

مراجعة نهائية وفق الهيكل الوزاري منهج انسابير



تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ← المناهج الإماراتية ← الصف الحادي عشر المتقدم ← علوم ← الفصل الثاني ← ملفات متنوعة ← الملف

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ملفات اكتب للمعلم اكتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل
منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي للمدرس

المزيد من مادة
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التواصل الاجتماعي بحسب الصف الحادي عشر المتقدم



صفحة المناهج
الإماراتية على
فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف الحادي عشر المتقدم والمادة علوم في الفصل الثاني

المراجعة النهائية الشاملة للمقرر وفق الهيكل الوزاري

1

حل تجميعية أسئلة مراجعة وفق الهيكل الوزاري

2

تجميعية أسئلة مراجعة وفق الهيكل الوزاري

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حل أسئلة الامتحان النهائي منهج بريدج

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EOT coverage G 11 AD- Biology

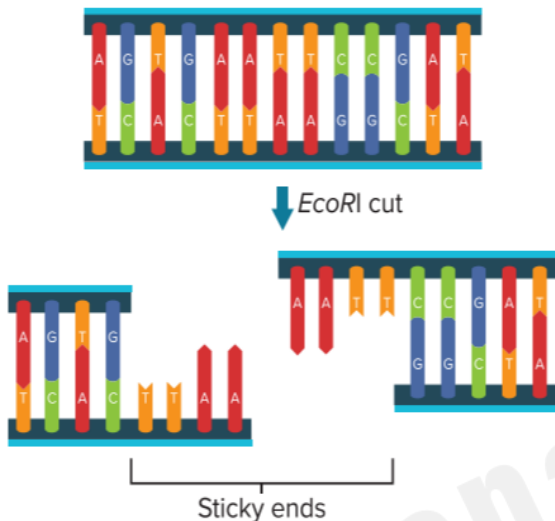


Figure 2 DNA containing the sequence GAATTC can be cut by the restriction enzyme *EcoRI* to produce sticky ends.

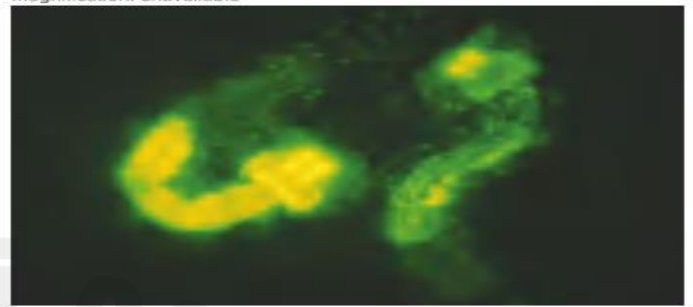


Figure 1 The gene for green fluorescent protein (GFP) was introduced into mosquito larvae so that researchers could verify that exogenous DNA was inserted.

Predict how genetic engineering might be used in the future by the medical field.

Gel electrophoresis

PHYSICS Connection An electric current is used to separate DNA fragments according to the size of the fragments in a process called **gel electrophoresis**. **Figure 3** shows how the DNA fragments are loaded on the negatively charged end of a gel. When an electric current is applied, the DNA fragments move toward the positive end of the gel. The smaller fragments move faster than the larger ones. The unique pattern created based on the size of the DNA fragment can be compared to known DNA fragments for identification. Also, portions of the gel containing each band can be removed for further study.

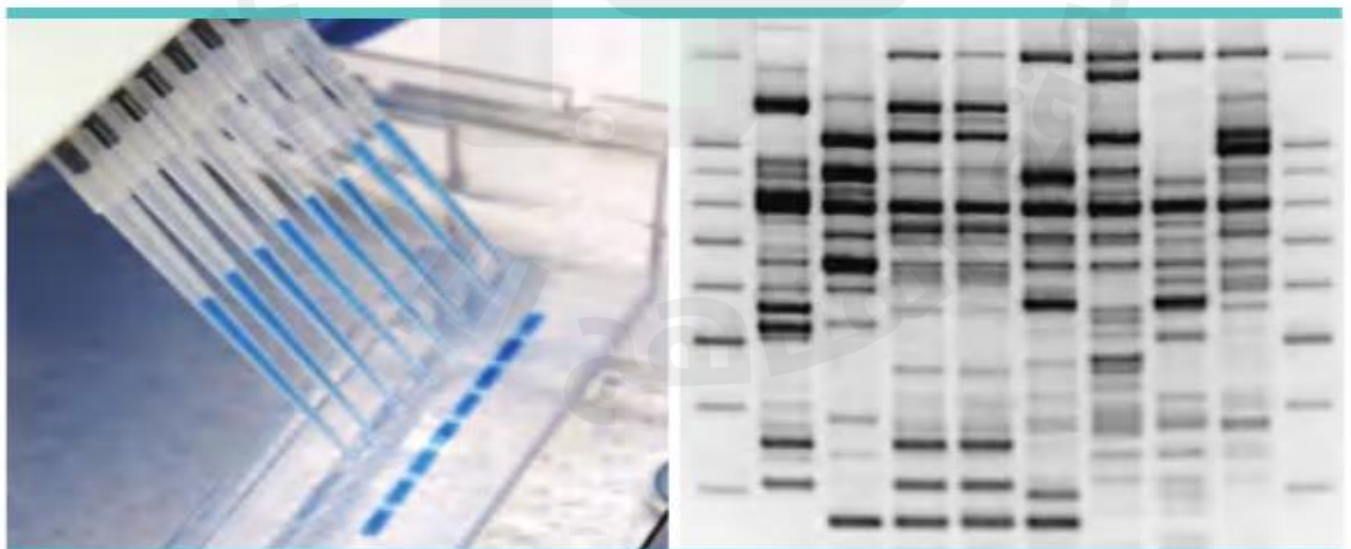


Figure 3 When the loaded gel is placed in an electrophoresis tank and the electric current is turned on, the DNA fragments separate.

