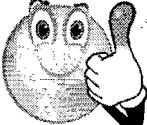




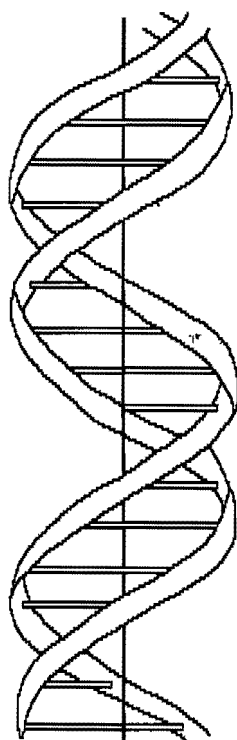
Unit 7 – DNA Replication

Topic			
DNA			
DNA Replication			
RNA			
Mutations			
Genetic Engineering			

DNA	
DNA Replication	
RNA	
Mutations	
Genetic Engineering	

Questions 3 and 4 refer to the following:

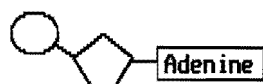
The diagram below represents part of an organic molecule.



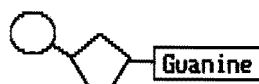
- 3) The diagram represents a molecule of
 A) FSH B) RNA C) ATP D) DNA
- 4) Which two scientists proposed the double helix arrangement of this molecule?
 A) Mendel and De Vries C) Watson and Crick
 B) Darwin and Lamarck D) Hardy and Weinberg
- 5) Which is the sugar component of a DNA nucleotide?
 A) deoxyribose B) adenine C) phosphate D) glucose
- 6) DNA and RNA molecules are similar in that they both contain
 A) thymine C) a double helix
 B) deoxyribose sugars D) nucleotides
- 7) Which substances are components of a DNA nucleotide?
 A) thymine, deoxyribose, and phosphate C) phosphate, ribose, and adenine
 B) ribose, phosphate, and uracil D) phosphate, deoxyribose, and uracil
- The building blocks of both DNA and RNA molecules are known as
 A) nucleotides B) amino acids C) polysaccharides D) hydrocarbons

Questions 9 and 10 refer to the following:

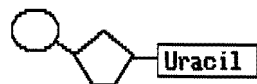
The diagrams below represent nucleotides.



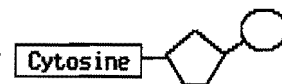
(1)



(3)

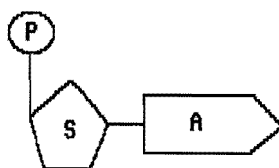


(2)



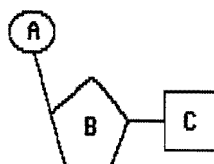
(4)

- 9) Which pair of nucleotides can be held together by weak hydrogen bonds?
 A) 4 and 2 B) 3 and 4 C) 1 and 3 D) 2 and 3
- 10) Which nucleotide contains a nitrogenous base that pairs with thymine in double-stranded DNA?
 A) 4 B) 2 C) 3 D) 1
- 11) The molecule represented by the lettered symbols below is a



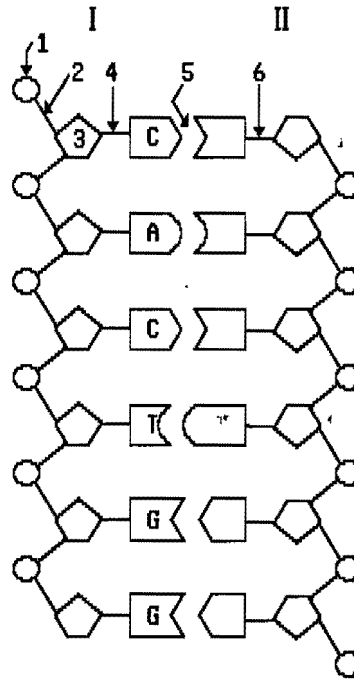
- A) codon B) base pair C) nucleotide D) triplet code

- 12) Which is the correct identification of the parts of the DNA nucleotide in the diagram below?



- A) $A = \text{thymine}$, $B = \text{ribose}$, $C = \text{uracil}$ C) $A = \text{uracil}$, $B = \text{deoxyribose}$, $C = \text{thymine}$
 B) $A = \text{phosphate}$, $B = \text{ribose}$, $C = \text{uracil}$ D) $A = \text{phosphate}$, $B = \text{deoxyribose}$, $C = \text{thymine}$

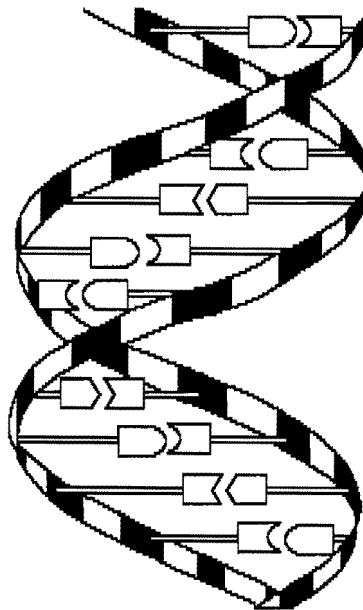
- 13) The diagram below represents a portion of a double-stranded DNA molecule.



The base sequence of strand *II* is most likely

- A) G-T-G-U-C-C B) G-G-T-C-A-C C) C-A-C-T-G-G D) G-T-G-A-C-C

- 14) Which scientists developed the molecular model represented below?

