Evolution and Heredity:

DNA, Genes, Sexual Reproduction and Mutations

Pre-Test Review Sheet :

1. **Deoxyribonucleic Acid**

2. **Ribonucleic Acid**

3. **Messenger**

4. **Transfer**

5. **3**

**Consider the following DNA sequence for Q6-Q11:**

**GGC AGT TTA CCC CAT …**

6. Which of the following shows a FRAMESHIFT mutation caused by an INSERTION? Circle all that apply.

**A. GGA CAG TTT ACC CCA …**

**G. GGC AGT TTT ACC CCA…**

7. Which of the following shows a FRAMESHIFT mutation caused by a DELETION? Circle all that apply.

**E. GGA GTT TAC CCC ATC…**

8. Which of the following shows a POINT mutation caused by a SUBSTITUTION? Circle all that apply.

**B. GGA AGT TTA CCC CAT…**

9. Which of the following shows the corresponding DNA strand? Circle all that apply.

**F. CCG TCA AAT GGG GTA…**

10. Which of the following shows the mRNA sequence after transcription? Circle all that apply.

**D. CCG UCA AAU GGG GUA…**

11. What is the sequence of amino acids coded for by this sequence?

**Proline-Serine-Asparagine-Glycine-Valine**

12. What amino-acid is coded for by the following mRNA sequences?

A. GCU **Alanine**

B. GGU **Glycine**

C. ACA **Threonine**

D. UGA **STOP**

E. UUU **Phenylalanine**

F. GAG **Glutamic acid**

G. GGA **Glycine**

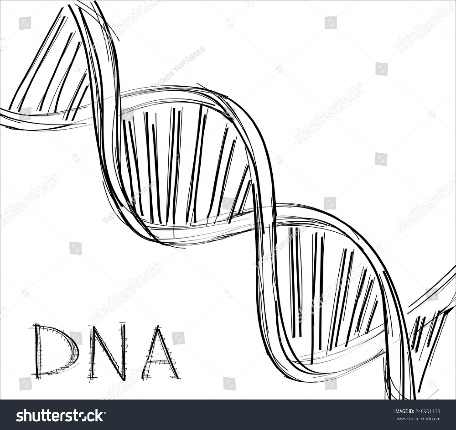
H. CGU **Arginine**

13. **UUA, UUG, CUA, CUC, CUG, CUU**

14. **AGC, AGU, UCA, UCC, UCG, UCU**

15. **UUA, UUG**

16. **A double helix consists of two long spiral molecules next to one another joined by cross links. It is often compared to a long twisted ladder. You could also visualize it as a very long spiral staircase.**



17. 1. **The mutation could be a simple substitution that results in the same amino acid being coded for.**

**2. The mutation may change a single amino acid, but the protein produced still performs the same function.**

**3. The mutation could occur on a section of DNA that is not a gene.**

**4. The mutation may affect a protein that performs a minor function, such that the change is insignificant. For example, there are hundreds of proteins responsible for our sense of taste, a mutation to one of these proteins would likely be undetectable.**

**5. The mutation may happen in one skin cell that is then sloughed off, or a hair cell or a fingernail cell.**

**6. The mutation could cause the creation of a new protein that performs a very similar function to the original function.**

18. **D. Nucleus**

19. **D. The sequence of nitrogenous bases is altered**

20. **10**

21. **0 (after meiosis the chromosomes ARE NOT PAIRED)**

22. **20**

23. **10**

24. **16**

25. **256**

26. **B. When a segment of a paternal chromosome and the homologous maternal chromosome switch places during meiosis**

27. **DNA Helicase**

28. **DNA polymerases bring the new DNA nucleotides and attach them to the template strand.**

