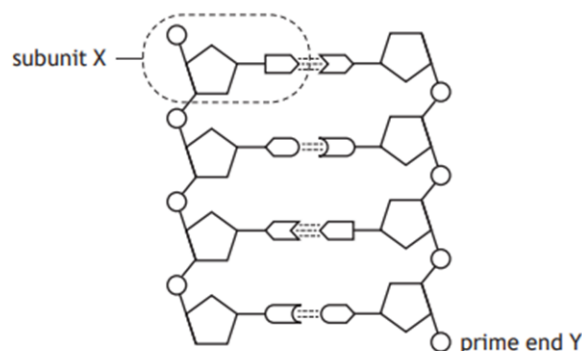


DNA Replication

1. The diagram shows the structure of part of a DNA molecule.



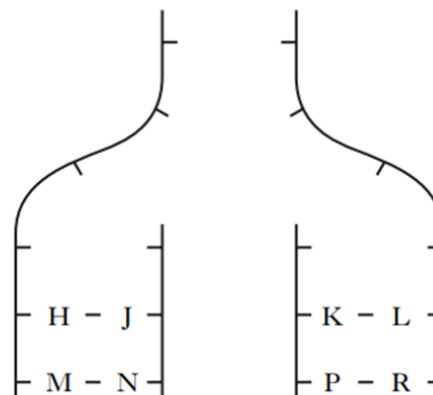
Which row in the table identifies subunit X and prime end Y?

	Subunit X	Prime end Y
A	nucleotide	3'
B	amino acid	5'
C	amino acid	3'
D	nucleotide	5'

2. If ten percent of the bases in a molecule of DNA are adenine, what is the ratio of adenine to guanine in the same molecule?

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

3. The diagram shows DNA during replication. Base H represents thymine and base M represents guanine. Which letters represent the base cytosine?



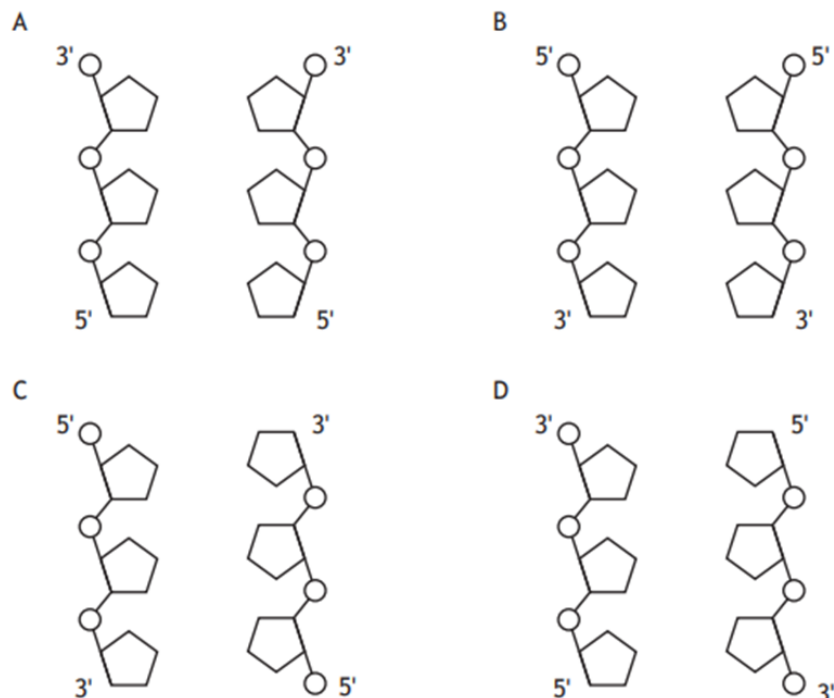
- A J and K
- B J and L
- C N and P
- D N and R

4. A section of a DNA molecule contains 300 bases. Of these bases, 90 are adenine. How many cytosine bases would this section of DNA contain?

- A 60
- B 90
- C 120
- D 180

DNA Replication

5. Which diagram shows the correct arrangement and labelling of the strands found in a section of a molecule of DNA?



6. A fragment of DNA contained 144 nucleotide base pairs.
What is the total number of deoxyribose sugars in this fragment?

