

DNA and Protein Synthesis Practice

Name: _____

Date: _____

1. The discovery of which of the following has most directly led to advances in the identification of suspects in criminal investigations and in the identification of genetic diseases?

- A. antibiotics
- B. cell structure
- C. DNA structure
- D. sterile procedures

2. Which of the following is the template for the production of RNA within a cell?

- A. DNA
- B. ATP
- C. protein
- D. carbohydrate

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5. Which sequence of DNA bases would pair with the ones shown in the partial strand below?

1 2 3
ATG TGA CAG

A. 1 2 3
ATG TGA CAG

B. 1 2 3
TAC ACT GTC

C. 1 2 3
GTA AGT GAC

D. 1 2 3
CAT TCA CTG

6. What molecules do both DNA and RNA contain?

- A. uracil
- B. thymine
- C. nucleotides
- D. deoxyribose

7. Which of the following *best* describes how DNA and RNA are similar?

- A. They both contain the nitrogen bases thymine and adenine.
- B. They both are formed in a double-helix structure.
- C. They both are composed of five different nucleotides.
- D. They both contain the nitrogen bases cytosine and guanine.

8. **Codons Found in Messenger RNA**

		Second Base				
		U	C	A	G	
First Base	U	Phe	Ser	Tyr	Cys	Third Base U C A G
		Phe	Ser	Tyr	Cys	
		Leu	Ser	Stop	Stop	
		Leu	Ser	Stop	Trp	
C	Leu	Pro	His	Arg	U C A G	
	Leu	Pro	His	Arg		
	Leu	Pro	Gln	Arg		
	Leu	Pro	Gln	Arg		
A	Ile	Thr	Asn	Ser	U C A G	
	Ile	Thr	Asn	Ser		
	Ile	Thr	Lys	Arg		
	Met	Thr	Lys	Arg		
G	Val	Ala	Asp	Gly	U C A G	
	Val	Ala	Asp	Gly		
	Val	Ala	Glu	Gly		
	Val	Ala	Glu	Gly		

A strand of mRNA containing the repeating sequence AAGAAGAAGAAG could code for which of the following amino acid sequences?

- A. lys-arg-glu-lys B. ser-ser-glu-glu
C. lys-arg-lys-arg D. lys-lys-lys-lys

9. Which of these would *most* likely cause a mutation?

- A. the placement of ribosomes on the endoplasmic reticulum
B. the insertion of a nucleotide into DNA
C. the movement of transfer RNA out of the nucleus
D. the release of messenger RNA from DNA

10. 5' G T A _____ A A 3'
3' C A T G C A T T 5'

This segment of DNA has undergone a mutation in which three nucleotides have been deleted. A repair enzyme would replace them with

- A. CGT. B. GCA. C. CTG. D. GTA.

11. A base sequence is shown below.

ACAGTGC

How would the base sequence be coded on mRNA?

- A. TGTCACG B. GUGACAU
C. UGUCACG D. CACUGUA

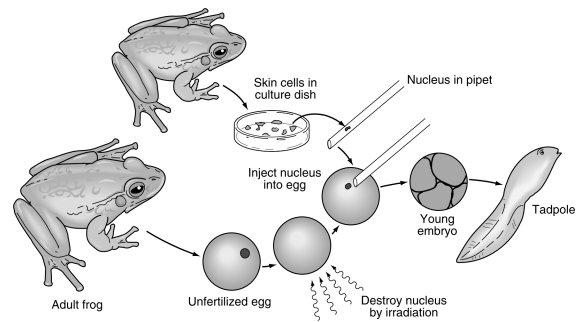
12. Semi-conservative replication of DNA refers to the idea that

- A. DNA molecules need to unwind before duplication begins.
B. each new DNA molecule contains two new single RNA strands.
C. the two strands of DNA molecules run in opposite directions.
D. each half of the original DNA molecule is joined with a new complementary DNA strand.

13. Genetic engineering has produced goats whose milk contains proteins that can be used as medicines. This effect was produced by
- mixing foreign genes into the milk.
 - injecting foreign genes into the goats' udders.
 - inserting foreign genes into fertilized goat eggs.
 - genetically modifying the nutritional needs of the goats' offspring.

