**Proeftentamen**

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| **1** Short segments of newly synthesized DNA are joined into a continuous strand by \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | helicase | | **B** | single-strand binding protein | | **C** | DNA polymerase | | **D** | ligase | | **E** | primase | |

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| **2** Which one of the following is **not** true about double-stranded DNA? | |
| **Answer** | |  |  | | --- | --- | | **A** | The strands run antiparallel. | | **B** | It is helical. | | **C** | The two strands are complementary. | | **D** | Adenine and uracil are present in equal amounts. | | **E** | It contains phosphodiester linkages. | |

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| **3** Which description of DNA replication is correct? | |
| **Answer** | |  |  | | --- | --- | | **A** | The two strands separate, and each one receives a complementary strand of RNA. Then this RNA serves as a template for the assembly of many new strands of DNA. | | **B** | Helicases separate the two strands of the double helix, and DNA polymerases then construct two new strands using each of the original strands as templates. | | **C** | The two strands of DNA separate, and restriction enzymes cut up one strand. Then polymerase synthesizes two new strands out of the old ones. | | **D** | Ligase separates the two strands of the DNA double helix. Then DNA polymerase synthesizes the leading strand and primase synthesizes the lagging strand. | | **E** | Ligase assembles single-stranded codons, then polymerase knits these codons together into a DNA strand. | |

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| **4** Which of the following enzymes is **not** involved in nucleotide excision repair? | |
| **Answer** | |  |  | | --- | --- | | **A** | ligase | | **B** | nuclease | | **C** | DNA polymerase | | **D** | primase | |

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| **5** Unlike prokaryotic DNA replication, replication of eukaryotic chromosomes \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | cannot be completed by DNA polymerase | | **B** | is error free | | **C** | is semiconservative | | **D** | has a single origin | | **E** | involves two leading strands and no lagging strands | |
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| **6** Usually, in eukaryotic genes \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | exons are transcribed, but the RNA transcribed from introns does not leave the nucleus | | **B** | introns are not transcribed | | **C** | exons are not transcribed | | **D** | both introns and exons are transcribed, but the RNA transcribed from them does not leave the nucleus | | **E** | exons and introns are transcribed, and the RNA transcribed from them leaves the nucleus | |

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| **7** Spliceosomes are composed of \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | snRNPs and other proteins | | **B** | polymerases and ligases | | **C** | introns and exons | | **D** | the RNA transcript and protein | | **E** | snRNPs and snurps | |

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| **8** Which one of the following is **not** associated with RNA? | |
| **Answer** | |  |  | | --- | --- | | **A** | ribose | | **B** | thymine | | **C** | phosphates | | **D** | uracil | | **E** | single-strandedness | |

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| **9** Polysomes may be defined as \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | groups of lysosomes | | **B** | groups of peroxisomes | | **C** | microfilaments and microtubules | | **D** | groups of chromosomes | | **E** | groups of ribosomes | |

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| **10** Genetic information of eukaryotic cells is transferred from the nucleus to the cytoplasm in the form of \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | proteins | | **B** | RNA | | **C** | lipids | | **D** | carbohydrates | | **E** | DNA | |

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| **11** What is the function of reverse transcriptase? | |
| **Answer** | |  |  | | --- | --- | | **A** | It catalyzes the formation of a polypeptide from an RNA template. | | **B** | It catalyzes the formation of DNA from a polypeptide template. | | **C** | It catalyzes the formation of RNA from a polypeptide template. | | **D** | It catalyzes the formation of RNA from a DNA template. | | **E** | It catalyzes the formation of DNA from an RNA template. | |

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| **12** Double-stranded viral DNA is incorporated into a host cell as a \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | promoter | | **B** | provirus | | **C** | transposon | | **D** | *lac* | | **E** | homeoboxes | |

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| **13** Which of the following is an example of vertical transmission of a virus in plants? | |
| **Answer** | |  |  | | --- | --- | | **A** | Viral particles are carried by the wind from one plant to another. | | **B** | An infected plant produces seeds that contain the virus, giving rise to infected progeny. | | **C** | Two neighboring plants touch each other, allowing viruses present in one plant to infect the other plant. | | **D** | Viral particles are carried from one plant to another by a pair of pruning shears. | | **E** | All of the above are correct. | |

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| **14** Sometimes genes are transferred between bacteria when a bacteriophage packages bacterial DNA into the capsid instead of viral DNA. This process is called \_\_\_\_\_. *Zit dit jaar niet in de stof* | |
| **Answer** | |  |  | | --- | --- | | **A** | transformation | | **B** | conjugation | | **C** | binary fission | | **D** | transduction | |

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| **15** When the *lac* operon is strongly active, \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | the *lac* repressor protein is active | | **B** | glucose levels are high | | **C** | allolactose is absent | | **D** | all of the above | | **E** | cAMP levels are high | |

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| **16** The nucleic acid of a virus particle is enclosed in a protein coat known as a(n) \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | capsid | | **B** | genome | | **C** | nuclear envelope | | **D** | nucleoid | | **E** | envelope | |

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| **17** A poly-A tail's resistance to degradation is affected by the characteristics of the | |
| **Answer** | |  |  | | --- | --- | | **A** | 3' untranslated region | | **B** | promoter | | **C** | stop codon | | **D** | enhancer | | **E** | 5' untranslated region | |