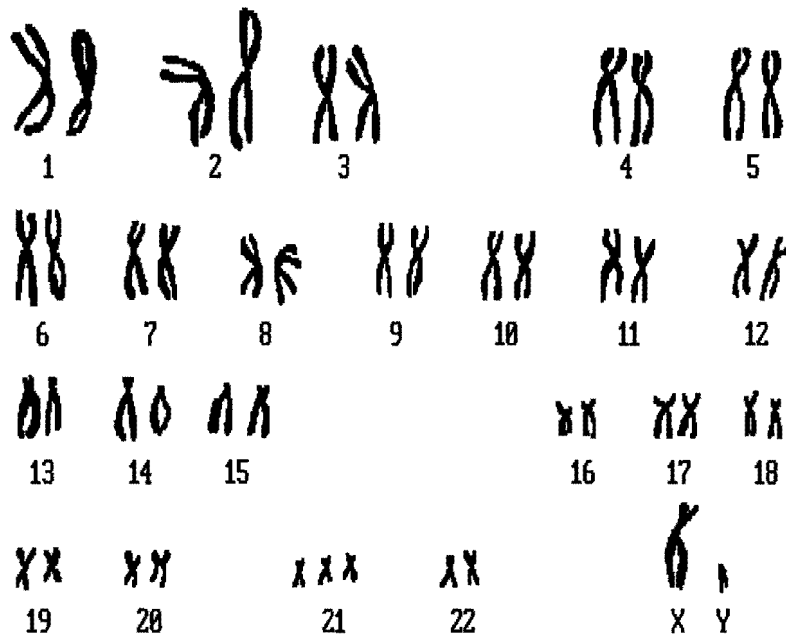


- A) Miller and Fox C) Mendel and Darwin
B) Lamarck and Weismann D) Watson and Crick

- 29) Sickle-cell anemia results from the substitution of one base for another in a DNA molecule. This change is an example of
- A) a polyploid condition
B) crossing-over
C) a gene mutation
D) nondisjunction
- 30) Which genetic disorder can be detected by the formation of abnormally shaped red blood cells?
- A) Sickle-cell anemia
B) Hemophilia
C) Phenylketonuria (PKU)
D) Tay-Sachs disease

Questions 31 and 32 refer to the following:

The diagram below illustrates the chromosomes from a human cell.



- 31) The diagram represents a
- A) disjunction
B) deletion
C) karyotype
D) synapsis
- 32) The individual from whom these chromosomes were taken is a
- A) male
B) polyploid
C) female
D) hermaphrodite
- 33) Genetic engineering has been utilized for the production of
- A) hydrochloric acid
B) uric acid crystals
C) human growth hormone
D) salivary amylase

34) **GENETIC ENGINEERING**

Genetic engineering is a technique used by scientists to combine or splice genetic material from different organisms. Gene splicing involves changing the normal base sequences of DNA by removing a section of DNA and introducing another gene. This technique may involve the use of the bacterium *Escherichia coli*. This bacterium has one large chromosome and several small plasmids, which are ring-shaped pieces of DNA found in the cytoplasm.

Genetic engineers have been able to extract plasmids from *E. coli*. Restriction enzymes are then used to cut the DNA of the plasmid at designated places in the nucleotide sequence. These same enzymes are then used to cut a section of human DNA. This section of human DNA is then placed into the space in the cut DNA of the bacterial plasmid. The human DNA codes for the synthesis of a product such as human growth hormone. The spliced bacterial DNA, which now contains a piece of human DNA, is referred to as a hybrid. This hybridized plasmid is then transplanted into *E. coli*. When this bacterium reproduces, the hybrid DNA will be replicated. Offspring will possess the ability to synthesize the human growth hormone.

What is one benefit of gene splicing?

- 35) When a culture of cells is exposed to gamma rays, chromosome damage results. This damage is very evident when the cells are stained and observed with a compound light microscope. The chromosome damage is primarily in the form of breaks and gaps, which are commonly referred to as chromosome aberrations. Investigations have shown that when the amino acid cysteine is added to the cell culture prior to gamma-ray exposure, the number of aberrations is reduced. The results of one investigation are shown in the data table below. In this investigation, each cell culture received the same amount of gamma-ray exposure.

DATA TABLE

Cell Culture Tube Number	Amount of Cysteine Added (g)	Average Number of Chromosome Aberrations per Cell After Gamma-Ray Exposure
1	0.0	1.20
2	0.7	0.65
3	1.0	0.58
4	2.6	0.40
5	5.3	0.33
6	10.5	0.25
7	15.8	0.18

Using the information in the data table, construct a line graph following the directions below.

- Mark an appropriate scale on each axis.
- Label each axis and indicate the units.
- Plot the data and connect the points. Surround each point with a circle.

Example:



1) A 2) C 3) D 4) C 5) A

6) D 7) A 8) A 9) B 10) D

11) C 12) D 13) D 14) D 15) C

16) C 17) C 18) C 19) C 20) A

21) A 22) A 23) C 24) B 25) A

26) A 27) A 28) A 29) C 30) A

31) C 32) A 33) C

34) One benefit of gene splicing is that certain bacterial cells will have the ability to make human growth hormone and other products useful to humans.

35) Answer is a graph.