14. Mutations within a DNA sequence are
- natural processes that produce genetic diversity.
 - natural processes that always affect the phenotype.
 - unnatural processes that always affect the phenotype.
 - unnatural processes that are harmful to genetic diversity.

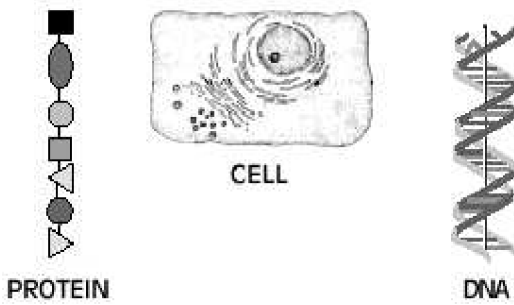
15. The diagram below shows the procedure scientists used to clone a frog from the nucleus of a skin cell.



This procedure is evidence that _____.

- the nuclei of the skin cells protect the frog
- only skin cells can be used to clone a frog
- the skin cells are the reproductive cells of the frog
- the nuclei of skin cells contain all the DNA needed for a new frog

16.



What is the relationship between the three structures in the diagram above?

- A. DNA is produced by protein which is produced in the cell.
- B. Protein is composed of DNA which is produced in the cell.
- C. DNA controls the production of protein in the cell.
- D. A cell is composed only of DNA and protein.

17. Which statement about DNA is correct?

- A. A child's DNA will be unrelated to the mother's or father's DNA.
- B. A child's DNA will show similarities to both the mother's and father's DNA.
- C. A female child's DNA will exactly match the mother's DNA.
- D. A male child's DNA will exactly match the father's DNA.

18. A substitution of thymine with adenine in one DNA codon causes a particular disorder.

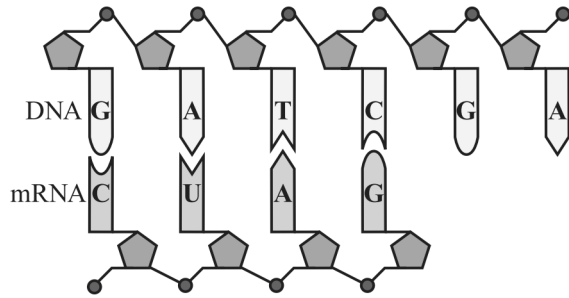
Which statement explains how the change in DNA leads to this disorder?

- A. The deletion mutation prevents the production of the hemoglobin protein in the body.
- B. The frameshift mutation prevents the production of several proteins found in the blood.
- C. The insertion mutation causes extra hemoglobin proteins to attach to red blood cells.
- D. The point mutation causes a different amino acid to be added to the hemoglobin protein.

19. Genetic information usually flows in one specific direction. Which of the following *best* represents this flow?

- A. DNA → Protein → RNA
- B. Protein → RNA → DNA
- C. RNA → Protein → DNA
- D. DNA → RNA → Protein

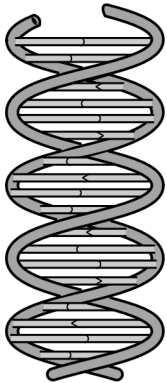
20. The diagram below shows a strand of DNA matched to a strand of messenger RNA.



What process does this diagram represent?

- A. mutation B. respiration
C. transcription D. translation

21. Look at the illustration below.



This illustration is a model of

- A. RNA B. DNA
C. a lipid D. a protein

22. DNA from four organisms was examined using gel electrophoresis. The results are shown in the diagram below.

DNA GEL ELECTROPHORESIS RESULTS

1	2	3	4
—	—	—	—
	—		—
—	—	—	—
—			—
	—	—	—

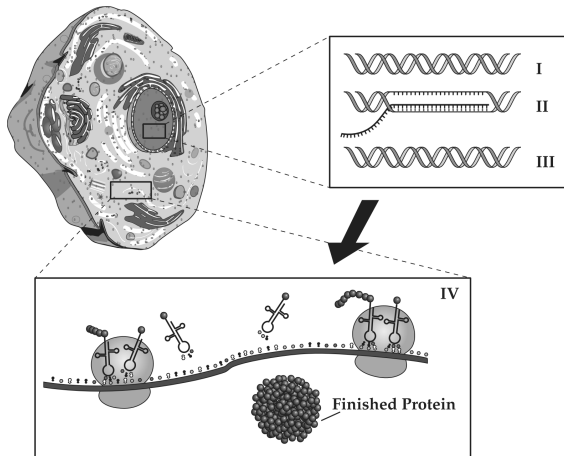
According to the data, which of these pairs of organisms are *most closely related*?

