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رُوجع على النص العربي ومطابق الأصل اليوناني ويطلع على مسؤولية اللجنة الفنية ،

[E.N / 15] ARAB REPUBLIC OF EGYPT [٥٢ / ج] ث.ع / ث / ح
Ministry of Education
General Secondary Education Certificate Examination, 2015
[New System – Second Session]
Biology Time: 3 hours
الأحياء [باللغة الإنجليزية]

تنبيه مهم : ١- يسلم الطالب ورقة امتحانية باللغة العربية مع الورقة المترجمة .
٢- الإجابات المتكررة عن أسئلة الاختيار من متعدد لن تقدر ويتم تقدير الإجابة الأولى فقط .
[الأسئلة في أربع صفحات]

Answer FOUR questions only of the following:
Question One: (15 marks)
(A) Choose the correct answer for each of the following, and write it only in your answer sheet:

- The transverse process exists in the
(thoracic cage – vertebra – skull – pelvic girdle)
- After fertilization in the plant, the ovule's wall becomes the
(pericarp – fruit – seed coat – seed)
- Agglutination does not take place when the blood is transfused from a person has (B⁺) group to a person has group.
(B⁺ – O⁻ – O⁺ – A⁺)
- Which of the following amino acids has hydrogen atom instead of (R) group?
..... .
(Valine – Glycine – Lysine – Arginine)
- All the following organisms reproduce by regeneration **except**
(crustaceans – sponges – some worms – sea stars)
- How many pairs of nitrogenous bases in a piece of DNA containing 150 turns?
(150 – 3000 – 1500 – 300)

(B) 1. The opposite figure represents a part of the protein synthesis process.
Answer the following questions:

- What is the importance of structure (2) in this process?
- Where does part (6) bind with part (1) at the beginning of this process?
- What is the role of structure (5) in this process?
- What do the numbers (3) and (4) represent?

[بقية الأسئلة في الصفحة الثانية]

[E.N / 15] [2] تابع [٥٢ / ج] ث.ع / ث / ح

2. What is meant by each of the following?
a. False fruit b. Cross pollination c. Parthenogenesis d. Plasmids

(C) A crossbreeding was conducted between long-legged and short-legged dogs.
The resulting dogs were 3 short-legged : 1 long - legged , while in another crossbreeding between short – legged dogs all the resulting dogs were long - legged dogs. Explain on genetic bases and state the genetic case.

Question Two: (15 marks)
(A) Rewrite the following statements after correcting what is underlined:

- In the sarcomere, the letter I is symbolized to the semi-light area.
- The orientation of codon indicates the DNA strand to be transcribed.
- The mutation resulted from utilization of mustard gas is a gene mutation.
- The flower of manthur plant is solitary apical and stops the growth of the stem.
- The outer chromatids in which the crossing over does not occur are called new combinations.
- If the chromosomal structure of an ovum is (3+ X), so the number of autosomes is (8) chromosomes.

(B) The opposite figure illustrates the level of 4 hormones in human blood during menstrual cycle.
Answer the following questions:

- What is source of secretion of hormones (a), (b), (c) and (d)?
- At any stage of menstrual cycle the two hormones (a) and (b) are secreted?
- What is the function of hormones (a), (b), (c) and (d)?

[بقية الأسئلة في الصفحة الثالثة]

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رُوجع على النص العربى ومطابق للأصل البيوى ويطلع على مسئولية اللجنة الفنية ،

