual changes accumulates generation after generation and causes natural selection. The traits selected are beneficial to the species.
Artificial selection is controlled by man in a limited/short period of time in which the beneficial traits are selected out to form a new species.

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80. An organ like a wing in birds is an advantage to the organism. Did they appear in different stages or were formed due to a single sudden change in them?
2012/2014/2015 [3 Marks]

The wings of birds have originated in different stages as a sequence of change called evolution

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81. (a) Which type of organs are shown in the figure shown here?
(b) which of type of origin and structure do these organs have?

2014/2015 [3 Marks]

(a) The images shown above are the wings of butterfly and the forelimbs of bird which are an example of analogous organs.
(b) The wings of an insect are the folds of membrane which are supported with few muscles. The wings of a bird are formed of limb bones which are covered with muscles, skin, and feathers. Both are modified to perform the same function *i.e.,* flying.