- A. 1 and 2 B. 2 and 3
C. 2 and 4 D. 3 and 4

23. Which of these is *not* a use for DNA fingerprinting?

- A. to determine how individuals are related
B. to make messenger RNA
C. to determine a genetic sequence
D. to study inherited diseases

24. The diagram below shows the key steps for making proteins. Use the diagram to answer the following question(s).



Which step involves transfer RNA?

- A. I B. II C. III D. IV

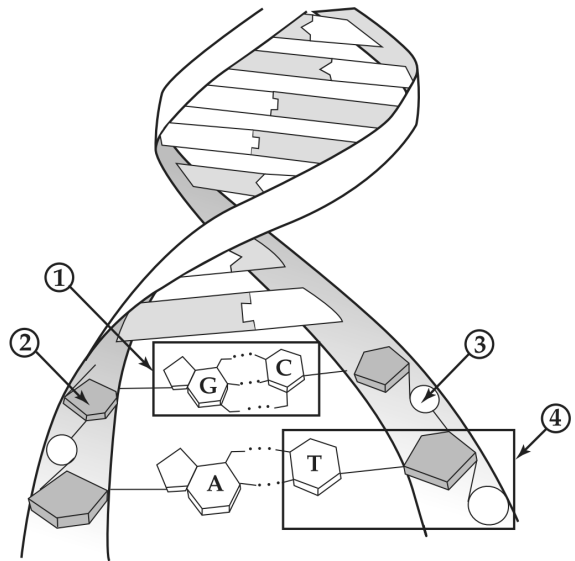
25. Which step involves ribosomes?

- A. I B. II C. III D. IV

26. Which of the following is correctly matched with its function?

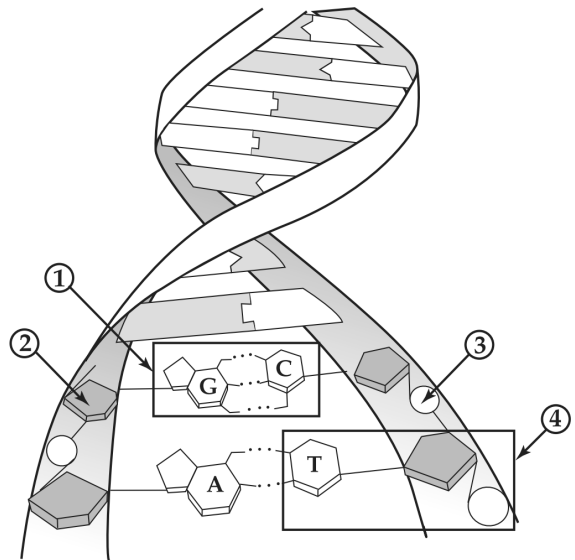
- A. rRNA – contains codes to make new ribosomes
- B. DNA – carries the amino acids to the ribosomes
- C. tRNA – combines with proteins to make up ribosomes
- D. mRNA – carries genetic codes from nucleus to the ribosomes