تابع [٥٢ / ج] ث.ع / ث / ح	[4]	[E.N / 15]
تابع [٥٢ / ج] ث.ع / ث / ح	<p>Question Four: (15 marks)</p> <p>(A) What would happen in each of the following cases?</p> <ol style="list-style-type: none"> 1. Absence of the modification enzymes from virus resistant strains of E.coli bacteria. 2. Absence of reverse transcriptase from some viruses. 3. Mating of two heterozygous long haired mice (without genetic analysis). 4. When using recombinant DNA technology, genes to be transplanted in higher plants and animals may be spliced to transposable elements rather than plasmids. 5. Exposing eggs and larvae of <i>Drosophila</i> to 25° C. <p>(B) 1. Mention the site and function of each of the following:</p> <p>a. UAA codon b. Foramen magnum c. Antheridia</p> <p>2. Illustrate by a labeled drawing only the steps of anther maturation in the plant.</p> <p>(C) 1. “The embryo is surrounded by two membranes inside the uterus.” What are these two membranes? What is the importance of each of them?</p> <p>2. What is the importance of the human genome?</p> <p>Question Five: (15 marks)</p> <p>(A) Compare between each pair of the following:</p> <ol style="list-style-type: none"> 1. Complete linkage and incomplete linkage (in terms of the concept and mention an example for each). 2. Structural proteins and regulatory proteins (in terms of the concept and mention an example for each). 3. Movement of tendrils and movement of pulling roots (in terms of the way of their occurrence). <p>(B) 1. How can Barr body be determined practically? How many Barr bodies in cells of the following individuals ...?</p> <p>a. A normal male</p> <p>b. A female suffers from Down’s syndrome</p> <p>c. A male suffers from Klinefelter’s syndrome</p> <p>d. A female with a chromosomal structure 44+XXXX</p> <p>2. Mention two various means of contraception. Show the scientific principles that the effect of each of them is based on.</p> <p>(C) Write a note about each of the following:</p> <ol style="list-style-type: none"> 1. Role of enzymes in replication of DNA molecule. 2. Repetitive DNA. <p style="text-align: right;">[انتهت الأسئلة]</p>	<p>[E.N / 15]</p> <p>تابع [٥٢ / ج] ث.ع / ث / ح</p> <p>(C) In a mammalian species, the females are characterized by black, grey, white and brown fur colour while males are characterized only by white and brown fur colour (knowing that the grey colour represents a lack of dominance between the white colour and black colour, and the gene of black colour is lethal). On genetic bases explain the phenotypes and genotypes of the offspring resulted from mating of a brown male and a grey female.</p> <p>Question Three: (15 marks)</p> <p>(A) Write the scientific term indicated by each of the following statements:</p> <ol style="list-style-type: none"> 1. A flat bone pointed at its lower part which is cartilaginous. 2. The protein which is associated with stop codon to stop protein synthesis. 3. The cells that secrete a fluid to nourish the sperms inside the testis. 4. Proteins produced by virus-infected cells, thereby protecting the neighbour healthy cells from infection with this virus. 5. A small, rounded bone lies in front of knee joint. 6. An enzyme secreted by the sperm and acts to dissolve a part of the ovum coat. <p>(B) Give reasons for each of the following:</p> <ol style="list-style-type: none"> 1. Maturation of about 400 ova only throughout the life of the human female. 2. Presence of a depression in the upper end of ulna bone. 3. Voidness of banana and pine-apple fruits from seeds. 4. Histone proteins are associated strongly to phosphate groups of the DNA molecule. 5. The sequence of nucleotides in one strand of DNA supplies the information needed to produce the complementary strand. <p>(C) In rabbits, the brown colour dominates over white colour. If you have two brown colour rabbits, one of them is pure and the other is hybrid. How can you determine the genotype for each of them? Show your answer on genetic bases.</p> <p style="text-align: right;">[بقية الأسئلة فى الصفحة الرابعة]</p>

الدرجة العظمى (٦٠)

الدرجة الصغرى (٣٠)

عدد الصفحات (٥)

جمهورية مصر العربية
وزارة التربية والتعليم
امتحان شهادة إتمام الدراسة الثانوية العامة
لعام ٢٠١٥ م
نموذج إجابة مادة [الأحياء] بالإنجليزية "

[٥٢]

الدور الثانى

(نظام حديث)

ANSWER OF QUESTION ONE : 15 MARKS (6 + 5 + 4)

(A) 1 x 6 = 6 Marks

1- vertebra p.193

2- seed coat p.236

3- B⁺ p.224

4- Glycine p.355

5- crustaceans p. 216

6- 1500 p. 338

(B) 5 Marks

1- 3 marks

a- **Importance of the structure number (2):** it has two sites, one of them is the peptidyl (p) that binds with initiation codon AUG and the second site is the aminoacyl (A) that binds with the second amino acid carried by tRNA. (Mark) p. 364

b- It binds with the binding site at the beginning of (1). (½ Mark) p. 357

c- **Role of the structure (5):** It carries amino acids to the ribosomes. (½ Mark) p. 358

d- **Number (3):** represents an amino acid binds with tRNA molecule. (½ Mark)