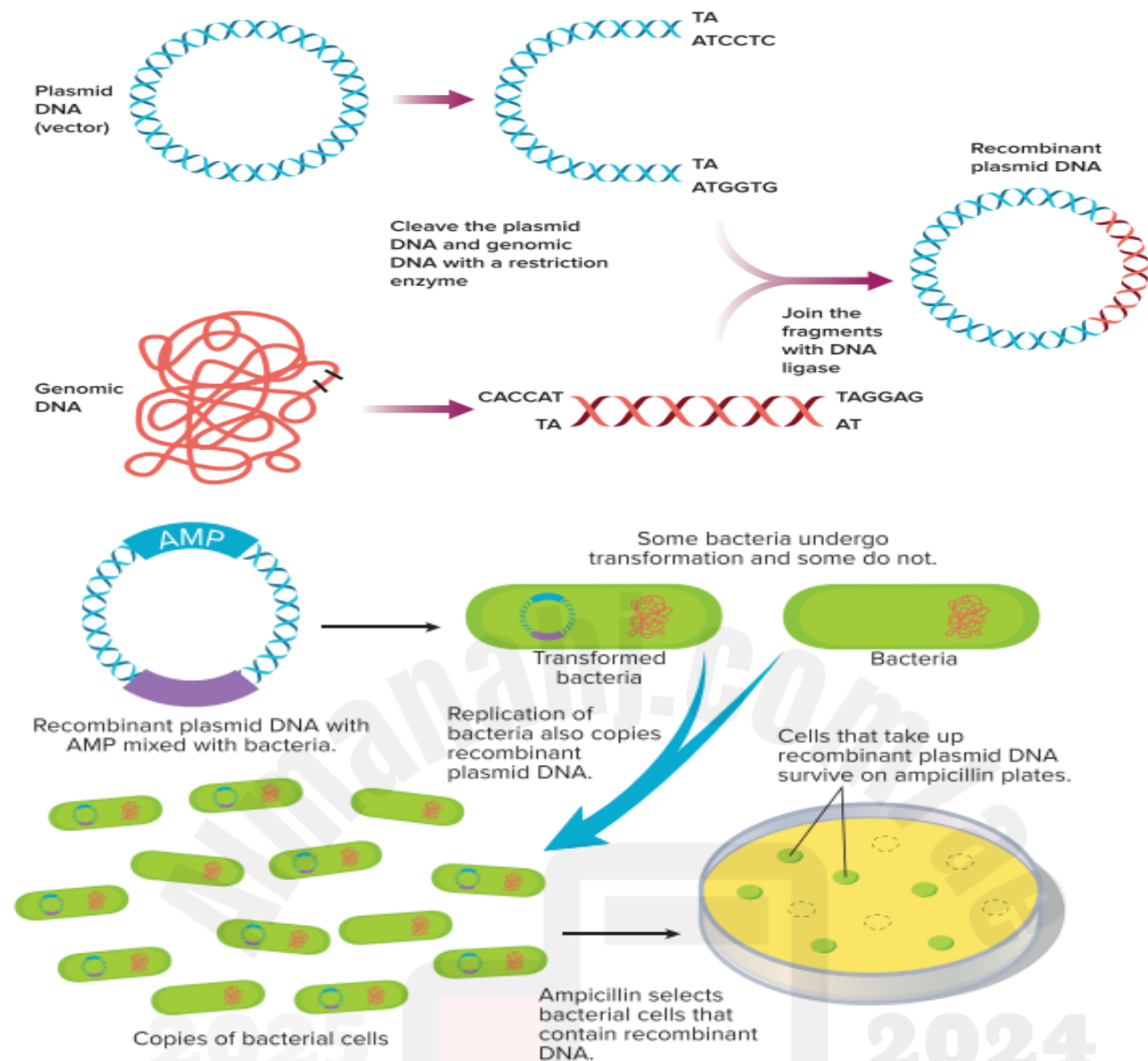


Figure 5 Clones containing copies of the recombinant DNA can be identified and used for further study when the bacterial cells that do not contain recombinant DNA die.

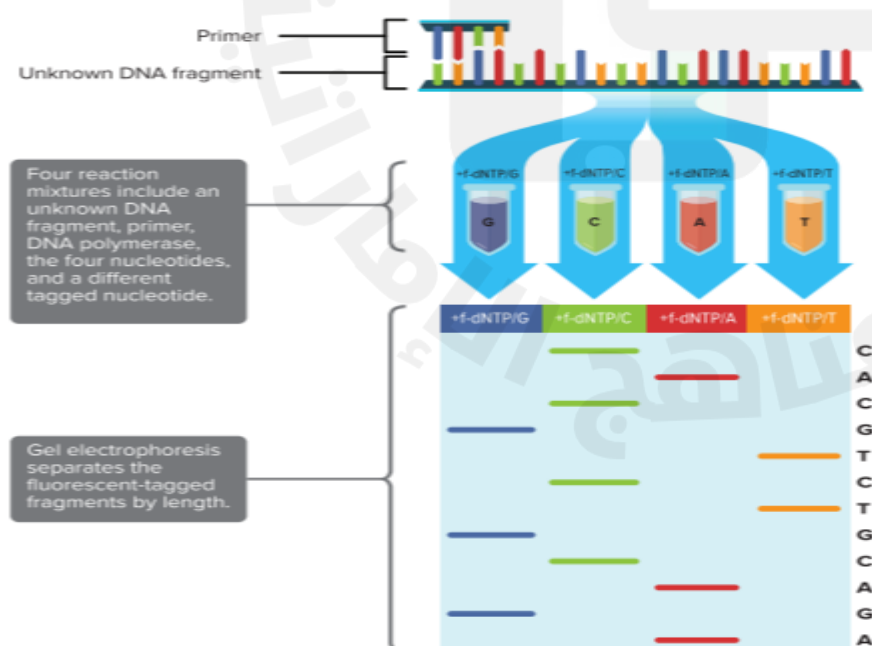


Figure 6 DNA can be sequenced using fluorescent-tagged nucleotides.

Describe how the sequence of the original DNA template is determined.

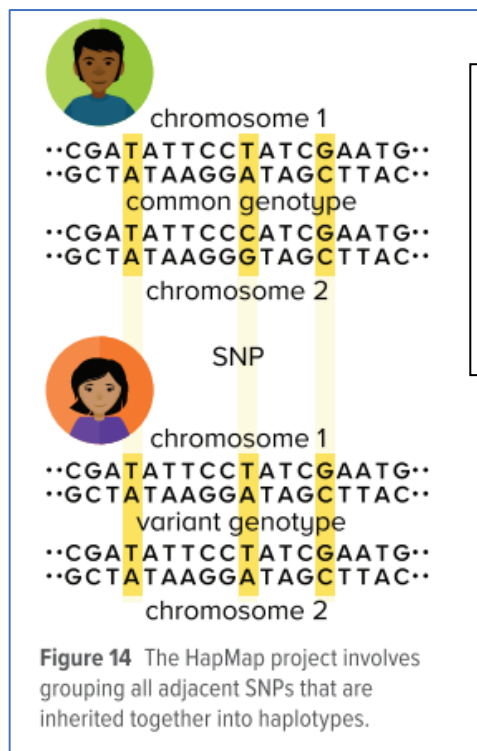


Figure 14 shows how the genome is divided into haplotypes. After three phases, the HapMap describes what these haplotypes are, where they occur in our DNA, and how they are distributed among people within populations and among several populations in different parts of the world. This information will help researchers take the next step to find genes that cause disease, such as cancer, stroke, and diabetes, and affect an individual's response to drugs.

Comparing genomes

Though the Human Genome Project is finished, analysis of the vast amount of data generated from this project will continue for many decades. To complete this huge task, researchers also have studied the genomes of many other organisms, including the fruit fly, the mouse, and *Escherichia coli*—a bacterium present in the human intestines. Studies in nonhuman organisms helped to develop the technology required to handle the large amounts of data produced by the Human Genome Project. These technologies help to analyze and interpret the functions of newly identified human genes.

Identifying genes

Now that the human genome is completely sequenced, the next step in the process is to identify the sections of the sequence that are genes and determine the functions of the genes. The functions of many of the genes in the human genome are still unknown. Researchers use techniques that integrate computer analysis and recombinant DNA technology to determine the function of these genes.

For organisms such as bacteria and yeast, whose genomes do not have large regions of noncoding DNA, researchers have identified genes by scanning the sequence for open reading frames (or ORFs, pronounced "orphs"). ORFs are stretches of DNA containing at least 100 codons that begin with a start codon and end with a stop codon. While these sequences might indicate a gene, they must be tested to determine if these sequences produce functioning proteins.

DNA Typing

You may have heard about DNA fingerprinting. The process is well-known because of the crime scene television shows where forensic scientists use it to identify suspects and victims, and to determine paternity. However, in forensics, the term DNA fingerprinting is inappropriate because forensic scientists also examine actual latent fingerprints. Forensic scientists prefer the term DNA typing or DNA analysis. **DNA typing** is the process of separating an individual's unique sequence of DNA fragments to observe distinct patterns.

Unlike the protein-coding regions of DNA that are almost identical among individuals, the long stretches of noncoding regions of DNA are unique to each individual. With the exception of identical twins, there is an extremely rare chance that two people in the world have the same stretches of noncoding regions of DNA. DNA typing analysis involves separating these DNA fragments using electrophoresis in order to observe the distinct patterns that are unique to every individual. Forensic scientists use DNA typing to identify suspects and victims in criminal cases, to determine paternity, and to identify soldiers killed in war.