27. Which of these is a nucleotide?



- A. 1 B. 2 C. 3 D. 4

28. Which of these is a sugar?



- A. 1 B. 2 C. 3 D. 4

29. The chromosome structure in a cell accounts for genetic variation based on the order of its

- A. sugar groups
- B. nitrogen bases
- C. hydrogen bonds
- D. phosphate groups

30. One way RNA is different from DNA is that RNA contains—

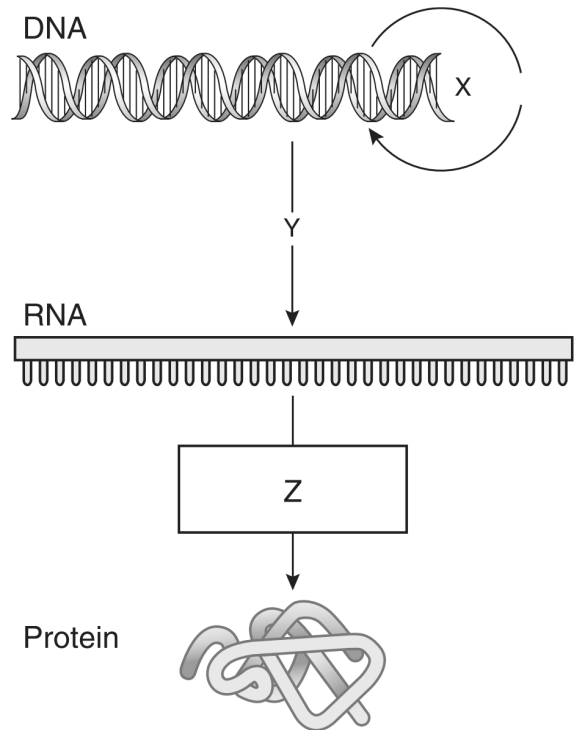
- A. phosphate groups.
- B. hydrogen bonds.
- C. ribose.
- D. bases.

31. UACUGA

Which of the following represents a tRNA complement to the codons above?

- A. UAGTGA
- B. ATCACT
- C. AUGACU
- D. TACTCA

32. A diagram of a cellular process is shown below.



Which of the following identifies the process shown at point Z?

- A. Translation
- B. Translocation
- C. Replication
- D. Transcription

33. A single nucleotide change results in the formation of a stop codon in the middle of a DNA sequence. Which of the following explains the effect on the protein produced from this gene?

- A. The protein would be shorter than expected.
- B. The protein would be produced in smaller quantities.
- C. The protein would be denatured easily by high temperatures.
- D. The protein would be made of nucleotides instead of amino acids.

34. The table below is a codon chart.

First Letter	Second Letter				Third Letter
	U	C	A	G	
U	phenylalanine	serine	tyrosine	cysteine	U
	phenylalanine	serine	tyrosine	cysteine	C
	leucine	serine	stop	stop	A
	leucine	serine	stop	tryptophan	G
C	leucine	proline	histidine	arginine	U
	leucine	proline	histidine	arginine	C
	leucine	proline	glutamine	arginine	A
	leucine	proline	glutamine	arginine	G
A	isoleucine	threonine	asparagine	serine	U
	isoleucine	threonine	asparagine	serine	C
	isoleucine	threonine	lysine	arginine	A
	^(start) methionine	threonine	lysine	arginine	G
G	valine	alanine	aspartate	glycine	U
	valine	alanine	aspartate	glycine	C
	valine	alanine	glutamate	glycine	A
	valine	alanine	glutamate	glycine	G

What is the likely effect of a mutation that causes the sequence CGC to become CGG?

- A. The reading frame will be shifted.
- B. The protein formed will be unchanged.
- C. The protein will be translated incorrectly.
- D. The translation process will stop prematurely.

35. What is the role of hydrogen bonds in the structure of DNA?

- A. to code for proteins
- B. to synthesize proteins
- C. to separate the strands
- D. to connect the base pairs

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- | | | | |
|---------|---|---------|---|
| 1. | | 21. | |
| Answer: | C | Answer: | |
| 2. | | 22. | |
| Answer: | A | Answer: | |
| 3. | | 23. | |
| Answer: | A | Answer: | B |
| 4. | | 24. | |
| Answer: | A | Answer: | D |
| 5. | | 25. | |
| Answer: | B | Answer: | D |
| 6. | | 26. | |
| Answer: | C | Answer: | D |
| 7. | | 27. | |
| Answer: | D | Answer: | D |
| 8. | | 28. | |
| Answer: | D | Answer: | B |
| 9. | | 29. | |
| Answer: | B | Answer: | B |
| 10. | | 30. | |
| Answer: | A | Answer: | C |
| 11. | | 31. | |
| Answer: | C | Answer: | C |
| 12. | | 32. | |
| Answer: | D | Answer: | A |
| 13. | | 33. | |
| Answer: | C | Answer: | A |
| 14. | | 34. | |
| Answer: | A | Answer: | B |
| 15. | | 35. | |
| Answer: | D | Answer: | D |
| 16. | | | |
| Answer: | | | |
| 17. | | | |
| Answer: | B | | |
| 18. | | | |
| Answer: | D | | |
| 19. | | | |
| Answer: | D | | |
| 20. | | | |
| Answer: | C | | |