

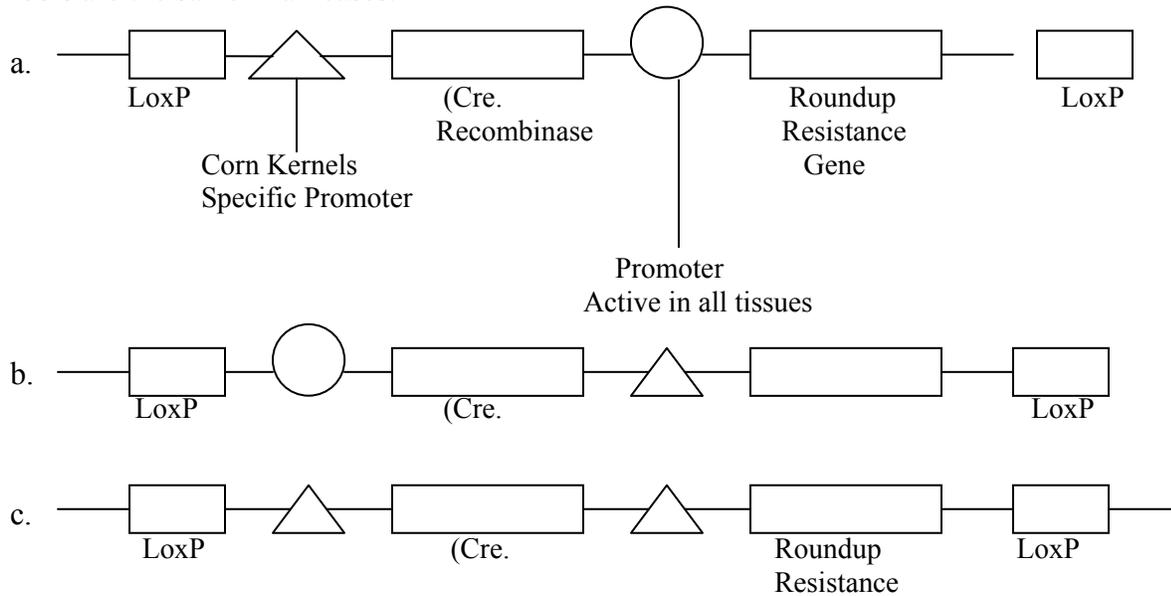
Directions: Choose the BEST answer from among the choices given.

1. Topoisomerases?
 - a. Rewind DNA after the replication fork has passed by
 - b. Open the DNA helix so that replication can start
 - c. Remove the strain on the helix that results from DNA replication
2. When DNA fragments are separated by gel electrophoresis, separation of fragments depends primarily on?
 - a. Size of fragment
 - b. The nucleotide sequence of fragment
 - c. Both a and b apply
3. Ubiquitin is?
 - a. A modified base in RNA
 - b. A protease
 - c. A small protein which when linked to other proteins targets them for degradation in lysosomes
 - d. A small protein that stabilizes other proteins
 - e. A small protein that when linked to cellular proteins target them for degradation in proteosomes
4. When you compare the exon sequences present in an initial gene transcript with the sequences in the mature message?
 - a. All the exon sequences are present in the mature message
 - b. The mature message may only contain some of the exon sequences
5. In order for mRNA to exit from the nucleus it must have?
 - a. A methyl G at the 3' end
 - b. A methyl G at the 5' end
 - c. A poly A tail
 - d. a and c apply
 - e. b and c apply
6. Aminoacyl tRNA synthetase? (think carefully)
 - a. Recognizes the anticodon of the tRNA and this is sufficient for the reaction to proceed (i.e. link an amino acid to the tRNA).
 - b. The enzymes also recognize other sequences in the tRNA
7. Amino acids are linked to tRNA at?
 - a. At its 5' end
 - b. At its 3' end. The terminal nucleotide which is Adenine
 - c. d. a and c apply
 - e. b and c apply
8. After completing protein synthesis the ribosomal subunits?
 - a. Remain bound to each other
 - b. Are separated
9. In eukaryotes the ribosome identifies a mRNA by the presence of a methyl G cap. In prokaryotes?
 - a. The same applies
 - b. Each coding sequence is preceded by a unique sequence in a polycistronic message

The next two questions are related

10. All proteins in a given cell type are degraded?
 - a. Randomly
 - b. Different protein are degraded at different rates
11. Proteins are normally degraded in a pathway that requires:
 - a. The nucleus
 - b. In proteosomes
 - c. Marked by ubiquitin
 - d. ATP
 - e. only b, c, and d apply

23. You wish to create a transgenic plant (corn), resistant to the weed killer Roundup, but do not want to risk the new genes being present in the edible portion of the plant, so that when Glaser eats tortillas he is not exposed to new proteins or genes. Which of the following genes insertions would complete this task? Symbols are the same in all cases.