Number (4): Polypeptide chain (½ Mark) p. 358

2- 2 marks (4 X ½ Mark)

a- **False fruit:** It is the fruit in which any part except its ovary enlarges to store food. P. 236

b- **Cross pollination:** The pollen grains are transported from the flower anther of a plant to the stigma of another plant of the same species. p. 233

c- **Parthenogenesis:** is the ability of the egg to develop to a new individual without being fertilized by a male gamete. p. 218

d- **Plasmids:** are small, circular DNA molecules that do not complexed with proteins. P. 343

(C) 4 Marks

Genetic case: complementary genes. (½ Mark)

Genes of long- legged are dominant (**A and B**) over genes of short- legged (**a and b**)

(½ Mark) (Any other right symbols can be accepted)

In the first case:

Long- legged × Short- legged

P: AaBb × aabb (Mark)

G: (AB) (Ab) (aB) (ab) (ab)

F: AaBb Aabb aaBb aabb (Mark)

Long- legged short- legged short- legged short- legged

In the second case: short - legged × short- legged

P: AAbb × aaBB (Mark)

G: (Ab) (aB)

F: AaBb
Long- legged

ANSWER OF QUESTION TWO: 15 MARKS (6 + 5 + 4)

(A) 1 x 6 = 6 Marks

- 1- H p.203 2- promoter p.357 3- induced p.351
4- Tulip 229 5- parental chromosomes p.303 6- (6) p.310

(B) 5 Marks (2 + 1 + 2) p. 249

- 1- **Hormone (a)** is secreted from anterior lobe of pituitary gland. ($\frac{1}{2}$ Mark)
Hormone (b) is secreted from anterior lobe of pituitary gland. ($\frac{1}{2}$ Mark)
Hormone (c) is secreted from corpus luteum. ($\frac{1}{2}$ Mark)
Hormone (d) is secreted from Graafian follicle. ($\frac{1}{2}$ Mark)
- 2- **Hormone (a)** is secreted during proliferation phase. ($\frac{1}{2}$ Mark)
Hormone (b) is secreted during ovulation phase. ($\frac{1}{2}$ Mark)
- 3- **Function of hormone (a):** stimulates the ovary to form the mature Graafian follicle. ($\frac{1}{2}$ Mark)
Function of hormone (b): stimulates the ovum to liberate from the Graafian follicle. ($\frac{1}{2}$ Mark)
Function of hormone (c): increases the thickness of the endometrium, and its blood supply, inhibits ovulation and stimulates the maternal mammary glands to develop gradually. ($\frac{1}{2}$ Mark)
Function of hormone (d): stimulates the growth of the endometrium. ($\frac{1}{2}$ Mark)

(C) 4Marks

Genes of the grey colour are (BW) – The gene of white colour is (W) and the gene of black colour is (B) (**Mark**)

The gene of brown colour (r) is a recessive allele to both genes of white colour and of black colour (**Mark**)

	Grey female		X	Brown male		
P:	$X^B X^W$		X	$X^r Y$		(Mark)
G:	$\textcircled{X^B}$	$\textcircled{X^W}$		$\textcircled{X^r}$	\textcircled{Y}	
F:	$X^B X^r$	$X^B Y$		$X^W X^r$	$X^W Y$	($\frac{1}{2}$ Mark)
	Black female	Black male		White female	White male	($\frac{1}{2}$ Mark)
		dies				

ANSWER OF QUESTION THREE : 15 MARKS (6 + 5 + 4)

(A) 1 x 6 = 6 Marks

- 1- Sternum bone p.194 2- Releasing factor p.365 3- Sertoli cells p. 240
4- Interferons p.373 5- Patella p. 196 6- Hyaluronic enzyme p.242

