Student Name: University Number:

PART1- Select the most appropriate answer:

1-Which of the following procedures are used as a routine technique for karyotyping using light microscopy?

A) C-banding
B) fluorescence in situ hybridization (FISH)
C) G-banding
D) Q-banding
E) BUdR-staining

2-The translocation of chromosomes 9 and 22 is characteristic of:

A) Retinoblastoma
B) Li-Fraumeni syndrome
C) Chronic myelogenous leukemia
D) Soft tissue sarcoma
E) None of the above

3-In Down's syndrome the karyotype shows----------.

A) 47 chromosome (Trisomy of 21)
B) 47 chromosome (XXY)
C) 46 chromosome (XY or XX)
D) 45 chromosome (XO)
E) None of the above

4-The polymerase chain reaction or PCR is a technique that

A) was used to demonstrate DNA as the genetic material
B) is used to determine the content of minerals in a soil sample
C) uses short DNA primers and a thermostable DNA polymerase to replicate specific DNA sequences in vitro.
D) measures the ribosome transfer rate during translation
E) detects the level of polymerases involved in replication

5-If the sequence of one strand of DNA is 5' TCGATC 3'. The sequence of the complementary strand would be ___.

A) 5' AGCTAG 3'
B) 5' TCGATC 3'
C) 5' CTAGCT 3'
D) 5' GCTAGC 3'
E) 5' GATCGA 3'

6-In gel electrophoresis, the marker DNA (e.g. lambda cut with HindIII) is useful:

A) for showing that DNA can stain orange with ethidium bromide
B) for showing the size of any DNA band that corresponds with a marker DNA band
C) for telling you when to stop the electrophoresis experiment
D) for allowing you to calculate the size of any DNA band in other lanes on the same gel
E) all of the above

7-A karyotype

A) may be prepared from chorionic villi cells of the foetus.
B) helps in the diagnosis of chromosome disorders.
C) helps in the identification of the Philadelphia chromosome, in chronic myeloid laeukemia.
D) A and B
E) A,B, and C

8-The correct steps of harvesting are:

A) Colcemid → hypotonic solution → fixative
B) Fixative → hypotonic solution → colcemid
C) Colcemid → fixative → hypotonic solution
D) Fixative → colcemid → hypotonic solution
E) Hypotonic solution → colcemid → fixative

9-which probe is used to detect the translocation most commonly found in CML:

A) PML/RARA probe
B) Inversion (16) probe
C) Chromosome X/Y probes
D) Prader-Willi probe
E) BCR/ABL probe

10-What gestational age is chorionic villi generally obtained:

A) 5-7 weeks
B) 9-11 weeks
C) 14-18 weeks
D) 25-28 weeks

Student Name: University Number:

PART2- Fill the blank:

1) The purpose of adding PHA to peripheral blood cultures for chromosomal analysis is……..

2) ……..works on the spindle fibers to stop mitosis in metaphase stage.

3) FISH stands for……

4) Two examples of chromosome special staining procedures include …… and ……. banding.

5) The components of the loading buffer (used when DNA/PCR products to a gel) include: H_2O, ……., and…….

6) The wavelength used in the DNA quantification process are ……..and……..nm

7) DNA is negatively charged due to…….

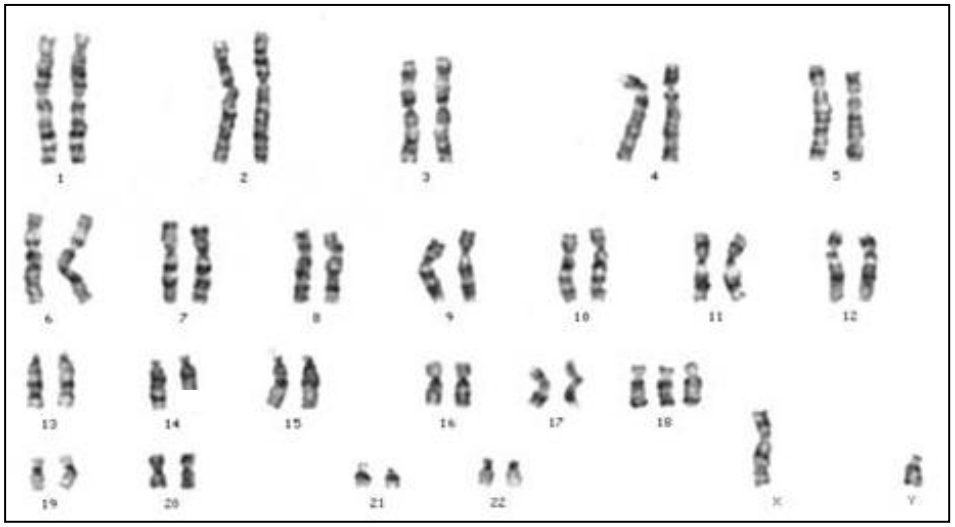
8) The cell lysis solution used in DNA extraction has two components: Detergent to……and Protease to……..

