

# Biology: DNA and RNA Review

## DNA Basic Information

1. How many nucleotides are shown in the DNA segment pictured?

6

2. Circle any **nucleotide** on the DNA segment.

3. Name the **three parts** of a nucleotide.

a. Phosphate group

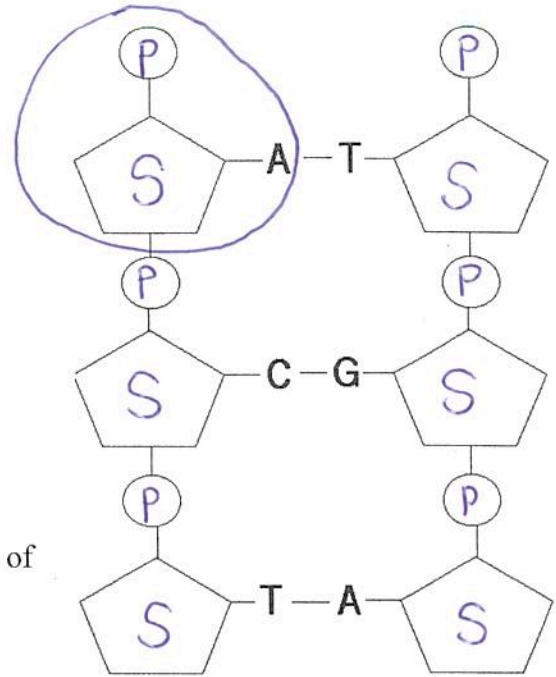
b. Sugar

c. Nitrogenous Base

4. Use the letters P and S to label the sugar and phosphate of the DNA molecule.

5. Which part does the **phosphate** molecule connect with?

The sugar (deoxyribose)



**DNA Replication:** Use your understanding of DNA replication to solve the questions below.

6. The diagram below shows DNA replication.

a. In area A, match the missing DNA bases from the strand given.

b. Name the enzyme that will separate the DNA strands in area A.

DNA Helicase

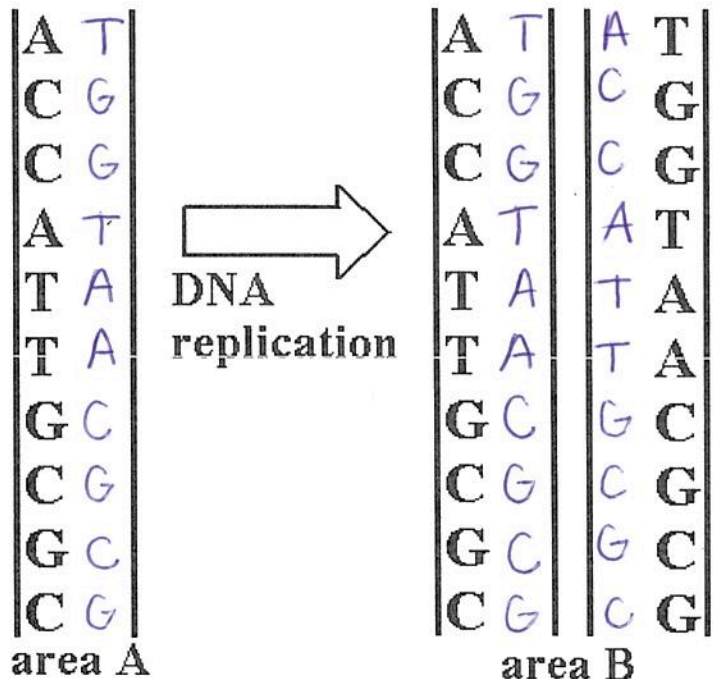
c. In area B, perform replication and fill in the two new strand of DNA.

d. Name the enzyme that will reconnect the DNA bases in area B.

Ligase

e. After filling in the correct DNA bases in area B, are the two strand of DNA identical?