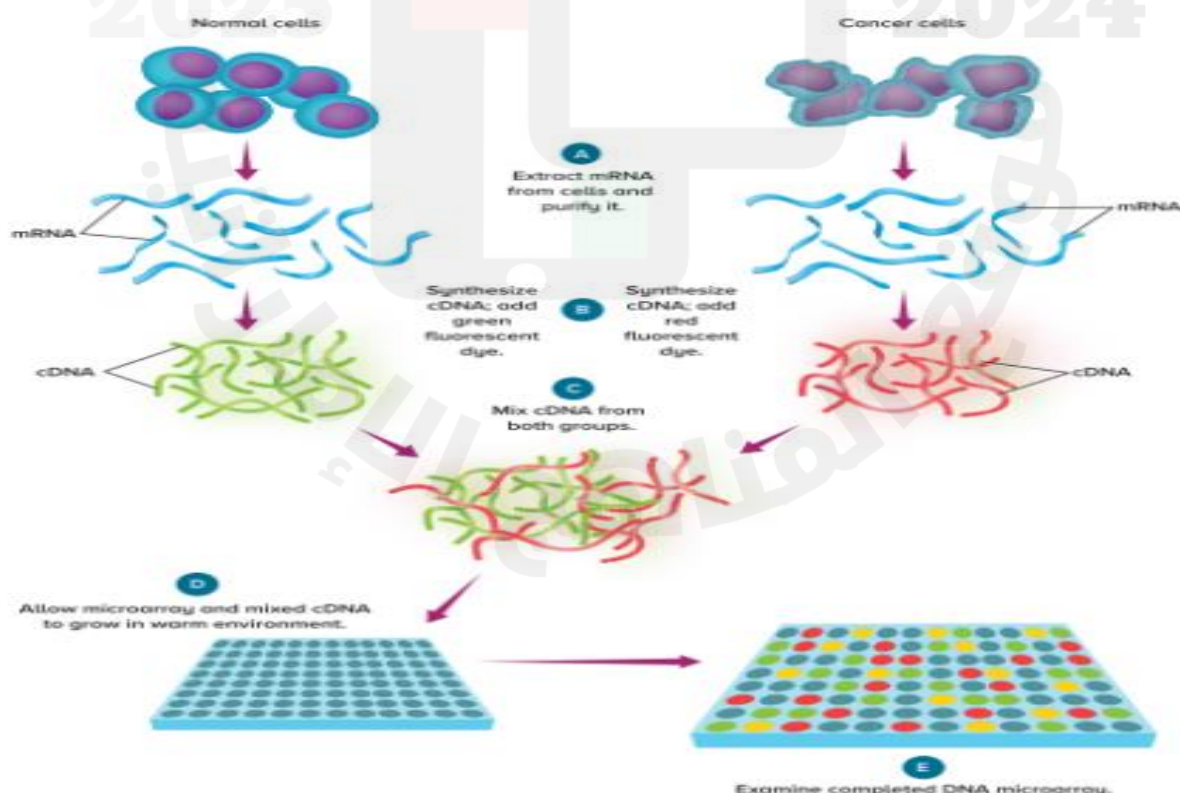
Bioinformatics

The completion of the Human Genome Project and the sequencing of the genomes of other organisms have resulted in large amounts of data. Not only has this enormous amount of data required careful storage, organization, and indexing of sequence information, but it also has created a new field of study. This field of study, called **bioinformatics**, involves creating and maintaining databases of biological information. The field of bioinformatics draws on other disciplines—computer science, biology, mathematics, and engineering—to analyze and interpret the data.

The analysis of sequence information involves finding genes in DNA sequences of various organisms and developing methods to predict the structure and function of newly discovered proteins. Scientists also study the evolution of genes by grouping protein sequences into families of related sequences and comparing similar proteins from different organisms.

Figure 13 Visualizing Microarray Analysis

The expression of thousands of human genes can be detected using DNA microarray analysis. Each spot on the microarray chip represents a gene. A red spot indicates the expression of a gene is higher in cancer cells compared to normal cells. A green spot indicates the expression in normal cells is higher. Yellow spots indicate no difference in the expression between cancer cells and normal cells.



~~characteristic~~. The process of directed breeding to produce offspring with desired traits, referred to as selective breeding, was called **artificial selection** by Darwin.

Artificial selection also occurs when humans develop new breeds of dogs or new strains of crop plants. Darwin inferred that if humans could change species by artificial selection, then perhaps the same process could work in nature. Further, Darwin thought that, given enough time, perhaps this process could produce new species.

Natural selection

While thinking about artificial selection, Darwin read an essay by economist Thomas Malthus. The essay suggested that the human population, if unchecked, eventually would outgrow its food supply, leading to a competitive struggle for existence. Darwin realized that Malthus's ideas could be applied to the natural world. He reasoned that some competitors in the struggle for existence would be better equipped for survival than others. Those less equipped would tend to die more often. Here, finally, was the framework for a new theory about the origin of species.

Darwin's theory of evolution by **natural selection** has four basic principles that explain how traits of a population can change over time. First, individuals in a population show differences, or variations. Second, at least some variations are inherited, meaning that they are passed down from parent to offspring. Third, some organisms have more offspring than can survive on available resources. Finally, variations that increase reproductive success will have a greater chance of being passed on than those that do not increase reproductive success.

Table 1 Basic Principles of Natural Selection

Principles	Example
Individuals in a population show variations among others of the same species.	The students in a classroom all look different.
Certain variations are inherited.	You look similar to your parents.
Some organisms have more young than can survive on the available resources.	The average cardinal lays nine eggs per summer. If each cardinal lived only one year and all offspring survived, in seven years there would be a million cardinals.
Heritable variations that increase reproductive success will be more common in the next generation.	If having a fan-shaped tail increases the reproductive success of pigeons, then more pigeons in the next generation will have fan-shaped tails.

In 1859, Darwin published *On the Origin of Species by Means of Natural Selection*—a condensed version of the book he had started many years before. In his book, Darwin used the term *evolution* only on the last page. Today, biologists use the term **evolution** to define cumulative changes in groups of organisms through time. Natural selection is not synonymous with evolution; it is a mechanism by which evolution occurs.

Although Darwin recognized the limitations of the fossil record, he predicted the existence of fossils intermediate in form between species. Today, scientists studying evolutionary relationships have found hundreds of thousands of transitional fossils that contain features shared by different species. For example, certain dinosaur fossils have feathers like modern birds and teeth and bony tails of reptiles. **Figure 5** shows an artist's rendering of *Archaeopteryx*, one of the first birds. *Archaeopteryx* fossils provide evidence of characteristics that classify it as a bird, and also show that the bird retained several distinct dinosaur features.



Figure 5 This artist's rendering of *Archaeopteryx* shows that it shares many features with modern birds while retaining ancestral dinosaur features.

Infer why transitional fossils like *Archaeopteryx* are important to studying evolution.

Researchers consider two major classes of traits when studying transitional fossils: derived traits and ancestral traits. **Derived traits** are newly evolved features, such as feathers, that do not appear in the fossils of common ancestors. **Ancestral traits**, on the other hand, are more primitive features, such as teeth and tails, that do appear in ancestral forms. Transitional fossils provide detailed patterns of evolutionary change for the ancestors of many modern animals, including mollusks, horses, whales, and humans.

Comparative anatomy

Why do the vertebrate forelimbs shown in **Figure 6** on the next page have different functions but appear to be constructed of similar bones in similar ways? Evolutionary theory suggests that the answer lies in shared ancestry.

