

مباراة الدخول 2020 – 2021

مسابقة في العلوم الطبيعية (A Series)

عدد الصفحات: 5

المدة: ٤٥ دقيقة

1- For each question circle the correct answer (Only one correct answer per question)

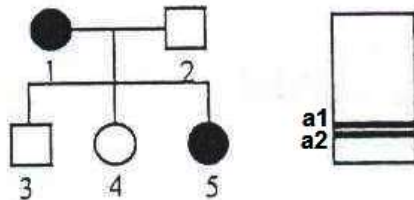
- Fertilization:
 - a- allows the appearance of new phenotypes.
 - b- allows the appearance of new alleles
 - c- results in a zygote, that is, a haploid cell.
 - d- corresponds to the union of two diploid cells.
- During meiosis, genetic recombination:
 - a- results from an exchange of chromatid fragments between homologous chromosomes.
 - b- takes place only during the second division of meiosis.
 - c- induces genetic diversity in the gametes produced.
 - d- affects genes located on the same pair of chromosomes.
- The following document represents the results of DNA electrophoresis of selected members of a family with some members suffering from an inherited disease.

| DNA Fragments | Mother | Daughter 1 | Daughter 2 |
|---------------|----------------|-----------------|----------------|
| F1 | ————— | ————— | ————— |
| F2 | ————— | ————— | ————— |
| | Healthy | Affected | Healthy |

The allele of the disease is:

- a- recessive carried by an autosome.
 - b- recessive carried by the X chromosome.
 - c- dominant carried by the X chromosome.
 - d- dominant carried by an autosome.
- A mutation affecting a somatic cell
 - a- is transmitted to only one of the two daughter cells during mitosis of the mutated cell
 - b- is never transmitted to daughter cells during mitosis of the mutated cell
 - c- is transmitted to germ cells during mitosis of the mutated cell
 - d- is transmitted to the two daughter cells during mitosis of the mutated cell
 - Pituitary hormones (FSH and LH) stimulate:
 - a- pituitary gland.
 - b- ovaries
 - c- uterus.
 - d- hypothalamus.
 - Progesterone exerts:
 - a- whatever its concentration, a negative feedback on the hypothalamic-pituitary complex.
 - b- whatever its concentration, a positive feedback on the hypothalamic-pituitary complex.
 - c- at high concentration, a negative feedback on the hypothalamic-pituitary complex.

- d- at low concentration, a negative feedback on the hypothalamic-pituitary complex.
- The hormone LH stimulates:
 - a- by a peak of secretion, the onset of menstruation
 - b- follicular growth.
 - c- regression of the yellow body.
 - d- by a peak of secretion, the triggering of ovulation.
- The functioning of the pituitary gland is:
 - a- inhibited by continuous secretion of GnRH produced by the hypothalamus.
 - b- stimulated by continuous secretion of GnRH produced by the hypothalamus.
 - c- inhibited by pulsatile secretion of GnRH produced by the hypothalamus.
 - d- stimulated by pulsatile secretion of GnRH produced by the hypothalamus.
- The following document represents the genealogical tree of a family in which some members have a hereditary anomaly controlled by a pair of alleles (a1, a2) and the results of the electrophoresis of the DNA in question in the individual 5.



- The allele responsible for the disease is:
- a- dominant.
 - b- viral.
 - c- recessive.
 - d- linked to the X chromosome.
- Before performing a transplant, we ensure the compatibility of the donor and the recipient by comparing
 - a- B lymphocytes
 - b- major histocompatibility complexes (MHC)
 - c- T lymphocytes
 - d- cytokines
 - The production of antibodies by the body:
 - a- is more important during the secondary response.
 - b- is less important during the secondary response.
 - c- occurs only during the secondary response.
 - d- occurs only during the primary response.
 - During meiosis, a genetic recombination occurs by
 - a- an intrachromosomal recombination during the second division of meiosis
 - b- an interchromosomal then intrachromosomal recombination during the first division of meiosis
 - c- an intrachromosomal then interchromosomal recombination during the second division of meiosis
 - d- an intrachromosomal then interchromosomal recombination during the first division of meiosis

- The zygote formed by fertilization:
 - a- contains a unique and novel combination of alleles
 - b- contains the same combination of alleles as its parents
 - c- contains the same combination of alleles as one of its parents
 - d- contains a combination of alleles that is identical to the other descendants of the couple

- the prophase of the second division of meiosis
 - a- is preceded by a DNA replication during the stages of the first division
 - b- involves two cells having chromosomes with two chromatids each
 - c- involves one cell having chromosomes with two chromatids
 - d- involves two cells having chromosomes with one chromatid

- Crossing over
 - a- Occurs exclusively during mitosis
 - b- Doesn't participate to genomes diversification
 - c- Occurs in males only
 - d- Corresponds to exchanges of fragments of non-sister chromatids of homologous chromosomes

- Genetic recombination:
 - a- corresponds to the succession of fertilization and meiosis.
 - b- Allows the karyotype stability during meiosis.
 - c- causes new combination of alleles in the descendants.
 - d- Always involves a crossing over.