(B) 1 x 5 = 5 Marks

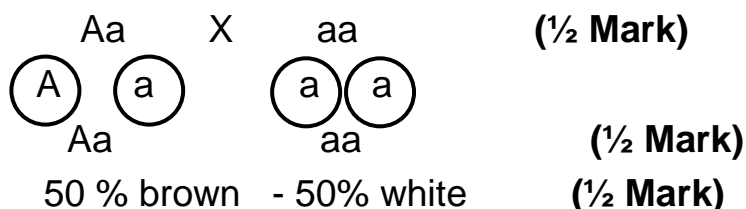
- 1- Maturation of ovules continues at a rate of ova every 28 day from one of the two ovaries alternately with other ovary per month (13 ova per a year) during the fecundity years (average 30 year), So the number of mature ovules in the age of female about 400 ova (30x13). **P.244**
- 2- Because inside this depression the inner projection of the humerus bone fits. **P.195**
- 3- Because these fruits are produced from natural parthenocarpy, i.e. without fertilization. **P.237**
- 4- Histones have a high content of the basic amino acids arginine and lysine. At the pH inside the cell, these amino acids have positively charged R groups, and so they bind strongly to the negatively charged phosphate groups of DNA. **P. 344**
- 5- Because the two strands have complementary base pairs, where adenine in one strand binds with thymine in the other strand and cytosine in one strand binds with guanine in the other strand. So if the two strands of a DNA molecule are separated, each can be used as a template to produce a complementary strand. **P. 339**

(C) 4 MARKS

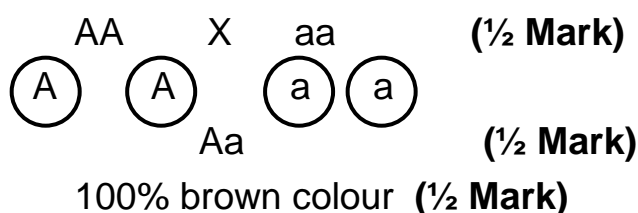
By carrying out a test cross for brown rabbit with white rabbit (**½ Mark**)

The gene of brown colour is (A) and the gene of white colour is (a) (**½ Mark**)

In case of heterozygous dominant trait:



In case of pure dominant trait:



ANSWER OF QUESTION FOUR: 15 MARKS (5 + 5 + 5)

(A) 1 x 5 = 5 Marks

- 1- Restriction endonucleases attack specific nucleotide sequences in the bacterial DNA and break the DNA into useless fragments. **P. 368**
- 2- The single stranded DNA will not be produced. **P. 372**
- 3- They will give birth 25% pure long-haired, 50% hybrid long- haired and 25% short- haired mice. (Another solution: 3 long haired : 1 short haired) **P. 375**
- 4- This gives the best chance that the gene will be incorporated in the cell genome. **P. 375**
- 5-Their wings (after metamorphosis of the insect from the pupa) grow in a curved manner. **P. 323**

(B) 3 + 2 = 5 Marks:

- 1- 1 X 3 = 3 Marks

	Site	Function
a. UAA codon	mRNA molecule (½ Mark) p.361	Terminates protein synthesis (½ Mark)
b. Foramen magnum	Posterior part (cerebral part) of the skull (½ Mark) p.193	Through which the spinal cord is connected to the brain. (½ Mark)
c. Antheridia	Anterior region of the lower surface of the gametophyte of <i>Polypodium</i> plant. (½ Mark) P.228	Male organs that liberate the male gametes. (½ Mark)

- 2- 2 marks p. 231

(C) 2.5 + 2.5 = 5 Marks

- 1- The outer membrane is : the chorion and the inner one is the amnion. (**½ Mark**) p. 252

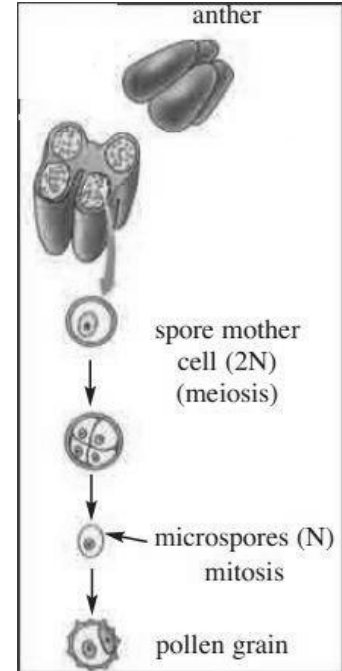
Importance:

Amnion: surrounds the embryo with a fluid serves to protect the embryo against shocks and dryness. (**Mark**).