Homologous structures Anatomical structures inherited from a common ancestor are called **homologous structures**. Evolution predicts that an organism's body parts are more likely to be modifications of ancestral body parts than they are to be entirely new features. The limbs illustrated in **Figure 6** move animals in different ways, yet they share similar construction.

Bird wings and reptile limbs are another example. Although birds use their wings to fly and reptiles use their limbs to walk, bird wings and reptile forelimbs are similar in shape and construction, which indicates that they were inherited from a common ancestor. While homologous structures alone are not evidence of evolution, they are an example for which evolution is the best available explanation for the biological data.

Table 2 Vestigial Structures

Trait	Wisdom teeth	Emu wings	Tailbone
Example			
Description	Since modern humans do not share the same plant heavy diet as our ancestors, they can be removed when they emerge	The wings of emus are too small to be of any use in flight.	The tailbone, or coccyx, is the remnant of the tail that all mammals, including humans, develop at some point.



English rabbit



Mara

Figure 10 The mara (*Dolichotis patagonum*) exists in a niche similar to that of the English rabbit (*Oryctolagus cuniculus*).

Geographic distribution

The distribution of plants and animals that Darwin saw during his South American travels first suggested evolution to Darwin. He observed that animals on the South American mainland were more similar to other South American animals than they were to animals living in similar environments in Europe. The South American mara, for example, inhabited a niche that was occupied by the English rabbit. You can compare a mara and an English rabbit in **Figure 10** on the next page. Darwin realized that the mara was more similar to other South American species than it was to the English rabbit because it shared a closer ancestor with the South American animals.

Patterns of migration were critical to Darwin when he was developing his theory. Migration patterns explained why, for example, islands often have more plant diversity than animal diversity: the plants are more able to migrate from the closest mainland as seeds, either by wind or on the backs of birds.

Camouflage Some species have evolved morphological adaptations that allow them to blend in with their environments. This is called **camouflage** (KA muh flahj). Camouflage allows organisms to become almost invisible to predators, as shown in **Figure 11**. As a result, more of the camouflaged individuals survive and reproduce.

Mimicry Another type of morphological adaptation is **mimicry**. In mimicry, one species evolves to resemble another species. You might expect that mimicry would make it difficult for individuals in one species to find and breed with other members of their species, thus decreasing reproductive success. However, mimicry often increases an organism's fitness. Mimicry can occur in a harmless species that has evolved to resemble a harmful species, such as the example shown in **Figure 12**. Sometimes two harmful species mimic each other. Both mimics are protected because predators quickly learn to avoid both species.



Figure 11 It would be easy for a predator to overlook this insect because of the animal's effective yellow camouflage.



Get It?

Compare mimicry and camouflage.

Antimicrobial resistance Species of bacteria that originally were killed by penicillin and other antibiotics have developed drug resistance. For almost every antibiotic, at least one species of resistant bacteria exists. One unintended consequence of the continued development of antibiotics is that some diseases, which were once thought to be contained, such as tuberculosis, have re-emerged in more harmful forms.



Kingsnake



Table 1 Basic Principles of Natural Selection

Principles	Example
Individuals in a population show variations among others of the same species.	The students in a classroom all look different.
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Some organisms have more young than can survive on the available resources.	The average cardinal lays nine eggs per summer. If each cardinal lived only one year and all offspring survived, in seven years there would be a million cardinals.
Heritable variations that increase reproductive success will be more common in the next generation.	If having a fan-shaped tail increases the reproductive success of pigeons, then more pigeons in the next generation will have fan-shaped tails.

P = allelic frequencies of dominant Allele

P+q=1

q= allelic frequencies of recessive Allele

Based on the table below, use the Hardy-Weinberg equation $p^2 + 2pq + q^2 = 1$ to determine the frequency of the short (tt) genotype in a population of pea plants.

Pea Plants (population: 100)		
36 ← TT → 36	48 ← Tt → 48	16 ← tt → 16
36	48	16

$$P = \frac{36 + 36 + 48}{200} = \frac{120}{200} = 0.6$$

$$P + q = 1 \rightarrow q = 0.4$$

- 2pq ○ 0.48
- p² ○ 0.36
- q² ○ 0.16
- 1.0

Homozygous dominant $p^2 = p \times p = 0.6 \times 0.6 = 0.36$

Heterozygous $2pq = 2 \times 0.4 \times 0.6 = 0.48$

Homozygous recessive $q^2 = q \times q = 0.4 \times 0.4 = 0.16$

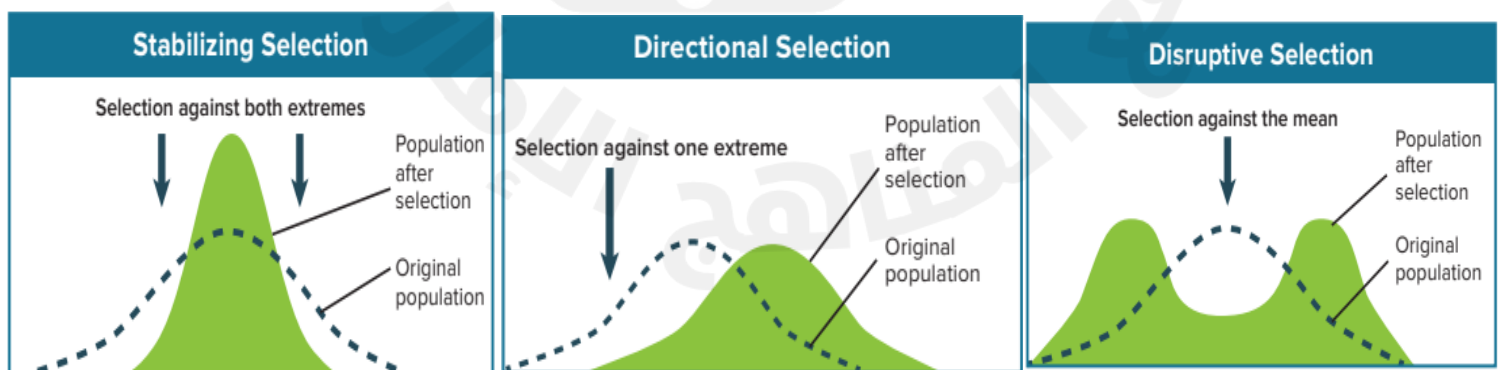




Figure 18 Northern water snakes have two different color patterns, depending on their habitats. Intermediate color patterns would make them more visible to predators.

Which process separates DNA fragments by size?

- ☐ polymerase chain reaction
- ☐ DNA sequencing
- ☐ gel electrophoresis
- ☐ recombinant DNA technology

A technique called _____ looks at separated DNA fragments to identify unique patterns that are unique to every individual.
(Blank 1)

Which is the process that scientists use to produce large numbers of recombinant DNA molecules?

- ☐ recombinant DNA technology
- ☐ gel electrophoresis
- ☐ polymerase chain reaction
- ☐ gene cloning

Which substance creates DNA fragments with sticky or blunt ends to be joined with other DNA fragments?

- ☐ plasmid
- ☐ DNA ligase
- ☐ restriction enzyme
- ☐ reverse transcriptase

A forensic scientist finds a strand of hair at a crime scene. The forensic scientist would like to identify the person to whom the hair belongs. Place the steps that the forensic scientist has to take into the correct order from top to bottom.

- 1) _____
- 2) _____
- 3) _____
- 4) _____

Extraction of the DNA

Comparison of the DNA with known sources

PCR to amplify the DNA

Analysis of the DNA

Which is the scientific field devoted to creating and maintaining databases about the gene sequences of organisms?

