



## Questions

### A) Choose the correct answer:

1- In lack of dominance case, the ratio of 2<sup>nd</sup> generation resulted from the copulation of two individuals different in one pair of opposite traits is .....

- A- 1:3                      **B- 1:2:1**                      C- 7:9                      D- 1:2

2- When a man of blood group (AB) marries a woman of blood group (O), the ratio of children which have blood group (O) is .....

- A- 0%**                      B- 50%                      C- 25%                      D- 75%

3- Blood group which has both types of antigens is.....

- A- A                      B- O                      **C- AB**                      D- B

4- Blood group which has both types of antibodies is.....

- A- A                      **B- O**                      C- AB                      D- B

5- Blood group which is known as "Universal recipient" is

- A- A                      B- O                      **C- AB**                      D- B

6- ..... gene is an example on recessive lethal genes

- A- Yellow colour of mice                      **B- Infantile dementia**  
C- Turner's syndrome                      D- Bulldog race in cow

7- The Karyotype of male cell is .....

- A- XX + 44                      **B- XY+44**                      C- XO + 44                      D- XXY + 44

8- The Karyotype of female cell is .....

- A- XX + 44**                      B- XY+44                      C- XO + 44                      D- XXY + 44

# Biology



9- The appearance of chlorophyll is affected by the factor of .....

- A- Temperature    **B- light**    C- humidity    D- oxygen

10- The ratio of 2<sup>nd</sup> generation in case of complementary genes is

- A- 1:3:3:9    **B- 9:7**    C- 3:1    D- 1:2:1

11- The Karyotype of male cell is .....

- A- XX + 44    **B- XY+44**    C- XO + 44    D- XXY + 44

12- The Karyotype of female cell is .....

- A- XX + 44**    B- XY+44    C- XO + 44    D- XXY + 44

13- Karyotype of Klinefelter's syndrome is .....

- A- XXY + 44**    B- XO +44    C- YO + 45    D- XY + 45

14- Karyotype of Turner's syndrome is .....

- A- XXY + 44    **B- XO +44**    C- YO + 45    D- XY + 45

15- Down syndrome in males is caused by the fertilization of an ovum (X+22) with sperm

- A- X + 23    **B- Y + 23**    C- X + 22    D- Y+22

## **B) Write the scientific term:**

1-The arrangement of chromosomes of cells in descending order according to their size and number.

2- A form of inheritance in which no genes dominate over the opposite one, but they interact forming new trait

3- chemical substances which exist on the surfaces of red blood cells, they play an important role in blood transfusion process.

4- A kind of antigens whose inheritance is controlled by three pairs of genes which are carried on one chromosome pair.

# Biology



- 5- Genes which interact with each other causing the appearance of a hereditary trait.
- 6- Genes which obstruct growth and cause death at different ages when they exist in pure (homozygous) form
- 7- Genetic disorder caused by the increase of sex chromosome (X) in some males (XXY + 44)
- 8- Genetic disorder caused by the decrease of chromosome (X) in some females (XO+44)
- 9- Genetic disorder caused by the existence of an additional chromosome in chromosome pair (21)

## **C) Compare between:**

- 1- Blood types (A) and (B)
- 2- Lethal genes and Complementary genes
- 3- Klinefelter's , Turner's and Down's syndromes.

## **D) Give reasons for:**

- 1- When two individuals different in one pair of hereditary traits copulate, the second generation ratio is 1:2:1 not 1:3
- 2- The importance of blood groups
- 3- Blood group (O) is a universal donor, while blood group (AB) is a universal recipient

# Biology



## **E) What happens when:**

- 1- Transfusing blood from a man of group (AB) to another one of group (A)
- 2- (Rh-) woman married (Rh+) man (with respect to the first and second babies)
- 3- Two sweet pea plants with white flowers whose genotypes are (aaBB) and (AAbb) copulate (first and second generations)
- 4- Breeding two yellow mice (Yy)
- 5- Planting corn plant seedlings in a dark place
- 6- A sperm (Y+22) fertilizes an abnormal ovum (XX+22)
- 7- A sperm (X+22) fertilizes an abnormal ovum (O+22)
- 8- The fertilization of a gamete carrying a complete pair of chromosome in pair (21)