The chorion: surrounds the amnion and its function is to protect the embryo and it participates in formation of placenta. (**Mark**)

2- Importance of human genome: (2.5 Marks)

- Identifying the genes that cause the rare and common hereditary diseases. (**½ Mark**)
- Identifying the genes that cause the disability of organs to perform vital activities. (**½ Mark**)
- Preparing drugs without side effects in the future. (**½ Mark**)
- Studying the evolution of living organisms by comparing the human genome with genes of living organisms. (**½ Mark**)
- Improving offspring by identifying the defected genes of the fetus before it is born and how to be cured (gene therapy). (**½ Mark**) p. 378



ANSWER OF QUESTION FIVE: 15 MARKS (6 + 5 + 4)

(A) 2 x 3 = 6 Marks

1- 302	Complete linkage	Incomplete linkage
The concept	The genes are carried on the chromosome as one genetic unit from one generation to the other through the gametes and inherited as a genetically unit. ($\frac{1}{2}$ Mark)	The linked genes on the chromosome may separate from each other and move from one chromosome to its homologous. This occurs when crossing over occurs. ($\frac{1}{2}$ Mark)
Example	Grey male <i>Drosophila</i> with long wings. ($\frac{1}{2}$ Mark)	Grey female <i>Drosophila</i> with long wings. ($\frac{1}{2}$ Mark)

2- 354	Structural proteins	Regulatory proteins
The concept	Proteins that constitute the building materials in the living organisms. ($\frac{1}{2}$ Mark)	Proteins that regulate numerous processes and activities for the organism. ($\frac{1}{2}$ Mark)
Example	Actin and myosin, collagens and keratins. ($\frac{1}{2}$ Mark)	These include enzymes, antibodies and hormones. ($\frac{1}{2}$ Mark)

3-	Movement of tendrils p. 198	Movement of pulling roots p.199
The way of occurrence	The tendril raises itself into the air and is likely to make contact with a solid object. It immediately twines closely around the object for a few turns in a spiral form. Its length decreases, and so the plant stem approaches the support, and grows vertically. (Mark)	By contraction of these roots, the corm or bulb is pulled downwards to a suitable level in the soil, to support the aerial parts against wind effects. (Mark)

(B) 5 Marks (3 + 2)

1- 3 Marks (1 + 2)

- **Determination of Barr body practically:** by scratching some of the mucous membrane lining the cheek. The nuclei of this tissue are stained by special stain during the interphase of mitosis. By examining this preparation under the microscope, an (X) chromosome appears in each cell in a loose form. In males, there is only one (X) chromosome, so, it is found in the loose form. The female has two (X) chromosomes one of them is in the loose form while the other is more compact and takes up the stain. This stained chromosome is called Barr body. (Mark)
- **Number of Barr bodies: (2 Marks= 4 X $\frac{1}{2}$)**
a- Absent b- One c- One d- Three

2- 2 Marks (One mark for each mean)

Means of contraception: p.255 (The request is 2 means only)

- **The pills:** They contain a combination of synthetic estrogen and progesterone hormones. These pills prevent pregnancy by inhibiting ovulation.
- **The intrauterine device (the coil):** It is inserted into the lumen of the uterus. It prevents the fertilized ovum to be implanted in the uterus.
- **Condom:** It prevents the sperms from entering the vagina.
- **Surgical sterilization:** It involves the ligation of the two fallopian tubes in the woman and cutting them. So, fertilization does not occur for the ova produced by the ovary. In a similar way in the man where each vas deferens is tied, separated from other structures and is cut. So, no sperms will come out.

(C) 4 Marks (3 + 1)

1- **Role of enzymes in the replication of DNA molecule: 340-341 (3 marks)**

- **DNA- helicase enzymes:** move along the double helix, separating the two strands. (Mark)
- **DNA polymerase:** It follows the helicase, adding new nucleotides to the 3' end of the new strand it goes. (Mark)
- **DNA-ligase:** It joins short pieces together for synthesizing a new strand in the direction 5' to 3'. (Mark)

2- **Repetitive DNA: (Mark)**

Most genes are present in only one or a few copies in a genome. However, every eukaryotic cell carries many - often hundreds of copies of the genes needed to synthesize ribosomal RNA and histones. The cell needs these molecules in large amounts. DNA sequencing has turned up many more repeating sequences of DNA. The role of most of this repetitive DNA is still unclear.

In *Drosophila*, the brief nucleotide sequence A – G – A – A – G is repeated about 100,000 times in the middle of one chromosome. These and many other repeated sequences are noncoding DNA.

انتهى نموذج الإجابة