- ☐ proteomics
- ☐ genomics
- ☐ pharmacogenomics
- ☐ bioinformatics

The field of _____ uses computers to index and organize information created by sequencing the human genome.

Why would a forensic scientist use noncoding regions of DNA rather than coding regions of DNA?

- ☐ The noncoding regions of DNA are identical to each individual.
- ☐ The noncoding regions of DNA can create proteins that can be identified.
- ☐ The noncoding regions of DNA are not used. The coding regions are actually used.
- ☐ The noncoding regions of DNA are unique to each individual.

What is DNA typing?

- ☐ It is the process of determining the sequence of an organism.
- ☐ It is the process of determining what genes code for specific proteins.
- ☐ It is the process of separating an individual's unique sequence of DNA fragments to observe distinct patterns.
- ☐ It is the process of creating numerous strands of DNA fragments from preexisting ones using nucleotides.

Description	
Cells make copies of recombinant plasmid DNA during cell replication and the DNA is present in the new cells.	_____
Exogenous DNA of one organism is inserted into the DNA of another organism.	_____
The DNA sequence of the cloned recombinant DNA molecules is identified for further study.	_____
A short electric pulse or brief rise in temperature creates openings in the plasma membrane of cells and plasmid DNA enters into the cell.	_____
DNA fragments are separated in a medium according to their size.	_____
Millions of copies of a specific region of a DNA fragment are created.	_____
DNA is cleaved from the plasmid DNA with a restriction enzyme and joined together with DNA from another organism by DNA ligase.	_____

Based on the sequences below, which restriction enzyme produces a blunt end? *The cut site is indicated by the *.*

- ☐ *EagI* C*GGCC G
G CCGG*C
- ☐ *EcoRV* GAT*ATC
CTA*TAG
- ☐ *NsiI* A TGCA*T
T*ACGT A
- ☐ *TaqI* T*CG A
A GC*T

What process uses electric pulsation or heat to create openings in the plasma membrane of bacterial cells?

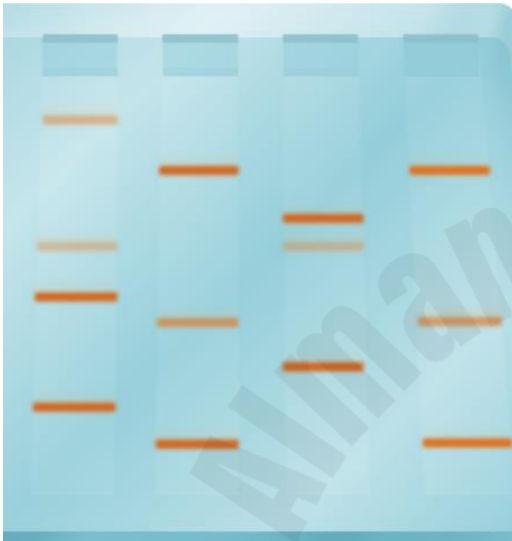
- ☐ cloning
- ☐ gel electrophoresis
- ☐ recombinant DNA formation
- ☐ transformation

During ___, a cell takes in DNA from outside the cell.

- ☐ cloning
- ☐ genetic engineering
- ☐ transformation
- ☐ DNA sequencing

Which term names small, circular DNA molecules that are found in bacterial cells?

- ☐ restriction enzymes
- ☐ genomes
- ☐ plasmids
- ☐ ligases



Which of the following are characteristics of a restriction enzyme? Select all that apply.

- ☐ splices DNA sequence together
- ☐ replicates the DNA fragment
- ☐ creates fragments of different sizes
- ☐ cleaves DNA within a specific sequence
- ☐ recognizes and binds to specific DNA sequences

There are two types of restriction enzymes. _____ end restriction enzymes recognize and bind to specific DNA sequences and contain single-stranded DNA that is complementary. _____ end restriction enzymes cut across both strands.

Darwin referred to the process of promoting certain traits by breeding members with those traits as _____.

What theory did Darwin propose to explain the origin of new species?

- ☐ heritability
- ☐ natural selection
- ☐ artificial selection
- ☐ evolution

Christina and her friends are discussing the theory of evolution. One friend states that there is no evidence to support the theory of evolution. Which line of evidence could Christina offer to contradict her friend's statement?

- ☐ All animal structures have evolved to perform a specific function.
- ☐ Vertebrate embryos share common ancestral features such as tails.
- ☐ Fossil evidence demonstrates the major changes of most species.
- ☐ Humans have bred dozens of dog varieties from ancestral wolves.

Murimi must watch a documentary about the life and work of Charles Darwin as part of an assignment for her science class. Murimi takes notes during the movie to help her remember basic facts about Darwin. Which would be in her notes?

- ☐ Aboard the HMS Beagle, Darwin observed the changing behaviors of finches.
- ☐ Aboard the HMS Beagle, Darwin wrote his book *On the Origin of Species*.
- ☐ Darwin provided evidence for the popular belief that species evolve.
- ☐ Darwin proposed natural selection as the mechanism for species change.

What is the field of bioinformatics?

- ☐ study of an organism's genome
- ☐ field of study that creates and maintains databases of biological information, especially genomic data
- ☐ study of how genetic inheritance affects the body's response to drugs in order to produce safer and more specific drug dosing
- ☐ study of the structure and function of proteins in the human body

In the context of genetic engineering, what is the purpose of cloning?

- ☐ to amplify specific sequences of a DNA molecule
- ☐ to produce large numbers of identical recombinant DNA molecules
- ☐ to create multiple copies of an organism
- ☐ to replicate the human genome

Forensic scientists are able to use _____ in order to determine the identity of an unknown person in an investigation by collecting sample DNA and comparing it to known samples.

What is the process called when a bacteria cell takes up DNA from an outside source, such as a recombinant plasmid DNA molecule?

- ☐ transformation
- ☐ transportation
- ☐ transmission
- ☐ transition

_____, the study of an organism's genome, has paved the way for _____, which is the study of the structure and function of proteins, by cataloging the genes in an organism that code for various proteins.

Match the following definitions to the appropriate term.

Definition	Term
bacterial protein that cuts DNA into fragments	_____
enzyme that chemically links DNA fragments together	_____
total DNA in each cell nucleus of an organism	_____
area of linked genetic variations in the human genome	_____
any of the small, circular, double-stranded DNA molecules that can be used as a vector	_____

The process used to identify an unknown accident or crime victim is called _____.

Fill in the blanks using the available answer choices.

_____ occurs when recombinant plasmid DNA is taken in by
(Blank 1)
bacterial cells after electric pulses create openings in the plasma membrane.

EcoRI is an example of a(n) _____.

Recombinant DNA technologies have led to the development of transgenic plants, which can withstand harsher environmental conditions by hybridizing the genome of two distinct plant species.

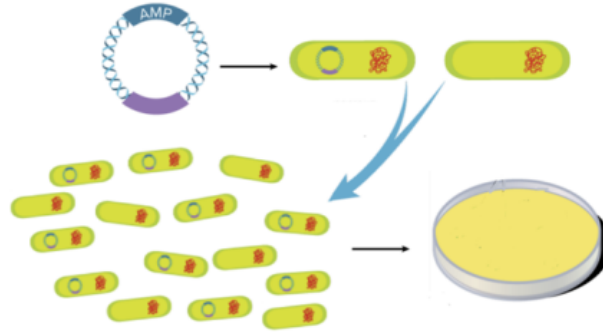
How can restriction enzymes be used to hybridize these two genomes?