A 48
B 72
C 144
D 288

7. How many adenine molecules are present in a DNA molecule of 4000 bases, if 20% of the base molecules are cytosine?

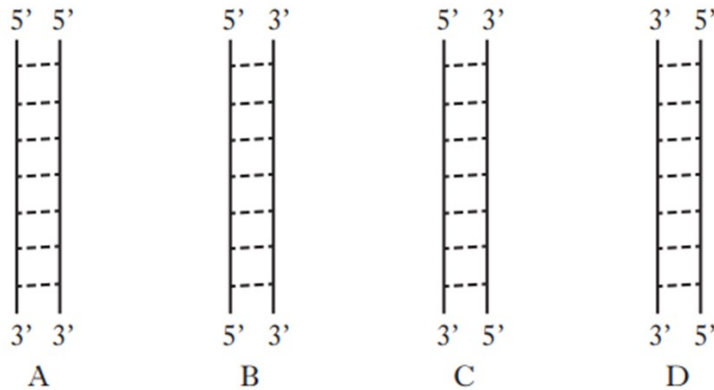
A 400
B 600
C 800
D 1200

8. A fragment of DNA was found to have 120 guanine bases and 60 adenine bases.
What is the total number of sugar molecules in this fragment?

A 60
B 90
C 180
D 360

DNA Replication

9. Which of the following diagrams correctly shows the structure of DNA?



10. A section of DNA containing 8000 bases has 1200 cytosine bases.

The number of adenine bases in this section of DNA is

- A 800
- B 1200
- C 1400
- D 2800.

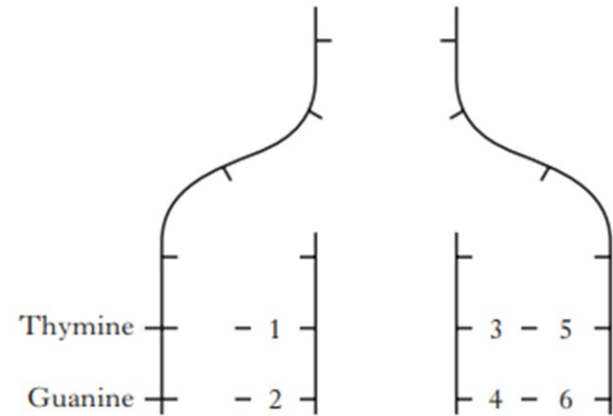
11. A section of a molecule of DNA has 12 000 bases with a 1:3 ratio of adenine to cytosine.

The number of guanine bases in this section is:

- A 1500
- B 3000
- C 4500
- D 9000.

12. The diagram below shows part of a DNA molecule during replication.

Which numbers represent the base cytosine?



- A 1 and 3
- B 1 and 5
- C 2 and 4
- D 2 and 6

13. A DNA molecule contained 8000 nucleotides of which 20% contained adenine.

How many nucleotides would have contained guanine?

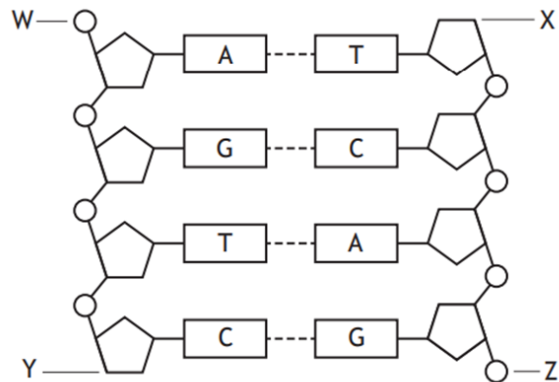
- A 1600
- B 2400
- C 3200
- D 4800

DNA Replication

14. Which of the following statements about DNA replication is correct?
Fragments are formed on the
- A leading strand and are joined by DNA polymerase
 - B lagging strand and are joined by ligase
 - C lagging strand and are joined by DNA polymerase
 - D leading strand and are joined by ligase.
15. A DNA molecule replicates three times during three cell division processes.
How many of the 8 resulting DNA molecules will contain the original DNA strands?
- A 0
 - B 2
 - C 4
 - D 8
16. Which of the following molecules are required in the replication of the lagging strand of a DNA molecule?
- A DNA polymerase and ligase only
 - B DNA polymerase and primers only
 - C Ligase and primers only
 - D DNA polymerase, ligase and primers
17. Which of the following statements about DNA replication is correct?
- A Polymerase adds nucleotides to the 3' end of a DNA strand
 - B Polymerase adds nucleotides to the 5' end of a DNA strand
 - C Ligase adds nucleotides to the 3' end of a DNA strand
 - D Ligase adds nucleotides to the 5' end of a DNA strand
18. During DNA replication, new nucleotides are added to the DNA strand at the
- A 3' phosphate end
 - B 3' deoxyribose end
 - C 5' phosphate end
 - D 5' deoxyribose end.