YES NO



**Transcription:** Use your understanding of transcription to answer the questions below.

7. Define TRANSCRIPTION: the process through which a single strand of mRNA is produced from a DNA strand

8. Name the four **RNA** bases.

- a. Uracil c. Cytosine  
b. Adenine d. Guanine

9. Fill in the **RNA** bases from the given DNA bases.

DNA strand A A T C C G C T A G  
RNA strand U U A G G C G A U C

10. Fill in the **DNA** bases from the given RNA bases.

RNA strand U C G U A C C A U U  
DNA strand A G C A T G G T A A

11. Fill in the missing bases from the strands of DNA and RNA.

DNA A T C A C G A T T A  
RNA U A G U G C U A A U

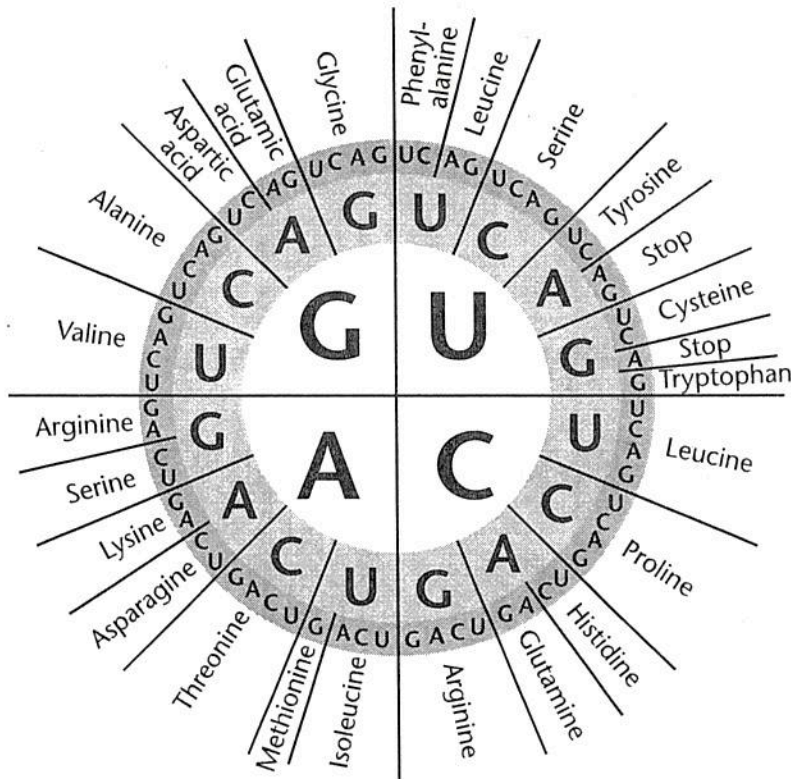
12. Examine #11. Is the top strand a piece of DNA or RNA? Explain your answer.

The top strand is a piece of DNA because it has Thymine as a nitrogenous base and T is not found in RNA.

### Decoding mRNA

The diagram shows the mRNA codes that correspond to amino acids and stop codons. Read the diagram from the center outwards. For example, the mRNA code UAC corresponds to the amino acid tyrosine.

Write the name of the amino acid that corresponds to each mRNA code. The first one has been done for you.



mRNA Code	Amino Acid
AAA	lysine
GCG	Alanine
GAU	Glutamic Acid
CAA	Glutamine

Use the diagram to answer the questions.