أدت تقنيات الحمض النووي المعاد تركيبه إلى تطوير نباتات معدلة جينيا يمكنها تحمل الظروف البيئية القاسية من خلال تهجين جينوم نوعين مختلفين من النبات.
كيف يمكن استخدام إنزيمات القطع لتهجين هذين الجينومين؟

- a. They can be used to cleave mitochondrial DNA at specific restriction sites. يمكن استخدامها لقطع الحمض النووي الموجود في الميتوكوندريا في مواقع قطع محددة.
- b. They can be used to cleave mitochondrial DNA at random restriction sites. يمكن استخدامها لقطع الحمض النووي الموجود في الميتوكوندريا في مواقع قطع عشوائية.
- c. They can be used to cleave nuclear DNA at specific restriction sites. يمكن استخدامها لقطع الحمض النووي الموجود في نواة الخلية في مواقع قطع محددة.
- d. They can be used to cleave nuclear DNA at random restriction sites. يمكن استخدامها لقطع الحمض النووي الموجود في نواة الخلية في مواقع قطع عشوائية.

The figure below represents the transformation process of bacterial cells to produce ampicillin resistant strain. What percentage of the cloned bacterial cells will be able to resist the ampicillin?

يمثل الشكل أدناه عملية تحول خلايا البكتيريا لإنتاج سلالة مقاومة للأمبيسلين. ما هي النسبة المئوية للخلايا البكتيرية المستنسخة التي ستكون قادرة على مقاومة الأمبيسلين؟



In the figure below, northern water snakes have two extreme traits for color patterns, depending on their habitat. A snake with intermediate coloring would be disadvantaged because it would be more visible to predators. What does that indicate?

في الشكل أدناه، ثمة نمطان متطرفان من الألوان لدى الأفاعي المائية الشمالية، وذلك بحسب مواطنها البيئية. وقد تم إزالة الأفراد ذوي الصفات الوراثية المتوسطة لكونها مرئية وأكثر عرضة للمفترسين. علام يشير ذلك؟



mottled brown skin

جلد بني أرقش



gray skin

جلد رمادي اللون

A population of animals has a dominant allele for dark-colored fur and a recessive allele for light-colored fur. Sixty percent of the animals are homozygous dominant, 25 percent are heterozygous dominant, and 15 percent are homozygous recessive. Calculate the equilibrium frequencies for the dark colored fur gene in the animals' population.

تمتلك مجموعة من الحيوانات أليلاً سائداً للفراء داكن اللون وأليلاً متنحيًا للفراء الفاتح اللون. 60% منهم ذو جينات متماثلة سائدة، 25% متخالفو الجينات، 15% متماثلو الجينات المتنحية. احسب تكرار أليل جين الفراء للون الداكن في الحيوانات.

The table below shows the basic principles of natural selection. Which letter of the following corresponds to the principle of Overproduction?

يوضح الجدول أدناه المبادئ الأساسية للانتخاب الطبيعي، أي حرف مما يلي يقابل مبدأ الافراط في الإنتاج؟

A	Individuals in a population show variations among others of the same species.	يُظهر أفراد جماعة أحيائية من النوع نفسه تنوعات فيما بينهم
B	Variations are inherited.	يتم توارث التنوعات
C	Animals have more offspring than can survive on the available resources.	إن عدد صغار الحيوانات يفوق قدرة الموارد المتاحة على ضمان بقاء جميعها على قيد الحياة
D	Variations that increase reproductive success will be more common in the next generation.	تكون التنوعات التي تزيد من نجاح التكاثر أكثر شيوعاً في الجيل التالي

Based on the table below, which letter of the following corresponds to the correct definition of Evolution?

استناداً إلى الجدول أدناه، أي حرف مما يلي يقابل تعريفاً صحيحاً للتطور؟

A	توزيع النباتات والحيوانات حول العالم The distribution of plants and animals around the world
B	الآلية التي يمكن بها تعديل جماعة أحيائية The mechanism by which a population changes
C	عملية تزاوج موجه لإنتاج ذرية تتميز بالصفات المرغوبة The process of directed breeding to produce offspring with desired traits
D	التغيرات التراكمية لدى مجموعات من الكائنات الحية عبر الزمن The cumulative changes in groups of organisms through time

In the figure below, it would be easy for a predator to miss this arctic hare in a snowy environment, as well as, other predator will not notice the insect on the yellow flower.

في الشكل أدناه، سيكون من السهل أن يغفل مفترس ما عن الأرنب القطبي في بيئة ثلجية وكذلك لن يلاحظ مفترساً آخر الحشرة فوق الزهرة الصفراء . فما السبب في ذلك؟

What is the reason for that?



Arctic Hare in snowy environment
الأرنب القطبي في بيئة ثلجية



The insect on the yellow flower
الحشرة فوق الوردة الصفراء

Which of the following is **not** a principle of Darwin's theory of evolution by natural selection?

أي مما يلي **ليس** من مبادئ نظرية داروين للتطور عن طريق الانتخاب الطبيعي؟

Learning Outcomes Covered

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- | | |
|----------------------------------|--------------------------|
| a. Heritability | التوريث |
| b. Reproductive Advantage | الإفراط في الإنتاج |
| c. Overproduction | الميزة التكاثرية |
| d. Similar traits of the species | الصفات المتشابهة للأنواع |

organisms with extreme expressions of a trait are removed

shift of a population toward an extreme version of a beneficial trait

individuals with average traits are removed, creating two populations with extreme traits

Which of the following are violations of the conditions necessary for genetic equilibrium according to the Hardy-Weinberg principle? Select all that apply.

- ☐ A population is isolated, with no immigration or emigration.
- ☐ Mating within a population is random.
- ☐ Mutations occur in the population.
- ☐ A population is known to consist of only of a few remaining individuals.
- ☐ Pressure from environmental change increases natural selection.

A biologist is studying why certain lizards are found on one island, but not on others. Which of the following is the best term to describe this type of study?

- ☐ evolution
- ☐ comparative biochemistry
- ☐ comparative anatomy
- ☐ biogeography

Biologists use the term _____ to define cumulative changes in groups of organisms through time.

Which was the first conclusion Darwin made soon after returning from the Galápagos Islands?

- ☐ New species of finches could emerge through small ancestral changes.
- ☐ Variety among Galápagos birds resulted from evolutionary changes.
- ☐ Natural selection was the evolutionary mechanism for species change.
- ☐ Wild finch diversity explained the breeding of domesticated animals.

(Blank 1) **occurs when average traits, rather than extreme traits, benefit a population.**

Blank 1 options

- Directional selection
- Disruptive selection
- Stabilizing selection

Match each definition with its term.

stabilizing selection _____

directional selection _____

disruptive selection _____

increases the expression of the extreme versions of a trait in a population

eliminates extreme expressions of a trait when the average expression leads to higher fitness

splits a population into two groups by removing individuals with average traits but retaining individuals expressing extreme traits at both ends of a continuum

Identify conditions of the Hardy-Weinberg principle. Select all that apply.

- ☐ organisms may move in and out of the population
- ☐ mating is not random
- ☐ there is no gene flow
- ☐ mating is random
- ☐ there is no natural selection
- ☐ there is no mutation
- ☐ there is no genetic drift

Which of the following adaptations can increase the fitness of an organism? Select all that apply.

- ☐ spandrels
- ☐ camouflage
- ☐ biogeography
- ☐ mimicry

_____ structures are inherited from a common ancestor, while
(Blank 1)

_____ structures are not.
(Blank 2)

_____ is a measure of the relative contribution that an individual trait
(Blank 1)
makes to the next generation. It often is measured as the number of reproductively viable offspring that an organism produces in the next generation.



- ☐ biogeography
- ☐ mimicry
- ☐ camouflage
- ☐ fitness

Which is an example of camouflage?

