

(1) Draw the complementary strand for the following DNA [2 points]

5' A G A T C A T C G A 3'

3' T C T A G T A G C T 5'

(2) Give two reasons (one SHORT sentence for each) why RFLP markers have been replaced by STR (microsatellite) markers [2 points]

(1) **Exact genotype for STR as opposed to a rough band for RFLP**

(2) **Far less DNA required for PCR-based STR typing**

(3) You have the following allele frequencies for three markers being examined and assume genotypes follow Hardy-Weinberg frequencies

Marker 1		Marker 2		Marker 3		Marker 4	
Allele	Freq	Allele	Freq	Allele	Freq	Allele	Freq
1	0.3	1	0.1	1	0.05	1	0.2
2	0.1	2	0.4	2	0.7	2	0.3
3	0.2	3	0.5	3	0.25	3	0.5

(a) What is the rarest genotype [2 points]

2,2 1,1 1,1 1,1

(b) What is the probability that a randomly-chosen person will have the following marker genotypes? [4 points]

Marker 1	2,3	$2 \times 0.1 \times 0.2$	=	0.04
Marker 2	2,2	0.4×0.4	=	0.16
Marker 3	2,3	$2 \times 0.7 \times 0.25$	=	0.35
Marker 4	1,3	$2 \times 0.2 \times 0.5$	=	0.2

$0.04 \times 0.16 \times 0.35 \times 0.2 = 0.000448$