

Chap 9 Sample Questions

_____ carries the blueprints for all forms of life on earth.

By the late 1800s scientists had determined that heritable information existed as discrete units called genes, which were located on _____.

Chromosomes contain both _____ and _____ and in the early 20th centuries scientists were unsure which of these carried the heritable units called genes.

In Griffith's experiments, what happened when heat-killed S strain pneumococcus were injected into a mouse along with live R strain pneumococcus?

- DNA from the live R was taken up by the heat-killed S, converting them to R and killing the mouse.
- DNA from the heat-killed S was taken up by the live R, converting them to S and killing the mouse.
- Proteins released from the heat-killed S killed the mouse.
- RNA from the heat-killed S was translated into proteins that killed the mouse.
- Nothing.

DNA has:

- A, U, G, and C bases
- Only C and T bases
- Only A and G bases
- C, T, A, and G bases
- Both U and T bases

If amounts of bases in a DNA molecule are measured, we find:

- $A = C$ and $G = T$
- $A = G$ and $C = T$
- $T = A$ and $C = G$
- No two bases would be equal in amount
- That all bases are equal in amount

The DNA of a certain organism has guanine as 30% of its bases. What percentage of its bases would be adenine?

- a. 0%
- b. 10%
- c. 20%
- d. 30%
- e. 40%

The DNA of a certain organism has cytosine as 20% of its bases. What percentage of its bases would be thymine?

- a. 0%
- b. 10%
- c. 20%
- d. 30%
- e. 40%

Which is not found in DNA?

- a. Deoxyribose sugar
- b. Adenine
- c. Phosphate group
- d. Phospholipid group
- e. Thymine

The correct structure of a nucleotide is:

- a. Phosphate-5 carbon sugar-nitrogen base
- b. Phospholipid-sugar-base
- c. Phosphate-sugar-phosphate-sugar
- d. Adenine-thymine and guanine-cytosine
- e. Base-phosphate-glucose

In DNA, phosphate groups bond to:

- a. Adenine
- b. Ribose
- c. Pyrimidine bases
- d. Other phosphate groups
- e. Deoxyribose

All the cells of a specific diploid organism contain equal amounts of:

- a. Adenine and guanine
- b. Guanine and cytosine
- c. Adenine and cytosine
- d. Thymine and cytosine
- e. Thymine and uracil

Which of the following statements is true?

- a. Both protein and DNA contain phosphorus.
- b. Both protein and DNA contain sulfur.
- c. Both protein and DNA contain thymine.
- d. Both protein and DNA contain carbon.
- e. All of the above choices are correct.

The rules for base pairing in DNA are:

- a. A = C and G = T in amount
- b. A with C, and G with T
- c. A with G, and C with T
- d. A with T, and G with C
- e. A = G and C = T in amount

By the early 1950s, many biologists realized that the key to understanding inheritance lay in the structure of:

- a. DNA
- b. Protein
- c. Histones
- d. Chromosomes
- e. Ribosomes

What is the relationship among DNA, a gene and a chromosome?

- a. A chromosome contains hundreds of genes which are composed of protein.
- b. A chromosome contains hundreds of genes which are composed of DNA.
- c. A gene contains hundreds of chromosomes which are composed of protein.
- d. A gene is composed of DNA, but there is no relationship to a chromosome.
- e. A gene contains hundreds of chromosomes which are composed of DNA.

Complementary base pairs are held together by:

- a. Peptide bonds
- b. Hydrogen bonds
- c. Disulfide bonds
- d. Covalent bonds
- e. Ionic bonds

The two polynucleotide chains in a DNA molecule are attracted to each other by:

- a. Covalent bonds between carbon atoms
- b. Hydrogen bonds between bases
- c. Peptide bonds between amino acids
- d. Ionic bonds between "R" groups in amino acids
- e. Covalent bonds between phosphates and sugars

The sequence of subunits in the DNA "backbone" is:

- a. --base--phosphate--base--phosphate--base--phosphate--
- b. --phosphate--sugar--phosphate--sugar--phosphate--sugar
- c. --sugar--base--sugar--base--sugar--base--sugar--base--
- d. --base--sugar--phosphate--base--sugar--phosphate--
- e. --base--phosphate--sugar--base--phosphate--sugar--

In a DNA molecule, base pairing occurs between:

- a. Adenine and thymine
- b. Adenine and guanine
- c. Guanine and uracil
- d. Thymine and cytosine
- e. Adenine and uracil

For the DNA sequence GCCTAT in one polynucleotide chain, the sequence found in the other polynucleotide chain is:

- a. CGGATA
- b. GCCATA
- c. CGGAUA
- d. ATTCGC
- e. GCCTAT

A DNA molecule has several types of bonds. Which of the following molecules are bonded together by hydrogen bonds in DNA?