- ☐ A leafy sea dragon looks more like a plant than an animal.
- ☐ A group of macaws isolated on an island have uniquely shaped beaks.
- ☐ The thick feathers of the great horned owl make it a nearly silent flier.
- ☐ The viceroy butterfly's colors match the monarch butterfly's colors.

Recently evolved traits that do not appear in ancestral fossils are called _____ traits.

Which statement about the tortoise shown would be part of an explanation for tortoise evolution based on natural selection?



- ☐ The tortoise shell does not look like the shell of either parent.
- ☐ Tortoises with domed shells have more young than tortoises with flat shells.
- ☐ All tortoises look like the tortoise shown.
- ☐ All tortoises born on an island survive.

A morphological adaptation in which one species resembles another is called ____.

- ☐ camouflage
- ☐ analogous structure
- ☐ mimicry
- ☐ fitness

Hawk wings and grasshopper wings allow for sustained flight, but these structures evolved separately.	_____ (2024)
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The figure below shows a recombinant nucleic acid plasmid, **What is the role of the molecule below in DNA cloning?**

الشكل أدناه يوضح بلازميد حمض نووي معاد التركيب. **ما دور هذا الجزيء في استنساخ الـ DNA؟**

- | | |
|---|---|
| a. To make the foreign DNA susceptible to digestion with enzymes | جعل الـ DNA الدخيل قابلاً للهضم عن طريق الإنزيمات |
| b. To identify the host cell that has taken up the gene of interest | تحديد الخلية المضيفة التي استقبلت الجين المعني |
| c. To identify the source of DNA as foreign | تحديد مصدر الـ DNA على أنه دخيل |
| d. To carry the foreign DNA into the host cell | نقل الـ DNA الدخيل إلى داخل الخلية المضيفة |

Which is the process that scientists use to produce large numbers of recombinant DNA molecules?

ما العملية التي يستخدمها العلماء لإنتاج أعداد كبيرة من جزيئات حمض نووي معاد التركيب؟

- a. Gel electrophoresis الفصل الهلامي
- b. Polymerase chain reaction تفاعل البلمرة المتسلسل
- c. Recombinant DNA technology تقنية الحمض النووي معاد التركيب
- d. Gene cloning الاستنساخ الجيني

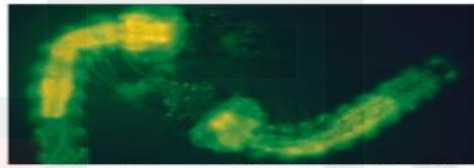
Which statement about the human genome is false?

أي من العبارات التالية المتعلقة بالجينوم البشري خاطئة؟

- a. The human genome contains long stretches of DNA with no known function
يحتوي الجينوم البشري على امتدادات طويلة للحمض النووي (DNA) من دون وظيفة معروفة
- b. The human genome was sequenced by scientists from around the world
قام علماء من كل أنحاء العالم بترتيب تسلسل الجينوم البشري
- c. The human genome contains nucleotide sequences that all code for proteins
يحتوي الجينوم البشري على تسلسلات نيوكليوتيدات ترمز كلها إلى بروتينات
- d. The human genome contains approximately 25,000 genes
يحتوي الجينوم البشري على ما يقرب من 25,000 جين

The researchers inserted a gene for a lighting protein called green fluorescent protein (GFP) into the larvae of the mosquito shown in the figure below. What is this technique called?

أدخل الباحثون جيناً لبروتين الإضاءة يسمى بروتين الفلوري الأخضر (GFP) في يرقات البعوضة الموضحة بالشكل أدناه، ماذا تسمى هذه التقنية؟



يرقات البعوض المعدلة وراثياً

- a. Genetic engineering هندسة الجينات
- b. DNA microarray مصفوفة DNA الدقيقة
- c. Bioinformatics المعلوماتية الأحيائية
- d. Transformation التحويل

Which statement about the DNA fingerprinting is false?

أي من العبارات التالية المتعلقة بالبصمة الوراثية خاطئة؟

- a. It analyses the long stretches of noncoding regions of DNA
تحليل الامتدادات الطويلة للمناطق DNA غير المشفرة
- b. Identify single nucleotide polymorphisms
تحديد حالات تعدد أشكال النيوكليوتيدات الفردية
- c. Identify individuals who have committed crimes
تحديد هوية الأفراد الذين ارتكبوا الجرائم
- d. Almost unique to each individual
تكون فريدة من نوعها لدى كل فرد

The figure below shows making a large quantity of

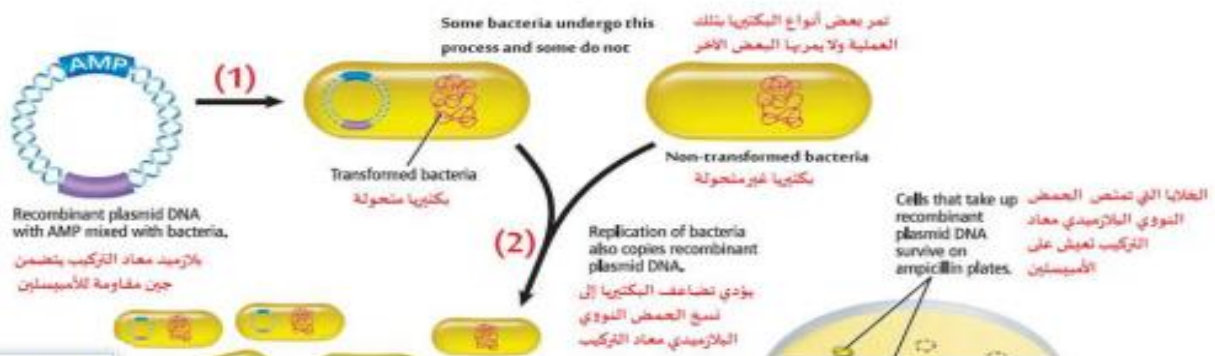
recombinant plasmid, Study it and then answer the question:

Which of the following does numbers (1) and (2) refer to?

الشكل أدناه يبين عملية إنتاج كمية كبيرة من بلازميد

الحمض النووي مُعاد التركيب، أدرسه ثم أجب عن السؤال:

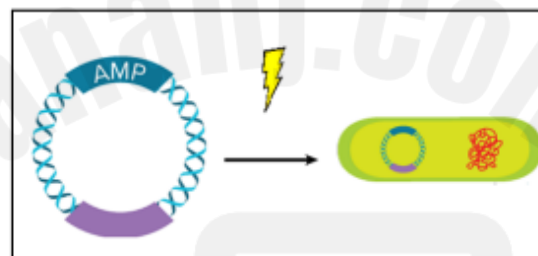
أي مما يلي تشير إليه الأرقام (1) و (2)؟



Outcomes Covered

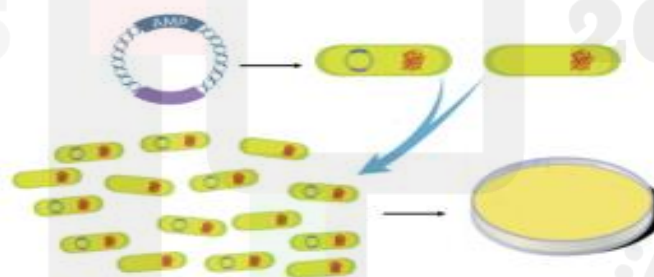
Study the figure below and answer the question.

What process uses electric pulsation or heat to create openings in the plasma membrane of bacterial cells?



