# 2017 Molecular Techniques MCQ

# 2017 / H2 / ACJC PRELIM / P1 Q13

**1** Which of the following correctly matches the step involved in Southern blotting to its purpose?

	Step	Purpose
A	Transferring DNA fragments from a gel to a nitrocellulose paper with the use of alkaline solution	To permanently attach the DNA fragments to a surface and to separate the two complementary DNA strands
В	Adding a radioactive probe	To bind to all DNA fragments for visualisation of the DNA bands
С	Adding restriction enzymes	To digest each DNA sample into fragments of similar lengths
D	Electrophoresis	To separate DNA fragments based on the amount of negative charges the fragment has

## 2017 / H2 / AJC PRELIM / P1 Q10

2 The diagram shows the results of DNA profiling using gel electrophoresis.



What conclusion can be drawn about the DNA in bands I and II?

- **A** The DNA in the two bands had the same base sequence.
- **B** The DNA in the two bands had the same ratio of bases.
- **C** The DNA in the two bands came from the same source.
- **D** The DNA in the two bands have the same charge to mass ratio.

### 2017 / H2 / AJC PRELIM / P1 Q17

**3** During PCR, the amount of DNA synthesised can be traced using fluorescent primers and the measurements are shown in the following plot. The process initially goes through an exponential phase, followed by a plateau phase eventually.

### Amount of DNA



Which of the following statements is **true**?

- A During the exponential phase, the number of DNA molecules synthesized after 15 cycles is 15<sup>2</sup>.
- **B** During the exponential phase, the temperature is always maintained at the optimum temperature of 72°C hence there is rapid amplification.
- **C** During the plateau phase, the reaction mixture is being depleted of ribonucleotides.
- **D** During the plateau phase, *Taq* polymerase may be denatured.

#### 2017 / H2 / JJC PRELIM / P1 Q16

**4** Multiple copies of a wanted DNA fragment can be made by the polymerase chain reaction (PCR).

Which description of this procedure is not correct?

- A After 'n' turns of the PCR cycle, up to 2<sup>n</sup> copies of the wanted DNA are produced.
- **B** Using a heat-stable enzyme, such as Taq polymerase, means that the enzyme does not lose activity over time.
- **c** Using an enzyme with a high optimum temperature allows DNA polymerisation above the annealing temperature.
- **D** Using specific primers means that only the wanted DNA is replicated.

## 2017 / H2 / MJC PRELIM / P1 Q15

#### **QUESTION 5**

A length of DNA from one of a pair of homologous chromosomes is shown. The target sites of *Eco*RI are shown by arrows and the length of DNA between the target sites is given in kilobases (kb).



A mutation alters one base of the coding sequence of the site marked with an asterisk (\*). This also results in the loss of a target site for *Eco*RI.

DNA from two individuals are cut with *Eco*RI and the DNA fragments separated according to size, and viewed subsequently by autoradiography.

Which of the following corresponds to the band patterns for individuals who are homozygous and heterozygous for this mutation respectively?





**6.** When a polymerase chain reaction amplification was performed on a sample of human genomic DNA, multiple products of varying sizes were obtained, including one of the expected size.

Which of the following modifications to the protocol is the most likely to eliminate the extra PCR products?

- A raising the annealing temperature from 52°C to 58°C
- B raising the elongation temperature from 70°C to 76°C
- **C** decreasing the number of cycles from 30 to 20
- **D** decreasing the amount of template DNA from 1.0 µg to 0.5 µg

#### 2017 / H2 / RI PRELIM / P1 Q18

7. A restriction enzyme recognises specific DNA nucleotide sequences and cleaves the DNA at those positions. This can be used to detect DNA polymorphisms that are found within these sites.

Why is it not always possible to use restriction fragment length polymorphism (RFLP) to detect a mutation involving a disease-causing allele?

- A Not all disease-causing alleles have an associated RFLP.
- **B** Point mutations can never be distinguished using RFLP.
- **C** Use of RFLP is restricted to genetic diseases that are heritable.
- **D** The temperature required in Southern hybridisation is unknown.

#### 2017 / H2 / RVHS PRELIM / P1 Q12

8 Seven skeletons were found in an unidentified grave. To establish the relationship between these seven individuals, DNA were isolated from these skeletons and then analysed using gel electrophoresis.

The results obtained from the skeletons, three children and four adults, are shown below.

Child 1	Child 2	Child 3	Adult 1	Adult 3	Adult 3	Adult 4
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	=	_				
_	_				_	
					_	

Other analysis showed that all three children have the same parents. Which two adults may be the parents of these children?

- A Adults 1 and 2
- **B** Adults 1 and 3
- C Adults 2 and 3
- D Adults 2 and 4

2017 Molecular Techniques MCQ ANS									
Question	Answer	Question	Answer						
1	A								
2	D								
3	D								
4	В								
5	C								
6	A								
7	A								
8	В								
9									
10									
11									