## **F) Write short notes about**

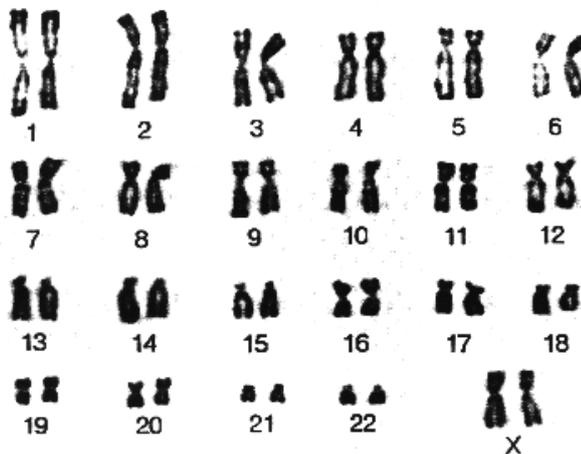
- 1- Chromosomal theory
- 2- Karyotype
- 3- Dangers of blood transfusion
- 4- Rhesus factor

# Biology



**G) Examine the figure then answer:**

**The following figure describe Karyotype of a cell, answer the questions**



- 1- What does this Karyotype describe, a somatic cell or gamete? Why?
- 2- What is the sex of the person carrying this Karyotype ? Why?
- 3- What is the number of somatic and sex chromosomes?

**H)1- The following table illustrates the generation resulted from the breeding of two sweet pea plants, then answer the following questions**

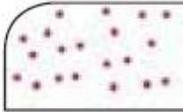
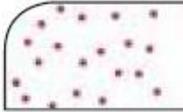
♀ \ ♂	AB	--	aB	ab
--	(1)	AABb	(2)	AaBb
--	(3)	AAbb	(4)	Aabb

- 1- What are the genotypes of (1), (2), (3), (4)
- 2- Find the genotypes of the parents
- 3- What is the percentage of white flowers in this generation?
- 4- What is the colour of flowers produced from the breeding of plant (4) with (3)

# Biology



## 2- Answer the following question

Group	anti-a	anti-b
.....		
.....		
.....		
.....		

1- Complete the previous table mentioning blood groups

2- Which blood group has both types of antigens?

3- Which blood group has both types of antibodies?

## 1- Rationalize the following cases on a genetic basis

1- A man of blood group (A) married a woman of blood group (B) and had a child of blood group (O)

2- A woman whose blood group is (AB) has a son of the same blood group, what are the probable genotypes of the father?

3- Breeding antirrhinum plant with red flowers with another one of pink flowers.

# Biology



## Answers

### B- Write the scientific term:

- 1- Karyotype
- 2- lack of dominance
- 3- antigen
- 4- Rh factor
- 5- Complementary gene
- 6- Lethal gene

### C) Compare:

<b>Blood group (A)</b> <ul style="list-style-type: none"><li>- It has antigens-a</li><li>- It has antibodies (anti-b)</li><li>- Its genotype is AA or AO</li><li>- Receives blood from groups (A), (O)</li><li>- Gives blood to groups (A) and (AB)</li></ul>	<b>Blood group (B)</b> <ul style="list-style-type: none"><li>- It has antigens-b</li><li>- It has antibodies (anti-b)</li><li>- Its genotype if BB or BO</li><li>- Receives blood from groups (B), (O)</li><li>- Gives blood to groups (B), (AB)</li></ul>
<b>Lethal genes</b> <ul style="list-style-type: none"><li>- They are genes which cause the death of living organisms if they are present in pure form because they stop its biological processes</li><li>Ex. Yellow colour of mice trait</li></ul>	<b>Complementary genes</b> <ul style="list-style-type: none"><li>- They are genes which interact together forming new trait</li><li>Ex. Flower colour of sweet pea plant</li></ul>