9) In DNA extraction, the high concentration salt is for……precipitation while the isopropanol is to precipitate ……..and make it visible.

10) In gel electrophoresis, the reason for allowing the agaros to cool down before adding the ethidium bromide is……..

Student Name: University Number:

PART3:



The above figure is not a real case

Q1: From the figure above please mention the following:

-What is the name of test shown?

-Name three patient samples that can be used in this test?

-What is the patient gender?

-What is the stain used in this routine test?

-What stage in the cell cycle is required for this test?

-Look carefully at the chromosomes and mention two abnormalities present.

Q2: Why do we add a hypotonic solution to cultured cells during the harvesting process?

Q3: Why do we add methanol-acetic acid solution to cultured cells during the harvesting process? (2 advantages)

Q4: What are the three parameters used for identifying chromosomes?

Q5: Why are cells dropped from a distance on glass slides in cytogentics?

Student Name: University Number:

PART4:

Q1: In a PCR experiment the primers could form either dimers or hairpin. In figures A and B identify what represents a hairpin and what represents dimers. Note that the vertical lines represent nucleotide matches. Mention what could these problems cause.

A) 

B) 

Q2: Why do we add *Taq* polymerase to the PCR?

Q3: Why do we need buffer solution and $MgCl_2$ as materials for PCR?

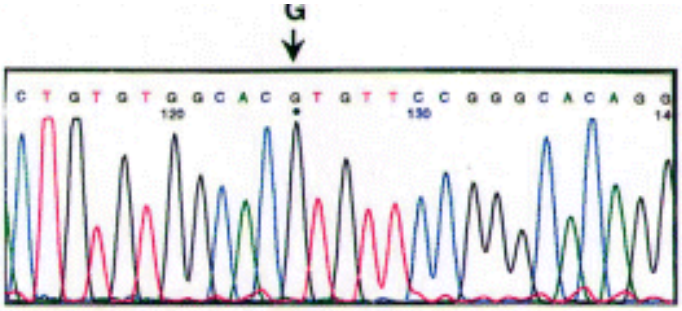
Q4: In PCR, what is the Tm of a primer and how does affect the reaction?

Q5: List four factors to be considered when designing primers.

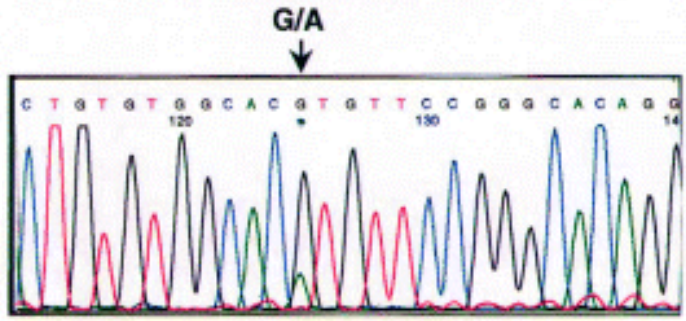
Student Name: University Number:

PART5:

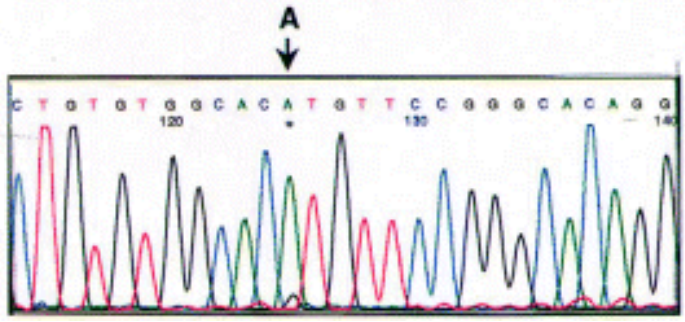
Control



A



B



Q1: What is the name of the test shown? What is the purpose of using this test?

Q2: What are the abnormalities seen in A and B?

Q3: Can the carrier show symptoms? Explain briefly.

Q4: What is the DNA source for this test?

Q5: What are the differences between the ddNTPs used in this test and the normal dNTPs?