DNA, Heredity and Natural Selection:

DNA, Genes, Sexual Reproduction and Mutations

Practice:

1. What is DNA short for?

2. Where in your cells is most of your DNA found?

A. Cytoplasm B. Mitichodria C. Ribosomes D. Nucleus

E. Cell Wall F. Cell Membrane G. Golgi Body H. Endoplasmic Reticulum

3. Each DNA molecule is shaped like a long ladder that has been twisted into a spiral. This shape is known as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. A DNA molecule is made of many (tens or hundreds of millions) small pieces. Each of these pieces contains 3 parts. A phosphate, a sugar and a nitrogenous base. Each of these pieces is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. The backbones of the DNA (the 2 sides of the ladder) are made up of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. The rungs of the ladder, that join the two sides together, are made up of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

7. A DNA molecule has 4 possible nitrogenous bases. These are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. Write the rule for base pairing. (What base pairs with what base?)

9. The DNA in your body is broken into pieces. Human DNA is found in 46 pieces (23 pairs: 23 from your father, 23 from your mother). These pieces are coiled up into structures called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

10. A section of DNA that codes for a specific protein is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

11. Different versions of the same gene are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. How many nucleotides are in a typical gene? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. For each of the following sequences of bases along a single strand of DNA, write sequence of bases on the complementary DNA strand.

a. GCA

b. TTG

c. TCA AAG

d. TGG CGA ACT GTG CGT TAC

e. CAA TCT GGG GAC TGG

f. AAC CAA GGC ATC GAG TTT

14. What is the name of the enzyme that “unzips” the DNA double helix by breaking the hydrogen bonds between the bases?

15. What role do DNA polymerases play in DNA replication?

16. When does DNA replication usually occur?

17. What is RNA?

18. What are the 4 bases in RNA?

19. Give 4 differences between DNA and RNA.

20. What is DNA transcription?

21. For each of the following sequences of bases along a single strand of DNA, write sequence of bases on the corresponding strand of mRNA.

a. TCG AGC GGA

b. CGT TCC AAC

c. CCG ACA TTG

22. What is DNA translation?

23. What is a mutagen?

24. What is a carcinogen?

Evolution and Heredity:

DNA, Genes, Sexual Reproduction and Mutations

Review Sheet:

1. What is DNA short for? Deoxyribonucleic Acid

2. Where in your cells is your DNA found?

A. Cytoplasm B. Mitichodria C. Ribosomes D. Nucleus

E. Cell Wall F. Cell Membrane G. Golgi Body H. Endoplasmic Reticulum

3. Each DNA molecule is shaped like a long ladder that has been twisted into a spiral. This shape is known as a

Double Helix

4. A DNA molecule is made of many (tens or hundreds of millions) small pieces. Each of these pieces contains 3 parts. A phosphate, a sugar and a nitrogenous base. Each of these pieces is called a Nucleotide.

5. The backbones of the DNA (the 2 sides of the ladder) are made up of SUGAR and PHOSPHATE

6. The rungs of the ladder, that join the two sides together, are made up of the NITROGENOUS BASES.

7. A DNA molecule has 4 possible bases. These are called Adenine, Cytosine, Guanine and Thymine

8. Write the rule for base pairing. (What base pairs with what base?)

Adenine with Thymine

Cytosine with Guanine

9. The DNA in your body is broken into pieces. Human DNA is found in 46 pieces (23 pairs: 23 from your father, 23 from your mother). These pieces are coiled up into structures called chromosomes

10. A section of DNA that codes for a specific protein is called a gene.

11. Different versions of the same gene are called alleles

12. How many nucleotides are in a typical gene? 10 000 average (usually between 1000 and 100 000)

13. For each of the following sequences of bases along a single strand of DNA, write sequence of bases on the corresponding strand.

a. GCA CGT

b. TTG AAC

c. TCA AAG AGT TTC

d. TGG CGA ACT GTG CGT TAC ACC GCT TGA CAC GCA ATG

e. CAA TCT GGG GAC TGG GTT AGA CCC CTG ACC

f. AAC CAA GGC ATC GAG TTT TTG GTT CCG TAG CTC AAA

14. What is the name of the enzyme that “unzips” the DNA double helix by breaking the hydrogen bonds between the bases?

DNA Helicase

15. What role do DNA polymerases play in DNA replication?

They deliver and attach the new nucleotides to the unzipped strands of DNA

16. When does DNA replication usually occur?

During cell division

17. What is RNA?

Ribonucleic Acid.

18. What are the 4 bases in RNA?

Adenine, Cytosine, Guanine and Uracil

19. Give 4 differences between DNA and RNA.

1. RNA has uracil while DNA has thymine

2. The sugar in the RNA backbone is RIBOSE, while the sugar in the DNA backbone is DEOXYRIBOSE

3. RNA is single stranded while DNA is double stranded

4. DNA is only in the nucleus while RNA can be in or out of the nucleus

20. What is DNA transcription?

The process of copying the sequence of bases on a DNA strand into a sequence of bases on a strand of messenger RNA (mRNA)

21. For each of the following sequences of bases along a single strand of DNA, write sequence of bases on the corresponding strand of mRNA.

a. TCG AGC GGA AGC UCG CCU

b. CGT TCC AAC GCA AGG UUG

c. CCG ACA TTG GGC UGU AAC

22. What is DNA translation?

It is the final step in protein production. It is the process of transfer RNA (tRNA) delivering and attaching amino acids to the mRNA template.

23. What is a mutagen?

A chemical or physical process that causes a change in the DNA sequence.

24. What is a carcinogen?

A chemical or physical process that causes cancer. Most commonly carcinogens are a type of mutagen.