1. Which two mRNA codes correspond to histidine?

CAU and CAC

2. How many different mRNA codes correspond to arginine?

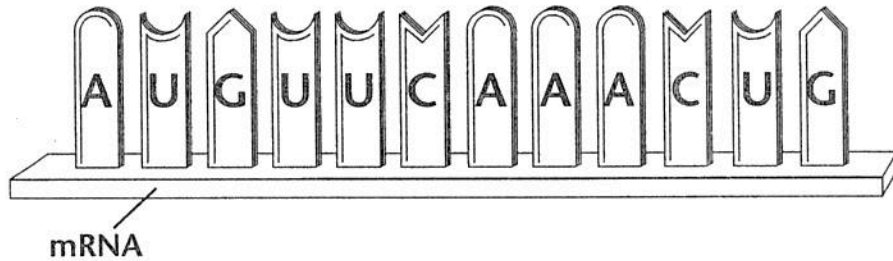
6



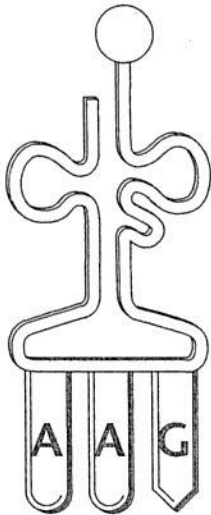
## Translation

During translation, transfer RNA (tRNA) anticodons match to messenger RNA (mRNA) codons. Each tRNA molecule can carry one particular amino acid. The amino acids are joined to form a polypeptide.

Number the four tRNA anticodons in the order in which they should appear to match the codons in the mRNA strand.

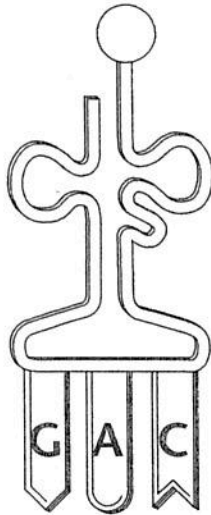


phenylalanine



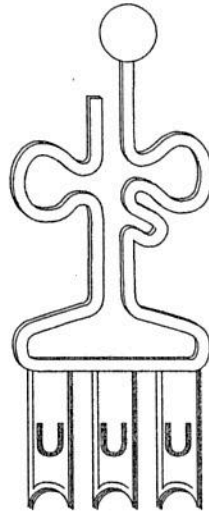
2

leucine



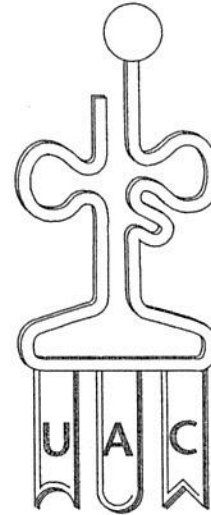
4

lysine



3

methionine



1

Use the diagrams to answer the question.