- a. Sugar-phosphate
- b. Ribose-uracil
- c. Deoxyribose-adenine
- d. Purine base-pyrimidine base
- e. Adenine-uracil

Which of the following base pairs is incorrect?

- a. Thymine-adenine
- b. Adenine-uracil
- c. Cytosine-guanine
- d. Adenine-cytosine
- e. All the choices are correct

How does the Watson and Crick model of DNA structure help explain DNA replication?

- a. Deoxyribose sugar always bonds to a nitrogenous base.
- b. Precise base pairing allows the base sequence to be copied.
- c. Phosphate groups always bond to deoxyribose sugar.
- d. The number of purines equals the number of pyrimidines.
- e. Four types of bases are found in DNA.

In the comparison of a DNA molecule to a twisted ladder, the uprights of the ladder represent:

- a. Nitrogenous bases linked together
- b. Deoxyribose linked to phosphates
- c. Deoxyribose linked to sulfates
- d. Nitrogenous bases linked to phosphates
- e. Hydrogen bonds between bases

In the comparison of a DNA molecule to a twisted ladder, the rungs of the ladder represent:

- a. Nitrogenous bases linked together
- b. Deoxyribose linked to phosphates
- c. Deoxyribose linked to sulfates
- d. Nitrogenous bases linked to phosphates
- e. The backbones of the molecule

The rules formulated by Chargaff state that

- a. $A = T$ and $G = C$ in any molecule of DNA.
- b. $A = C$ and $G = T$ in any molecule of DNA.
- c. $A = G$ and $C = T$ in any molecule of DNA.
- d. $A = U$ and $G = C$ in any molecule of RNA.
- e. DNA and RNA are made up of the same four nitrogenous bases.

Genes code for

- a. enzymes.
- b. polypeptides.
- c. RNA.
- d. all of the above.
- e. none of the above.

What are the three major properties of genes that are explained by the structure of DNA?

- a. They contain information, direct the synthesis of proteins, and are contained in the cell nucleus.
- b. They contain nitrogenous bases, direct the synthesis of RNA and are contained in the cell nucleus.
- c. They replicate exactly, are contained in the cell nucleus, and direct the synthesis of cellular proteins.
- d. They contain information, are passed on from one generation to the next, and contain nitrogenous bases.
- e. They contain information, replicate nearly error-free, and change to produce a mutation.

The X-ray diffraction pattern for DNA suggested to Wilkins and Franklin all of the following features about DNA except:

- a. A DNA molecule is helical
- b. A DNA molecule has a diameter of 2 nanometers
- c. One full turn of the DNA helix occurs every 3.4 nanometers
- d. The phosphate-sugar "backbone" of the molecule is on the outside of the DNA helix
- e. A pairs with T and G pairs with C in a DNA molecule

Which of the following does not follow from the Watson and Crick base pairing rules?

- a. $A = T$ in amount
- b. $G = C$ in amount
- c. $A + G = T + C$ in amount
- d. $A + T = G + C$ in amount
- e. All the above choices are correct answers

Which component of a nucleotide present within a DNA molecule could be removed without breaking the polynucleotide chain?

- a. Ribose
- b. Deoxyribose
- c. Phosphate
- d. Uracil
- e. Thymine

If cytosine makes up 22% of the nucleotides in a sample of DNA from an organism, then adenine would make up what percent of the bases?

- a. 22
- b. 44
- c. 28
- d. 56
- e. It cannot be determined with the information given

Which of the following descriptions best fits the class of molecules known as nucleotides?

