Unit 7 · Genetic Material

WORKSHEET

Full marks 32

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 32

1 Key words [4]

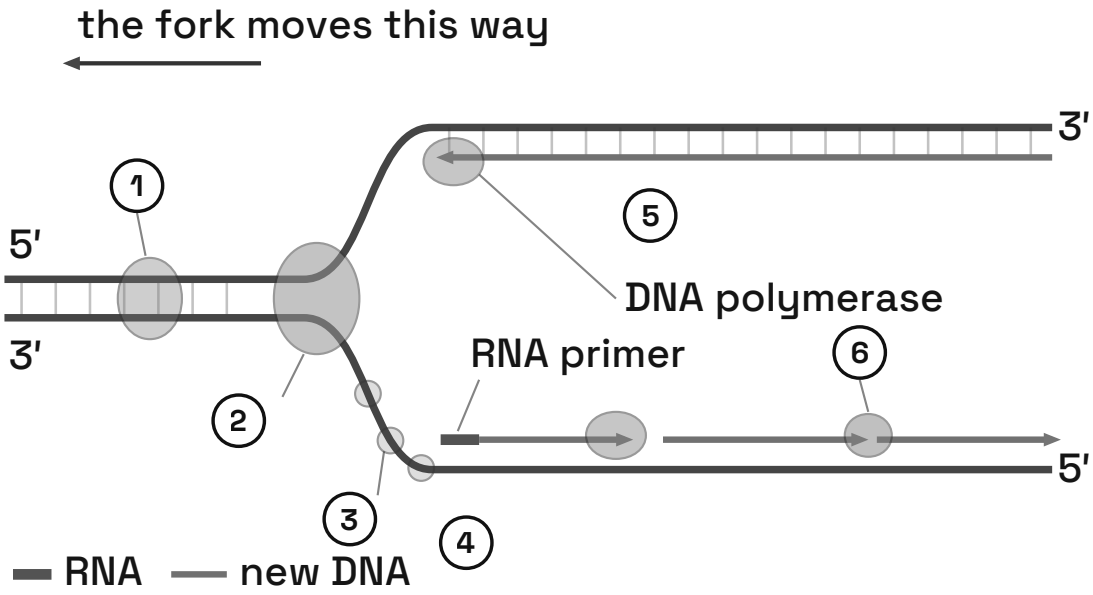
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

anticodon	**antiparallel**	**codon**	**genetics**	**histone**	**Okazaki**	**phosphodiester**	**purines**
ribose	**uracil**						

The branch of biology that studies heredity and variation is _____. Adenine and guanine, with two rings, are _____. The sugar of RNA is _____. Neighboring nucleotides in a strand are joined by _____ bonds. The two strands of DNA run in opposite directions: they are _____. In RNA, the base _____ takes the place of thymine. The short pieces in which the lagging strand is made are _____ fragments. A group of three bases on mRNA that stands for one amino acid is a _____.

2 Label the diagram [3]

The diagram shows a replication fork. Write the names of the parts 1 to 6. Each carries 0.5 mark.



1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Which pair are **both** pyrimidines? [1]

a. adenine and thymine
b. guanine and cytosine
c. cytosine and uracil
d. adenine and guanine

ii. A sample of nucleic acid from a virus contains 25 % uracil. What can you say about it? [1]

a. it is DNA, because it contains uracil
b. it is RNA, because uracil is found only in RNA
c. it is double-stranded DNA, so it also has 25 % adenine
d. it can't be from a virus, because viruses have no nucleic acid

iii. What is the job of DNA ligase? [1]

a. to unwind the double helix
b. to make the RNA primers
c. to join Okazaki fragments by forming phosphodiester bonds
d. to add nucleotides to the leading strand

iv. A stretch of DNA has 30 complete turns. About how many base pairs does it have? [1]

a. 30
b. 102
c. 300
d. 3400

v. A change in a gene turns the mRNA codon GGU into GGC. What happens to the protein? [1]

a. it stops at that codon
b. every amino acid after it changes
c. nothing: both codons stand for glycine
d. glycine is replaced by a stop signal

4 Short answers [9]

Write short answers to the following questions.

a. Write any two differences between DNA and RNA. [2]

b. The genetic code is called degenerate but unambiguous. Explain both words with an example. [2]

c. A DNA template strand reads 3′-TAC CCT GAA-5′. Write the mRNA made on it and the amino acids it codes for. (AUG Met, GGA Gly, CUU Leu.) [2]

d. How did Meselson and Stahl show that DNA replication is semi-conservative? **[3]**

5 Numerical problem **[4]**

Show your working.

A molecule of double-stranded DNA has 3000 base pairs, and 20 % of its bases are adenine. Find the percentages of thymine, guanine and cytosine, the number of guanine bases, the length of the molecule and the number of turns of its helix.

Answer:

6 Long answer **[4]**

Write a long answer to the following question.

Describe the Watson and Crick model of DNA.

7 Think **[3]**

If DNA polymerase could add nucleotides to both the 3′ and 5′ ends of a new strand, how would DNA replication be different? Explain.

8 Activity: A comparison chart of DNA and RNA

(not marked)

Draw a short stretch of DNA (both strands) and of RNA, with one color for each sugar, the phosphates and each base, and fill in the table.

	DNA	RNA
strands		
sugar		
bases		
where in the cell		
main job		

Which color appears in one drawing but not the other?