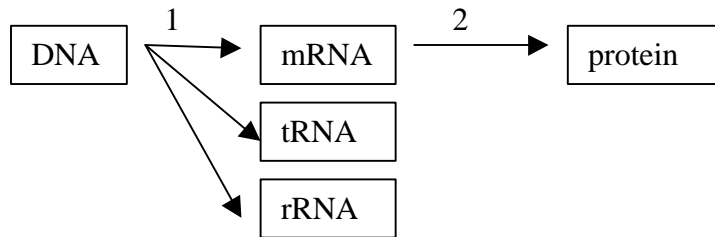


BIOL A201
Genetics
Exam 3
Spring 1999

Circle the best answer for the following 13 questions (3 pt. ea.)

- Which of the following is NOT a characteristic of RNA.
 - the stable form of RNA is usually single-stranded.
 - RNA consists of phosphate, sugar and nitrogenous bases.
 - The molecular structure of the ribose sugar in RNA includes an oxygen that is lacking in deoxyribose sugar.
 - adenine pairs with thymine and guanine pairs with cytosine in RNA
 - RNA is synthesized in the nucleus in eukaryotes.
- The Central Dogma is illustrated below. The arrows (at 1 and 2) are best labeled, respectively



- transcription; translation
 - transcription; translation
 - replication; reverse transcription
 - replication; transcription
 - transcription; translation
- RNA polymerase must bind to _____ before initiating RNA synthesis.
 - the promoter
 - the ribosome
 - the ribosome binding site
 - the intron
 - the primer
 - Which of the following is NOT a characteristic of the genetic code?
 - each group of two nucleotides in the mRNA specify one amino acid.
 - the codons in the mRNA are nonoverlapping
 - the genetic code is unambiguous
 - the genetic code contains "start" and "stop" signals necessary to initiate and terminate protein synthesis
 - the genetic code is redundant
 - The direction of RNA synthesis is _____. The _____ is the strand of the DNA that is read by the RNA polymerase and complementary to the RNA.
 - 5' → 3'; partner strand
 - 5' → 3'; template strand
 - 3' → 5'; partner strand
 - 3' → 5'; template strand

6. The role of mRNA in the cell is to
 - a. carry the codons of the gene to be translated
 - b. carry the specific amino acid and transport it to the ribosome
 - c. bind the specific amino acid to the correct carrier molecule
 - d. carry the anticodon of the carrier molecular
 - e. act primarily as a structural component of the ribosome.

7. A restriction enzyme
 - a. forms a covalent bond between two adjacent nucleotides in a DNA molecule
 - b. forms a covalent bond between an amino acid and a specific RNA molecule
 - c. causes a double-strand break at a specific site in a DNA molecule
 - d. causes a single-strand break at random sites in a DNA molecule
 - e. is a marker gene in a plasmid used in DNA cloning

8. The oligonucleotide synthesizer is a machine we discussed in class that is important in
 - a. producing DNA probes that are of a known nucleotide sequence as determined by reverse genetics
 - b. separation of plasmid DNA from chromosomal DNA in recovering cloned DNA
 - c. amplifying copies of a particular fragment of DNA (or gene) in the presence of a pair of primers flanking the region to be amplified
 - d. tagging bacterial colonies on an agar plate in order to distinguish between recombinants and non-recombinants
 - e. generating the DNA fingerprint of an unknown individual by simply adding a sample of the individual's blood or body fluids

9. There is a single target sequence of the *HindIII* (or any specified) restriction endonuclease within the pUC18 cloning vector. It occurs
 - a. within the ORI site
 - b. in the region between two marker genes
 - c. exclusively within the ampicillin resistance gene
 - d. in the polylinker region within the lacZ gene
 - e. at an unknown site within the vector

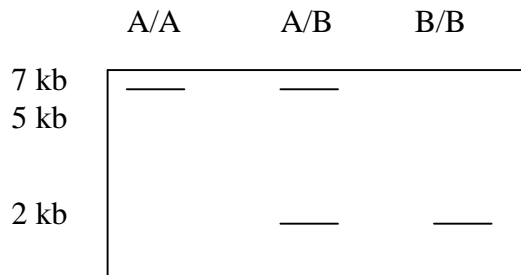
10. In forensics, the more reliable method (as discussed in class) for DNA fingerprinting is
 - a. the oligonucleotide synthesizer method
 - b. the PCR method
 - c. the RFLP method
 - d. the shotgun method
 - e. the colony hybridization method

11. What is the role of the antibiotic, ampicillin, in the DNA cloning procedure?
 - a. removes contaminants in order for the cloning to be clean
 - b. provides the main nutrient in the medium for bacterial growth
 - c. facilitates the uptake of the cloning vector by the bacterial host in the transformation step
 - d. prevents the uptake of the cloning vector by the bacterial host in the transformation step
 - e. selects for only transformed bacteria and eliminates non-transformed cells

Write name on back of exam.

12. When using a cloning vector such as pUC18, a bacterial colony containing a recombinant vector can be identified by:
- the way it pUCers its lips
 - growth, which demonstrates ampicillin sensitivity
 - growth, which demonstrates ampicillin resistance
 - white color, which shows the lacZ gene has been disrupted
 - blue color, which shows the lacZ gene has been disrupted
13. A restriction fragment length polymorphism can be caused by
- a mutation in a base pair caused by the restriction enzyme
 - a mutation in a base pair anywhere within a restriction fragment
 - a mutation in a base pair within a restriction site
 - a mutation in a base pair in the regions flanking a restriction site
14. Make a schematic drawing showing active RNA synthesis and be certain to include and label the following: **RNA polymerase, 5' ends, 3' ends, RNA molecule, DNA partner strand, DNA template strand, direction of synthesis.** (8 pt)

15. In an RFLP analysis, the following patterns were observed on a Southern blot:



Draw maps of allele A and allele B showing relative positions of restriction sites and the position on each map where the DNA probe most likely binds. (6 pt)