- a. a nitrogen base and a phosphate group
- b. a nitrogen base and a five-carbon sugar
- c. a nitrogen base, a phosphate group and a five-carbon sugar
- d. a five-carbon sugar, a phosphate group and a purine
- e. a pyrimidine, a purine and a five-carbon sugar

It became apparent to Watson and Crick after completion of their model that DNA molecule could carry a vast amount of hereditary information in its

- a. sequence of bases
- b. phosphate-sugar backbone
- c. complementary base pairing
- d. side groups of nitrogenous bases
- e. different five-carbon sugars

In an analysis of the nucleotide composition of DNA to see which bases are equivalent in concentration, which of the following would be true?

- a. $A = C$
- b. $A = G$ and $C = T$
- c. $A + C = G + T$
- d. $A + T = C + G$
- e. Both b and c are correct

The DNA of chromosomes is composed of two strands, wound about each other in a _____.

DNA is composed of monomer units of _____.

The X-ray crystallographs of the British scientists _____ were essential for the discovery of the structure of the DNA molecule.

The basic units of DNA are the _____.

_____ is the process whereby a molecule of DNA copies itself.

When DNA polymerase is in contact with thymine in the parental strand, what does it add to the growing daughter strand?

- a. Deoxyribose
- b. Phosphate group
- c. Adenine
- d. Single-ring pyrimidine
- e. Uracil

Semi-conservative DNA replication means:

- a. The old DNA is completely broken down
- b. The old DNA remains completely intact
- c. A pairs with T and G pairs with C
- d. Only half of the DNA is replicated
- e. Each new DNA molecule has half of the old one

All of the following occur during DNA replication except:

- a. Separation of parental DNA strands
- b. Use of parental DNA as a template
- c. Formation of chromatids
- d. Synthesis of totally new double-stranded DNA molecules
- e. Use of DNA polymerase enzymes

Exposure to which of the following causes an increase in mutation rate?

- a. X-rays
- b. Ultraviolet (UV) radiation
- c. Some chemicals
- d. All the above choices are correct

Which of the following statements is false?

- a. Each species has equal amounts of bases A, G, T, and C in its DNA.
- b. The DNA content of the nuclei doubles before each mitotic cell division.
- c. The DNA content of nuclei in any one species is constant in every cell except the gametes.
- d. Only the DNA of a bacteriophage enters a new host bacterium.
- e. In DNA, A pairs with T while G pairs with C.

If a cell has one DNA molecule containing only radioactive nitrogen, and the cell is placed in culture medium containing only regular nitrogen, how many cells will contain some DNA with radioactive nitrogen after 4 rounds of cell replication?

- a. 1
- b. 2
- c. 4
- d. 8
- e. 16

If you took a normal cell and placed it in culture medium containing radioactive thymine and allowed the cell to divide once, which of the following results would you expect?

- a. Only one of the daughter cells would have radioactive thymine in its DNA.
- b. Radioactive thymine would mispair with guanine in all the DNA of both cells.
- c. The RNA made in both cells would become radioactive.
- d. Neither daughter cell would contain radioactive thymine in their DNA.
- e. Both daughter cells would have DNA containing radioactive thymine.

Semiconservative replication of DNA involves

- a. each of the original strands acting as a template for a new strand.
- b. only one of the original strands acting as a template for a new strand.
- c. the complete separation of the original strands, the synthesis of new strands and the reassembly of double-stranded molecules.
- d. the use of the original double-stranded molecule as a template, without unwinding.
- e. none of the above.

The feature of the Watson-Crick model of DNA structure that explains its ability to function in replication is

- a. that each strand contains all the information present in the double helix.
- b. the structural and functional similarities of DNA and RNA.
- c. that the double helix is right-handed and not left-handed.
- d. that DNA replication does not require enzymes.
- e. the fact that the nitrogen bases are exposed on the outside of the molecule.

Which of the following are NOT involved in the DNA replication process?

- a. DNA helicase
- b. DNA ligase
- c. RNA polymerase
- d. DNA polymerase
- e. All of the above are involved.

During which part of the cell cycle does DNA replication occur?

- a. Mitosis
- b. Meiosis
- c. Interphase
- d. Cytokinesis
- e. All of the above

DNA is copied in the nucleus of a eukaryotic cell in the process of _____ to produce two identical DNA molecules.

DNA replication uses _____ base pairing to ensure genetic constancy.