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| 1. Using X-ray diffraction, what did Rosalind Franklin show the shape of DNA to be? | **a. twisted ladder** c. cell  b. circle d. triangular |
| 1. Watson and Crick built a DNA model like a | **a. twisted ladder** c. cell  b. circle d. triangular |
| 3. The sides of the DNA “ladder” are made of | a. bases **c. phosphate and sugar**  b. adenine d. thymine |
| 4. The “rungs” of the DNA ladder are | a. phosphate c. sugar  **b. bases** d. cell |
| 5. To be copied, a DNA molecule splits | **a. down the middle**  b.off to the side |
| 6. A string of nucleotides that has instructions for a certain trait is a | **a. gene** c.base  b. cell d. phosphate |
| 7. Three bases code for one | **a. amino acid** c. cell  b.base d. sugar |
| 8. In what type of mutation is one base left out? | **deletion** |
| 9. A tobacco plant with a firefly gene that makes it glow is an example of | **a. genetic engineering** c. firefly breeding  b. DNA fingerprinting |
| 10. Which best expresses the relationship between genes and DNA? | **a.Genes contain DNA**. c.Both contain chromosomes.  b.DNA destroys genes. d.They are unrelated. |
| 11. DNA is made of subunits called what? | **nucleotides** |
| 12. Nucleotides are made of a sugar, a phosphate, and a | **base** |
| 13. Chargaff’s Rule states that adenine in DNA always equals the amount of | **thymine** |
| 14. Each set of three bases is a called a \_\_\_\_\_\_\_\_\_\_\_\_ | 1. **amino acid** c. base 2. DNA d. RNA |
| 15. What is the type of mutation where a base is added to the gene? |  |
| 16. Using DNA to identify who committed a crime is | a.genetic engineering. c.genetic disease.  **b.DNA fingerprinting.** d.DNA cloning. |
| 17. What materials make up each nucleotide in a DNA molecule? | **Sugar, phosphate, base** |
| 18. Some genetic disorders, such as sickle cell anemia, are due to | **Mutation** |
| 19. The complementary strand to the DNA sequence TAGTCA is | **ATCAGT** |
| 20. What determines how tall you grow and whether your hair is curly or straight? | a. a chromatid **c. proteins**  b. RNA d. ultraviolet radiation |
| 21. What is a string of nucleotides called? | a. a ribosome c. a rule  **b. a gene** d. a chromosome |
| 23. DNA is composed of subunits known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | **nucleotides** |
| 24. Chargaff’s rules state that the amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in DNA is always equal to the amount of guanine. | **cytosine** |
| 25. When scientists transfer genes from one organism to another, it is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | **Genetic engineering** |
| 26. When sequences of base pairs are copied incorrectly, they are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | **mutation** |
| 27. Examples of chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ include asbestos and chemicals found in cigarette smoke. | **mutagen** |
| 28. If there is 30% cytosine in a sample, there will be 20% \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (Trick question alert!- Look carefully and think about the rule!) | a. guanine  **b.adenine** |
| 29. As mRNA and tRNA go through the ribosome, the adenine and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will pair. | **a. thymine**  b.guanine |
| 30. A DNA sequence that reads ATTGCCGAT that after being copied reads ATTGCCAGAT is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | a. substitution  **b. insertion**  c. deletion |
| 30. A DNA sequence that reads ATTGCCGAT that after being copied reads ATTGCCCAT is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | **a. substitution**  b. insertion  c. deletion |
| 31. A DNA sequence that reads ATTGCCCAT that after being copied reads ATTGCCAT is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | a. substitution  b. insertion  **c. deletion** |
| 32. Substitutions, insertions, and deletions can all be **caused** by a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (Alert! – Read the question carefully!) | **mutagen** |
| 33. the organelle where proteins are synthesized by messenger RNA and transfer RNA | **a. ribosome** C. cell  b. ER |
| 34. the material made of amino acids that causes most of the differences we see in organisms | **a. protein** c. sugar  b. cell d. phosphate |
| 35. a molecule that makes a mirror copy of sections of DNA and helps make proteins | **a. RNA**  b. DNA |
| 36. a change in DNA caused by random error or a mutagen | **mutation** |
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