29. **During cell division**

30. **Adenine, Cytosine, Guanine, Uracil**

31. 1. **RNA has the base Uracil while DNA has Thymine.**

**2. RNA has the sugar ribose in its backbone while DNA has the sugar deoxyribose.**

**3. RNA is single stranded while DNA is double stranded.**

**4. RNA can easily move in and out of the nucleus while DNA cannot.**

32. **The “copying” of the DNA code by mRNA and then moving that mRNA template out of the nucleus.**

33. a. **AGC UCG CCU**

b. **GCA AGG UUG**

c. **GGC UGU AAC**

34. **The process of assembling amino acids into proteins using the mRNA template.** **The tRNA molecules carry amino-acids and attach to the mRNA template. The amino acids are then joined together to make a protein.**

35. **Any biological, chemical or physical agent that causes a mutation in a DNA molecule.**

36. **Any biological, chemical or physical agent that causes cancer.**

37. The diagram below shows the chromosomes in a parent cell after DNA replication.

paternal

maternal

Use the diagram to answer the questions below:

A. **4**

B. **2**

C. **DIPLOID**

D. Which of the following best represents a possible daughter cell after MITOSIS? Circle all that apply.

E. Which of the following best represents a possible daughter cell after MEIOSIS? Circle all that apply.

38. **Double Helix**

39. **Nucleotide**

40. **Sugar and Phosphate**

41. **Nitrogenous Bases**

42. **Adenine, Cytosine, Guanine, Thymine**

43. **Adenine ⇔** **Thymine**

**Cytosine ⇔ Guanine**

44. **Chromosomes**

45. **Gene**

46. **Alleles**

47. **J. 6 000 000 000**

48. a. **CGT**

b. **AAC**

c. **AGT TTC**

d. **ACC GCT TGA CAC GCA ATG**

e. **GTT AGA CCC CTG ACC**

f. **TTG GTT CCG TAG CTC AAA**

49. **tRNA carries the amino acids to the mRNA template so they can be assembled into proteins.**

50. **23**

51. **Recessive. If it were dominant, 100% of individuals with the mutation would die before reproduction. Therefor the gene could not be passed on to the next generation.**

52. **The greater the number of genetic combinations that exist in a population, the greater the chances of a particular combination that will provide some advantage for survival.**

**The more genetic combinations, the greater the chance that some combination will provide immunity against some bacteria or virus that would otherwise cause extinction.**

**The more genetic combinations in a population the more adaptable that population will be to**

**changes in the environment.**

**The more genetic combinations that exist in a population the more likely that some individual will be adapted to fill some new niche that has arisen due to changes in the environment.**

53. Consider the following DNA sequence:

CCTGAGTCTAACATTCGAAACT

A. **GGA CUC AGA UUG UAA GCU UUG A**

B. **CCU GAG UCT AAC AUU CGA AAC U**

C. **Glycine-Leucine-Arginine-Leucine-STOP (Alanine-Leucine…)**

54. **Simply because most mutations do not result in cancer.**

55. **This genetic disorder, for the most part, does not affect the ability of an individual to survive and to reproduce and to pass on their genetic information. In this case the effect of the mutation is minor, so the individual may not even know that they are affected.**

56. **In this case the effects of the disorder are severe. However, the symptoms do not appear until after most individuals have reproduced. The genes will be passed on before the individual (or anyone else) knows that there is anything wrong.**

57. **Certain genes appear only on the X chromosome and not on the Y. For these genes males get only one allele, while females get the usual 2 alleles because males have only one X chromosome and one Y chromosome, while females have 2 X chromosomes. Let us call the two alleles A (dominant) and a (recessive). Males get only one of these alleles. If they inherit the A allele, they do not have the disorder, if they inherit a single a allele they have the disorder. In females, they will inherit two alleles so the possible genotypes are: AA, Aa and aa. Only those females with two recessive a alleles will have the disorder.**

58. **It must be recessive. If it has been known since 1926, it must have existed since at least 1926, probably for much longer. If it were dominant, 100% of those with the mutation die before passing it on and it cannot exist past 1 generation.**