- Considering two linked genes undergoing a crossing over, the test-cross of two individuals gives among the descendants:
 - a- four phenotypes at equal proportions.
 - b- two phenotypes at equal proportions.
 - c- Parental phenotypes higher in number than recombined phenotypes.
 - d- Parental phenotypes lower in number than recombined phenotypes.

- The principal hormone having a positive feedback on hypothalamus and pituitary gland is :
 - a- progesterone
 - b- estrogen
 - c- FSH
 - d- GnRH

- Indicate the correct statement.
Statement 1: ovulation is triggered at the end of the menstrual cycle
Statement 2: there is a sudden drop of the level of ovarian hormones during the last days of the cycle.
 - a- The two statements are correct but without a cause-effect relationship
 - b- The two statements are correct with a cause-effect relationship.
 - c- The two statements are false.
 - d- One of the two statements is correct and the other is false.

- A gene:
 - a- Frequently exists in a single allelic form
 - b- exists in one copy in somatic cells
 - c- is a sequence of nucleotides
 - d- is never subject to mutations

- A mutation:
 - a- Always alters the phenotype
 - b- Doesn't alter the genotype
 - c- Always modifies the sequence of the protein encoded by the mutated gene
 - d- Must occur in a germinal cell to be transmitted to the descendence

- When a trait is autosomal and dominant, we expect to have
 - a- More males than females showing this trait
 - b- Each affected person has 2 affected parents
 - c- Each affected person has at least one affected parent
 - d- If both parents are affected, we expect to have 100% of affected children

- A soluble antibody is:
 - a- formed of four polypeptide chains
 - b- at the origin of the formation of an immune complex
 - c- synthesized in response to the presence of a specific antigen
 - d- All of the above

- Cytotoxic T lymphocytes:
 - a- exist prior to any antigen penetration
 - b- act by phagocytosing infected cells
 - c- decrease the viral load along with limiting viral reproduction
 - d- are incapable of protein secretion

- Cells involved in humoral response are:
 - a- granulocytes
 - b- plasma cells
 - c- monocytes
 - d- all of the above

- Antibody secreting cells are:
 - a- granulocytes
 - b- T4 lymphocytes
 - c- T8 lymphocytes
 - d- none of the above

- Phagocytosis:
 - a- starts with exocytosis
 - b- is involved only in non-specific immune reactions
 - c- is performed by T8 lymphocytes
 - d- none of the above

- Les immunoglobulins are:
 - a- Granulocyte receptors
 - b- B lymphocyte receptors
 - c- The effectors of cell-mediated responses
 - d- All of the above

- An X-linked recessive anomaly is transmitted:
 - a- From phenotypically normal parents to all their sons
 - b- From a phenotypically normal mother to all her sons
 - c- From a phenotypically affected father to his sons
 - d- From a phenotypically affected mother to all her sons

- The karyotype of a boy affected with trisomy 21 includes:
 - a- 44 autosomes + XY
 - b- 45 autosomes + XX
 - c- 45 autosomes + XY
 - d- 43 autosomes + XY

2- Answer by true (T) or false (F) the following questions

| T/F | |
|-----|---|
| | Vaccination is efficient at the medium and the long-term but it doesn't procure any advantage at a very short-term because the protective response needs time to develop. |
| | Ovaries are gonads that produce female gametes from puberty to menopause. |
| | Yellow-body cells secrete both estrogen and progesterone. |
| | Macrophages and polynuclear neutrophils are necessarily involved in a cell-mediated specific immune response. |
| | The secretory phase of the menstrual cycle is associated with a decrease in the concentration of estrogen and progesterone. |
| | During a physiological sexual cycle, the peak of the plasmatic concentration of luteinizing hormone occurs at day 21. |
| | Follicular cells secrete progesterone. |
| | Effector T8 cytotoxic lymphocytes kill their target by phagocytosis. |
| | Test-cross is the breeding of two pure strains. |
| | Estrogen appears only after ovulation. |

Good Work