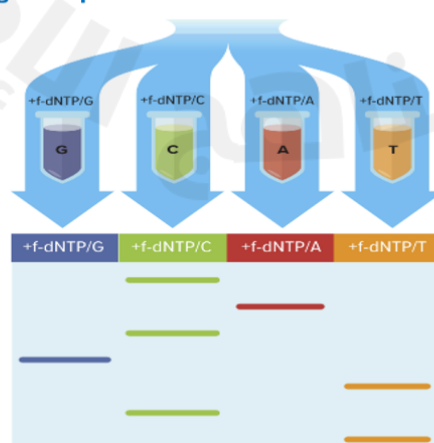
The figure below represents the transformation process of bacterial cells to produce ampicillin resistant strain. What percentage of the cloned bacterial cells will be able to resist the ampicillin?

يمثل الشكل أدناه عملية تحويل خلايا البكتيريا لإنتاج سلالة مقاومة للأمبيسلين. ما هي النسبة المئوية للخلايا البكتيرية المستنسخة التي ستكون قادرة على مقاومة الأمبيسلين؟



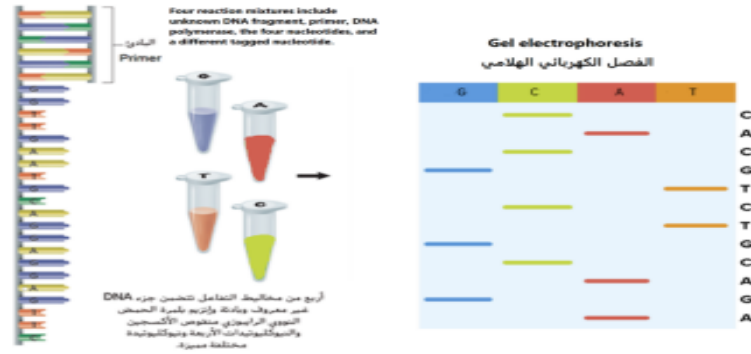
The figure below represents the Gel electrophoresis in the DNA sequencing process of an unknown DNA fragment where fluorescent-tagged nucleotides were used with four different colors.

Which of the following is the right sequence of the nucleotides on the gel below?



The figure below shows the arrangement of DNA sequences using fluorescently labeled nucleotides. On what basis are the fluorescently labeled fragments separated in gel electrophoresis?

استناداً إلى الشكل أدناه الذي يوضح ترتيب تسلسل DNA باستخدام النيوكليوتيدات الموسومة بالفلوريسنت، على أي أساس يتم فصل الأجزاء المميزة بالفلوريسنت في عملية الفصل الكهربائي؟



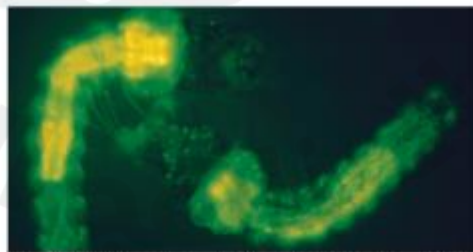
- a. Weight الوزن
- b. Mass الكتلة
- c. Length الطول
- d. Density الكثافة

What are variations in specific nucleotides that are linked to human diseases called?
ما هي الاختلافات في النيوكليوتيدات المحددة المرتبطة بالأمراض التي تصيب الإنسان؟
(2 Points)

- ☐ A. proteomes البروتيوم
- ☐ B. haplotypes النموذج الفردي
- ☐ C. single nucleotide polymorphisms تعدد أشكال النيكلوتيدات الفردية

The researchers inserted a gene for a lighting protein called green fluorescent protein (GFP) into the larvae of the mosquito shown in the figure below. What is this technique called?

أدخل الباحثون جيناً لبروتين الإضاءة يسمى بروتين الفلوري الأخضر (GFP) في يرقات البعوضة الموضحة بالشكل أدناه، ماذا تسمى هذه التقنية؟



Genetically engineered mosquito larvae يرقات البعوض المعدلة وراثياً

- a. Genetic engineering هندسة الجينات
- b. DNA microarray مصفوفة DNA الدقيقة
- c. Bioinformatics المعلوماتية الأحيائية

Based on the nucleotides sequences below, which restriction enzyme produces a blunt end?

The cut site is indicated by the *.

T*CG A
A GC*T

TaqI

GAT*ATC
CTA*TAG

EcoRV

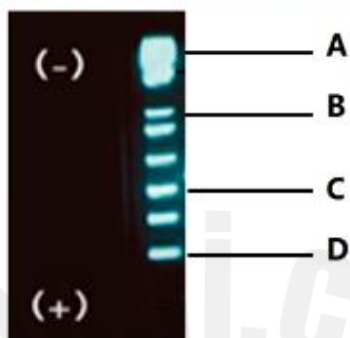
A TGCA*T
T*ACGT A

NsiI

C*GGCC G
G CCGG*C

EagI

The figure below shows the DNA fragments pattern after the packed gel was placed in the electrophoresis tank and the current was turned on. Which of the following letters represents the band with the smallest DNA fragment?



Scientists studied the derived and the ancestral traits of the Horseshoe crab.
Which of the following evidence of evolution they have studied?

- Comparative molecular biology
- The fossil record
- Geographic distribution
- Types of adaptation

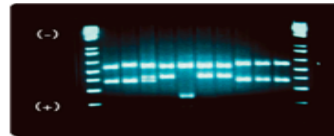
The figure below represents the open reading frames (ORF). Which of the following is **not** an ending codon?



Based on the table below, use the Hardy-Weinberg equation ($p^2 + 2pq + q^2 = 1$) to determine the equilibrium frequency of the dominant tall (TT) genotype in a population of pea plants.

Pea plants (population :100)		
TT	Tt	tt
40	40	20

In the figure below, what happens to the DNA fragments when the packed gel is placed in the electrophoresis tank and the current is turned on?



- a. DNA fragments degrade
- b. DNA fragments adhere to the gel
- c. Gel particles melt
- d. DNA fragments separate

A biologist is studying lizards' location and why certain lizards are found on one island, but not on others. Which of the following is the best term to describe this type of study?

- a. Evolution
- b. Comparative biochemistry
- c. Comparative anatomy
- d. Biogeography

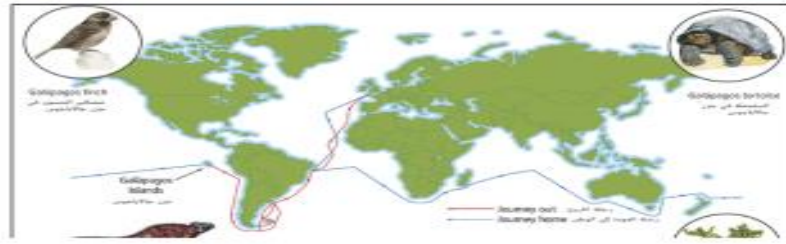
Which of the following is **not** a condition of the Hardy–Weinberg principle?

- a. There is no immigration or emigration.
- b. Natural selection does not occur.
- c. Random mating occurs.
- d. Mutations occur.

What did Darwin call the process of directed mating to produce offspring with large tomato plants?

- a. Natural selection
- b. Evolution
- c. Overpopulation
- d. Artificial selection

The figure below shows Darwin's journey and the animals he studied at Galápagos Islands of South America. Which was the first conclusion Darwin made soon after returning from the Galápagos Islands?



a. Variety among Galápagos birds resulted from evolutionary changes

b. New species of finches could emerge through small ancestral changes

c. Wild finch diversity explained the breeding of domesticated animals

d. Natural selection was the evolutionary mechanism for species change

What is the term that best describes the point mutations in specific nucleotides that are linked to human diseases?

a. Proteomes

b. Haplotypes

c. Single nucleotide polymorphisms

Which of the following is a protein that allows the mRNA to build complementary DNA strand?

Reverse transcriptase enzyme