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| **18** In a eukaryote, activating transcription factors may stimulate gene expression by binding to a DNA site called a(n) \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | histone | | **B** | promoter | | **C** | operon | | **D** | silencer | | **E** | enhancer | |

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| **19** Gene duplication can ultimately give rise to all of the following **except** \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | groups of genes with identical functions, but entirely unrelated sequences | | **B** | pseudogenes | | **C** | two closely related versions of a gene that are expressed in different tissues, or at different times during development | | **D** | structurally related genes with entirely different functions | | **E** | groups of identical genes that are expressed together | |

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| **20** A scientist clones a regulatory gene that is involved in controlling the expression of other genes, and discovers that the regulatory gene encodes a histone deacetylase enzyme. It is likely that this enzyme regulates gene expression by \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | causing tighter packing of the chromatin at the target gene, thereby enhancing transcription | | **B** | causing looser packing of the chromatin at the target gene, thereby enhancing transcription | | **C** | causing tighter packing of the chromatin at the target gene, thereby inhibiting translation | | **D** | causing tighter packing of the chromatin at the target gene, thereby inhibiting transcription | | **E** | causing looser packing of the chromatin at the target gene, thereby inhibiting transcription | |

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| **21** RNA interference (RNAi) refers to the \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | hijacking of most cellular functions by retroviruses upon infection | | **B** | tendency of mRNA to get stuck in the nuclear pores, blocking all movement of molecules into and out of the nucleus | | **C** | destruction of RNA molecules having a sequence complementary to an introduced double-stranded RNA | | **D** | inhibition of the activity of certain enzymes by RNA molecules mimicking their normal substrates | | **E** | ability of mRNA to hybridize to the DNA template and inhibit DNA replication | |

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| **22** Segments of eukaryotic DNA that can move from one site to another in the genome by means of an RNA intermediate are called \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | transposons | | **B** | introns | | **C** | retrotransposons | | **D** | plasmids | | **E** | alleles | |

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| **23** In genetic engineering, "sticky end" refers to \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | none of the above | | **B** | the site on mRNA that sticks to the DNA during transcription | | **C** | short bits of single-stranded DNA left at the end of DNA molecules cut by restriction enzymes | | **D** | a technique for finding a gene of interest within a nucleus without destroying the cell | | **E** | the ability of plasmids to stick to a bacterial cell wall and thus be taken up into the bacterium | |

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| **24** Archaeologists unearthed a human skull with a small dried fragment of the scalp still attached. They extracted a tiny amount of DNA from the scalp tissue. How could they obtain sufficient DNA for an analysis of the ancient human's genes? | |
| **Answer** | |  |  | | --- | --- | | **A** | Subject the DNA to electrophoresis. | | **B** | Subject the specimen to amniocentesis. | | **C** | Subject the DNA to restriction enzymes. | | **D** | Use a nucleic acid probe. | | **E** | Use the polymerase chain reaction. | |

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| **25** A nucleic acid probe can be used to \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | find a particular nucleotide sequence within a mass of DNA | | **B** | make DNA for gene cloning | | **C** | insert genes into a host cell | | **D** | splice pieces of DNA | | **E** | cut pieces of DNA down to a manageable size | |

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| **26** A genomic library is \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | a listing of the known nucleotide sequences for a particular species | | **B** | a place where one can obtain DNA samples from various species | | **C** | all the genes contained in one kind of organism | | **D** | a collection of cloned DNA pieces from a genome | | **E** | where you look to find out how to make recombinant DNA | |

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| **27** The main goal of the Human Genome Project (HGp) was to \_\_\_\_\_. | |
| **Answer** | |  |  | | --- | --- | | **A** | map all the human genes and determine the nucleotide sequence of the entire human genome | | **B** | find cures for human genetic disorders | | **C** | map and sequence the genomes of important research organisms such as *Drosophila melanogaster* | | **D** | develop new technologies for studying DNA | | **E** | compare the genomes of a large number of individuals from different parts of the world | |

**Open vragen:**

1. Beschrijf een praktijkexperiment waarmee je kunt aantonen of DNA-replicatie volgens het conservatieve, semiconservatieve, of het dispersieve model plaatsvindt.

2. Wat is de functie van aminoacyl-tRNA synthetase?

3. Wat zijn de verschillende verschijningsvormen die de dragers van het genetisch materiaal in virussen kunnen hebben?

4. Wat is een prion? Hoe planten prionen zich voort en hoe worden ze overgedragen?

5. Uit welke verschillende onderdelen bestaat een operon? Wat is de functie van een operon?

6. Welke twee types van negatieve regulatie van operons ken je? Wat is het verschil? Noem ook een voorbeeld van positieve regulatie.

7. Beschrijf het produceren van miRNA in de cel. Wat is de functie van miRNA?

8. Op welke manieren kunnen genduplicaties ontstaan?

9. Hoe gaat de dideoxy chain termination method voor het sequencen van DNA in zijn werk?

10. Wat is RNA-processing? Noem 3 vormen van processing.

11. Wat is de juiste volgorde van het mRNA als hieronder de template gegeven is:

5’ cag tct aga ctg ggc aag tta gca tat 3’