3,4 ) Answer by yourself

# Biology



## **D) Give reasons for:**

1- Because the genes of those different traits do not dominate over each other. So, they interact with each other forming new trait, which appears in 2<sup>nd</sup> generation with the two opposite traits at ratio 1:2:1 (not 1:3 – as Mendel laws state – because of the lack of dominance)

2-Because they :-

- Solve problems of the determination of paternity (parents of children) and pedigree of children (blood groups denies pedigree but don't prove it)

- Determine blood transfusion processes between individuals.

- Are used in the study of human races classification and evolution

3- Blood group (O) is a universal donor because it Doesn't have both antigen-a or antigen-b and doesn't have any antibodies, which makes it capable of giving blood to all groups. While blood group (AB) is a universal recipient because it has both antigen a and antigen b and doesn't contain any antibodies, which makes it capable of receiving blood from all types.

## **F) What happens?**

1-This will break red blood cells of the recipient person because his blood produces anti-b for antigens-B of blood group (AB), which causes shivering in body, chest pain, blueness, irregular heartbeat, headache, low blood pressure

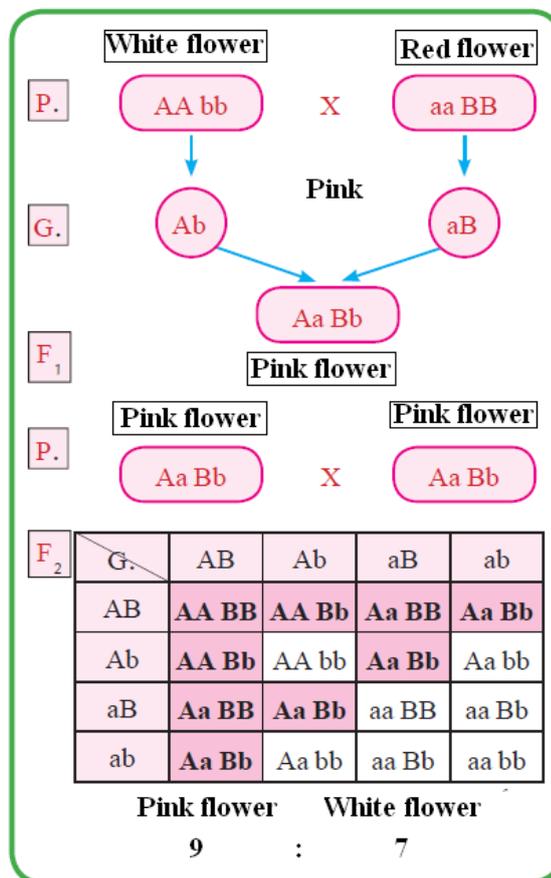
2-When the woman becomes pregnant with the first baby (which is Rh+), a part of his blood transfers from him to his mother, which stimulates her immune system to produce antibodies of Rh factor antigens. If mother

# Biology



wasn't given vaccine after delivery of the first baby, and became pregnant again with another baby, Rh+ blood transfers from mother to her second baby through placenta, which breaks up his red blood cells and causes him acute anemia and even death.

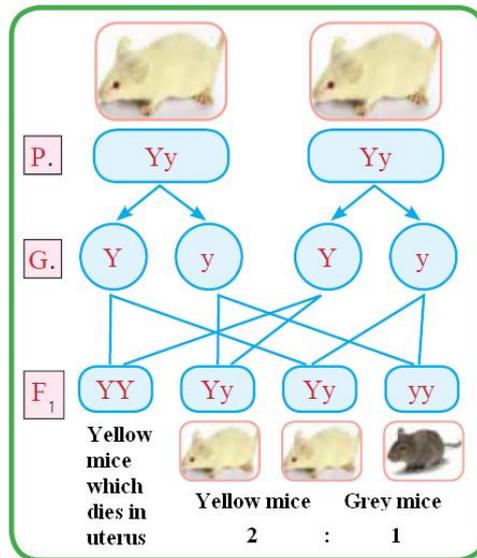
3-100% pink flowers are produced in the first generation, while both pink and white flower appear in the second generation at ratio 9:7