DNA Replication

1. The diagram represents the structure of a section of DNA.



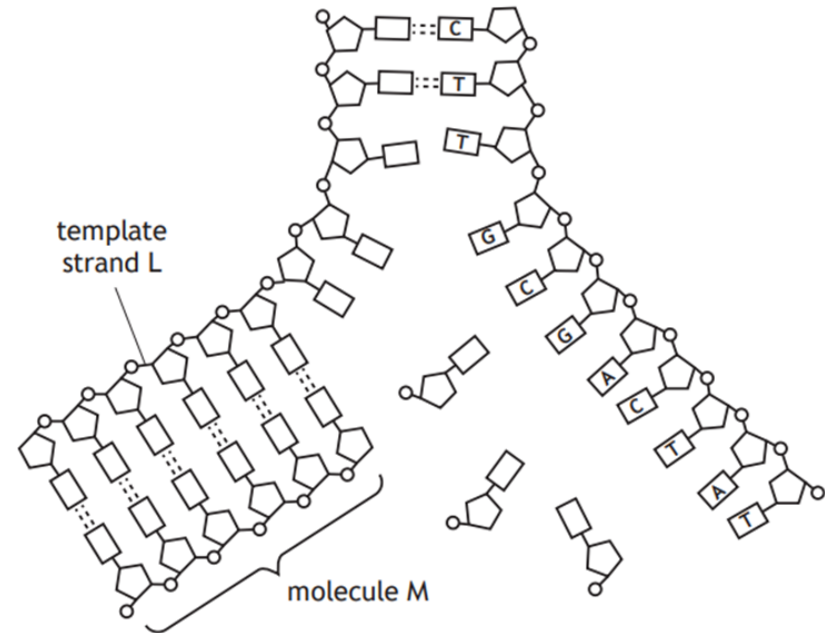
(a) (i) Name the repeating units that make up DNA.

(ii) Name the parts of these units, joined by strong bonds, that make up the backbone of DNA.

_____ and _____

(iii) Identify one letter from the diagram that labels the 3' end of a DNA strand.

2.



(a) Name the base at the 5' end of template strand L.

1

(b) (i) Name molecule M that is required to start DNA replication.

1

(ii) Give the sequence of bases for molecule M.

1

(iii) Name the enzyme that attaches free nucleotides to molecule M during DNA replication.

1

DNA Replication

3 a) During DNA replication two new daughter strands are synthesised using the original strands as templates.

(i) State why the antiparallel nature of the DNA molecule results in one of the strands being synthesised in short fragments.

(ii) Template DNA, enzymes and ATP are necessary for DNA replication. State **one** other substance required.

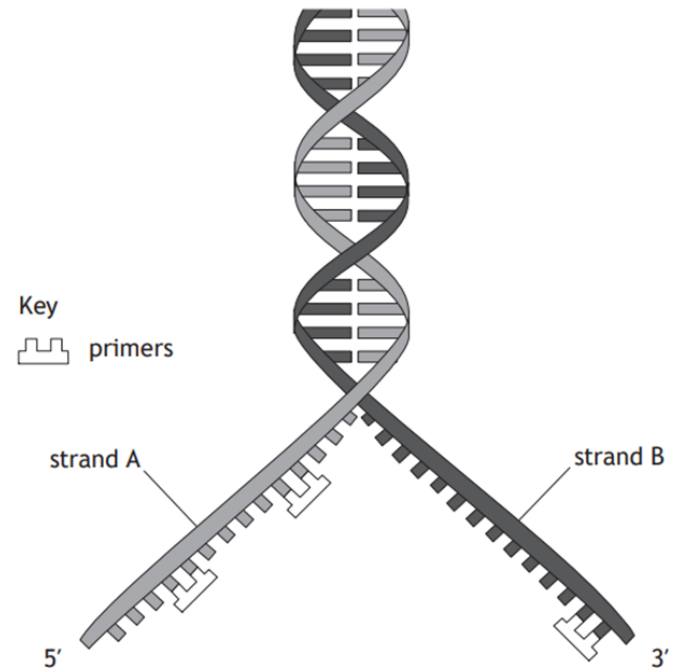
b) Explain why cells need to carry out DNA replication.

(c) Describe the role of the following enzymes in DNA replication.

DNA polymerase _____

Ligase _____

4.



1

1

1

2

(a) Name the enzyme that adds DNA nucleotides to newly synthesised strands.

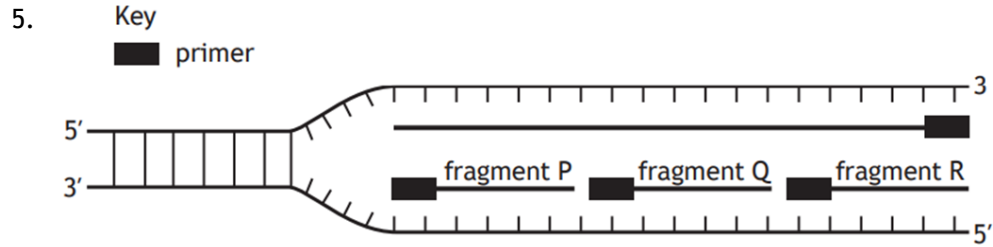
1

(b) Strand A is the lagging strand.

