D1.1 DNA replication

What the Cell · DP Biology · worksheet · SL statements D1.1.1–5

Name _____ **Date** _____ **Total** _____ / 40

About 40 minutes, or one section at a time. A calculator is allowed. The number of marks shows how many separate points to make.

Section A: Recall

8 marks

1 **State** three reasons why cells replicate their DNA. D1.1.1 **[3]**

2 A template strand has the sequence A C G G T A. **Write** the complementary strand. D1.1.2 **[1]**

3 **State** the type of bond broken by helicase. D1.1.3 **[1]**

4 **State** the approximate temperature of each of the three steps in a PCR cycle. D1.1.4 **[2]**

5 **State** the electrode that DNA moves towards in gel electrophoresis. D1.1.4 **[1]**

Section B: Understanding

12 marks

6 **Explain** what is meant by semi-conservative replication. D1.1.2 **[2]**

7 **Explain** how complementary base pairing allows DNA to be copied accurately. D1.1.2 **[3]**

8 **Outline** what helicase and DNA polymerase do in replication. D1.1.3 **[3]**

9 **Explain** why Taq polymerase is used in PCR, and not a polymerase from a human cell. D1.1.4 **[2]**

10 **Explain** why short DNA fragments travel further through a gel than long fragments. D1.1.4 **[2]**

Section C: Working with data

14 marks

All data in this section are invented for practice. The patterns are realistic.

11 D1.1.4

A PCR started with 200 copies of a DNA section. Each cycle took 4 minutes.

Number of cycles	**0**	**1**	**2**	**3**	**10**
Copies of the section	200	400	800		

a **Calculate** the number of copies after 3 cycles and after 10 cycles. **[2]**

b **Calculate** the time taken for 10 cycles. **[1]**

c **Suggest** one reason why real reactions stop doubling after many cycles. **[1]**

12 D1.1.5

The table shows the bands found on a gel, at four loci, for a mother, her child and two men. A tick shows that the band is present.

Person	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6
Mother	✓		✓		✓	
Child	✓	✓		✓	✓	
Man R		✓		✓		✓
Man S	✓		✓	✓		

a **Identify** the bands that the child must have inherited from the father. **[2]**

b **Deduce** which man could be the father, giving a reason. **[2]**

c **Explain** why many loci are compared and not just one. **[2]**

d **Explain** why PCR must be carried out before electrophoresis when a sample is very small. **[2]**

e **State** what is run in one lane to estimate the length of the fragments. **[2]**

Section D: Longer answers

6 marks

13 **Describe** how a small sample of DNA found at a crime scene could be used to identify a suspect. D1.1.4, D1.1.5 **[6]**