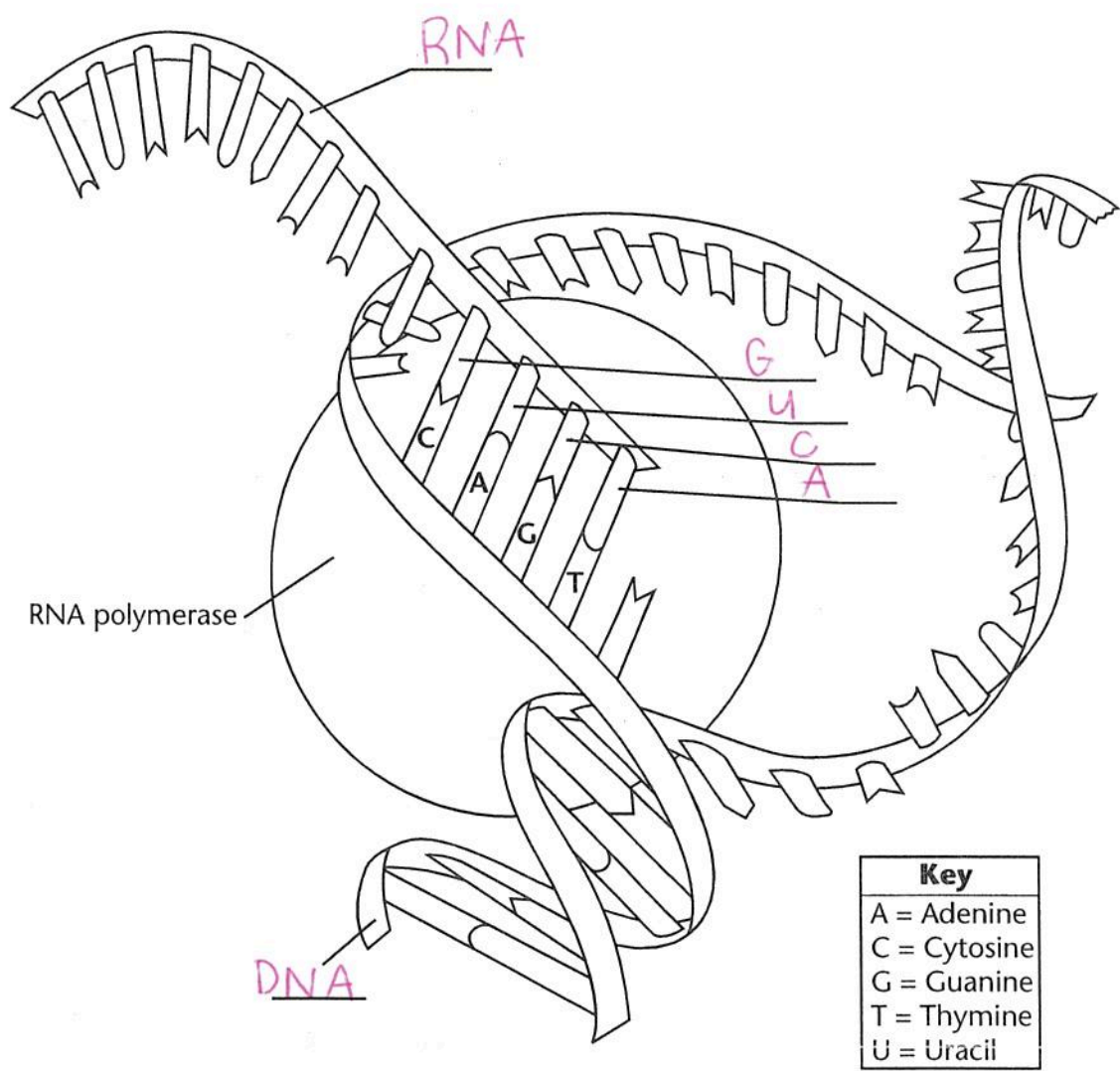
1. List the amino acids in the order they would appear in the polypeptide coded for by the mRNA.

Methionine → Phenylalanine → Lysine → Leucine

### Transcription

In transcription, RNA polymerase splits the two halves of a strand of DNA. RNA then uses one half as a template to make a copy of the other half. RNA contains the nucleotide uracil instead of the nucleotide thymine.

Label the DNA and RNA. Then, label the missing nucleotides marked on the diagram.



Use the diagram to answer the question. Circle the correct answer.

1. In RNA, which nucleotide is always paired with uracil?

- adenine
- guanine

## Comparing DNA Replication and Transcription

DNA replication is the process by which a cell copies its DNA. During replication, both strands of the double helix are used as templates to make complementary, or matching, strands of DNA. DNA transcription is the process by which a single strand of DNA is used as a template to generate a strand of mRNA.

Fill in the missing information. One row has been completed for you.

Template DNA	Complementary DNA	Messenger RNA (mRNA)
TTACG	AATGC	AAUGC
CCGCC	GGCGG	GGCGG
TGCATCG	ACGTAGC	ACGUAGC
AGACTC	TCTGAG	UCUGAG
CTATTCT	GATAAGA	GAUAAGA
GACCGATG	CTGGCTAC	CUGGCUAC

Use the table to answer the question.

1. Give another example of a template DNA code that is at least four base pairs long. Then give its matching complementary DNA and mRNA codes.

ATGC → complimentary = TACG → messenger = UACG  
DNA RNA