Use information from the diagram to support this statement.

1

DNA Replication



(i) Describe the role of primers in allowing DNA replication to start.

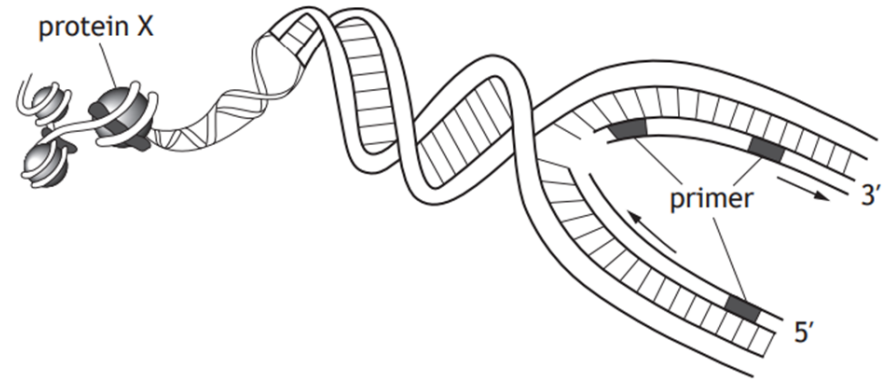
(ii) Fragments P, Q and R are joined together to replicate the lagging strand.

Explain why the lagging strand is replicated in fragments.

(iii) Identify the first fragment produced from the lagging strand.

(iv) Name the enzyme that joins the fragments together.

6. The diagram shows the replication of DNA in a chromosome from a eukaryotic cell. The arrows show the directions of replication.



a) Explain why primers are necessary for DNA replication.

1

(b) (i) Explain why only the leading strand can be replicated continuously.

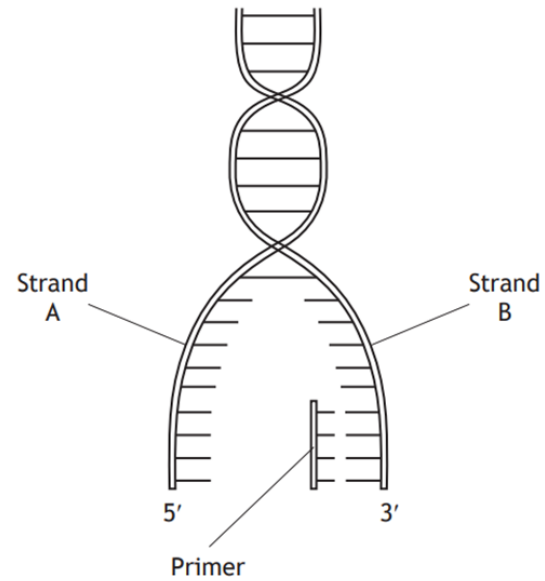
1

(ii) Name the enzyme that joins fragments together in the lagging strand.

1

DNA Replication

7.



8.

- (a) (i) Name the type of bond which links the primer to strand B. 1

- (ii) Name the chemical group found at the 5' end of a DNA strand. 1

- b) Strand B is replicated continuously while strand A can only be replicated in fragments.

Explain why the strands are replicated in different ways. 1

DNA Replication Answers

1. D

2. D

3. D

4 A

5. C

6. D

7. D

8. D

9. C

10. D

11. C

12. D

13. B

14. B

15. B

16. D

17. A

18. B

1 a (i) nucleotides (ii) sugar & phosphate (iii) X and Y

2 a) guanine b) primer

3a (i) DNA only replicates 5' to 3' end on the new strand

(ii) primers/free DNA nucleotides

b) too ensure each daughter cell receives same number of chromosomes as original cell.

C) DNA pol: adds free complementary DNA nucleotides to 3' end (of new strand).

Ligase: joins fragments together in lagging strand.

4. a) DNA polymerase

b) Two primers/more than 1 primer

5. (i) Primers bind to target DNA sequence

Starts DNA replication by DNA polymerase

(ii) DNA is anti parallel but DNA polymerase only replicates from 5' to 3' on new strands

(iii) Fragment P

(iv) ligase

6. a) histone

b) Primers bind to target DNA sequence

Starts DNA replication by DNA polymerase

c) (i) DNA is anti parallel but DNA polymerase only replicates from 5' to 3' on new strands

(ii) ligase

7 a (i) hydrogen (ii) phosphate

B) DNA is anti parallel but DNA polymerase only replicates from 5' to 3' on new strands