# Biology



4- Hybrid yellow and black mice are produced at ratio 2:1 respectively, pure yellow mice (YY) - which represent 25% of the generation – die in uterus before being bc



5-Seedlings lose their green colour due to the lack of chlorophyll, as the gene responsible for chlorophyll formation is activated only by light (which is absent)

6- Klinefilter's male will born

7- Turner's female will born.

8-A male fetus (XY+45) or female fetus (XX+45) suffering from Down syndrome is formed (because of having 3 copies of chromosome 21), which causes mental retardation, short stature, oval face, flat head back, short fingers and toes, small ears and narrow eyes

# Biology



## **E) Write short note :**

1- Scientists Boveri and Sutton put chromosome theory in 1902, which states that:-

a- Chromosomes exist in somatic cells in the form of homologous pairs (2n)

b- Gametes contain half the no. of chromosomes in somatic cells as a result of meiotic cell division; where homologous pairs get separated from each other forming two identical groups

c- Each pair of chromosomes acts independently when transferring to gametes.

d- After fertilization process, the normal number of chromosomes (2n) comes back

e- Each chromosome carries hundreds of genes.

## **2,3 Answer by yourself .**

4-Rhesus factor is a kind of antigens which exist on the surfaces of red blood cells of 85% of humans, its inheritance is controlled by 3 pairs of genes which exist on one chromosome pair.

## **G- The following figure describe Karyotype of a cell, answer the questions**

1- Somatic cell, because it contains 23 pairs of chromosomes (diploid cell 2n)

2- Female, its sex chromosome is homologous (XX)

3- Somatic chromosomes: 44 (22 pairs) Sex chromosomes: 2 (1 pair)

# Biology



**H-1- The following table illustrates the generation resulted from the breeding of two sweet pea plants, then answer the following questions**

♀ \ ♂	AB	Ab	aB	ab
AB	(1)	AABb	(2)	AaBb
Ab	(3)	AAbb	(4)	Aabb

1- (1) AABB

(2) AaBB

(3) AABb

(4) AaBb

2- Genotype of 1<sup>st</sup> parent: AaBb

Genotype of 2<sup>nd</sup> parent: AABb

3- 25%

4- 75% Pink flowers

25% white flowers

# Biology



2)

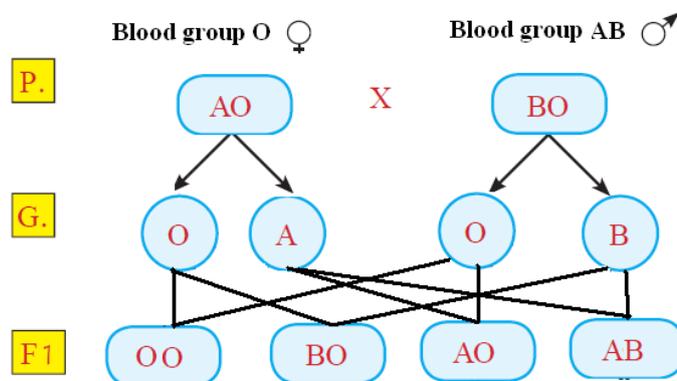
Group	anti-a	anti-b
<b>A</b>		
<b>B</b>		
<b>AB</b>		
<b>O</b>		

2- (AB) group

3- (O) group

## I- Rationalize the following cases

### Case (1)



# Biology



## Case (2)

Genes forming blood type (AB) are (A) and (B)

Thus, father should have at least one of those genes in his blood type

Probable genotypes of father are (AO) – (AA) – (AB) – (BO) – (BB)

## Case (3)