24. When phosphatidyl ethanolamine is present in a lipid bilayer you expect the ethanolamine to be?
 a. At the center of the bilayer b. In the aqueous phase

25. Where two cells are fused so that their cytoplasmic membrane are continuous, after a short period of time you expect?
 a. The membrane proteins of both cells are now randomly distributed
 b. Some membrane proteins are constrained from free diffusion

26. The ribosomal subunits in eukaryotes are assembled in the?
 a. Cytoplasm b. Nucleus c. Nucleolus

27. mRNAs in eukaryotes can be transcribed whether they have a poly A tail or not?
 a. True b. False

28. For the replication of DNA?
 a. From the initiation site the replication fork moves in only one direction
 b. From the initiation site the replication fork moves in two directions
 c. Initiation starts at random sites
 d. a and c are correct e. b and c are correct

29. Oxidation of Guanine can lead to 8 oxoguanine to generate for the pair G/C → 8 oxo G/C. If this is not repaired prior to replication a mutation will result, in one of the daughter cells, you expect the daughter cells which received the mutated strand after removal of the 8 oxoguanine to have a base pair. Think carefully:
 a. G/C b. T/A c. A/T

30. A plasmid vector used for cloning DNA fragments in bacterial cells minimally requires sequences that are?
 a. An origin of replication b. A gene that allows selection of cells that contain the plasmid
 c. One or more sites cleavable by restriction enzymes d. a and c apply e. a, b and c apply

31. To prepare plasmids that contain liver DNA sequences and will be expressed in *E. coli* you would?
- Clone genes present in chromosomes
 - Prepare cDNAs from all the RNAs expressed in the cell, that code for these proteins
 - Prepare a cDNA from RNAs expressed in the cell that have a poly A sequence at its 3' end
 - Prepare a cDNA from RNAs expressed in the cell that have a poly A sequence at its 5' end
32. Amplification of a particular DNA sequence by Polymerase Chain Reaction requires knowledge of:
- The full sequence of the region you wish to amplify
 - The sequence of the 3' and 5' end of the region that you wish to amplify
 - A specific restriction enzyme
 - a and b apply
 - b and c apply
33. Higher organisms often contain multiple proteins which have apparently evolved from a common ancestral gene. The most likely origin of these is? (for example, hemoglobin)
- Unequal crossing over
 - Bacterial infections
 - Insertion of enhancer molecules close to the initiation site of gene transcription
34. You prepare liposomes in an aqueous solution that contains a small protein (insulin), glucose, and NaCl you isolate the liposomes by gentle centrifugation and disperse them in a large volume of distilled H₂O. After several hours you expect to find in the water surrounding the liposome?
- Glucose
 - NaCl
 - Insulin
 - all of the above
 - none of the above
35. The carboxyl terminal region of RNA Polymerase II?
- Is responsible for attachment of the enzyme to the "TATA" box in DNA
 - Is phosphorylated by ATP after completion of mRNA synthesis
 - Serves as an anchor for other enzymes involved in synthesis of the mature mRNA.
36. The initiation of RNA synthesis by Polymerase II requires the presence of?
- Telomerase
 - Primase
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37. Transcription factors that are activated by lipid soluble hormones?
- In the absence of hormones, some reside in the cytoplasm and others are always bound to DNA
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38. You have isolated a DNA fragment that you believe is part of the gene coding for Mallerase, a new enzyme you determine the sequence of this fragment as:
 -AUGUCCGCCUGA-
 You conclude from this that the aminoacid sequence of this protein is?
 (the genetic code is available at the end of the test)
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39. If you examine the genes coding for protein in the human genome you find?
- Most of the sequence represents exons
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40. Retrotransposons excise a DNA sequence from one location in the genome and move it to another location?
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41. The primary transcript for tRNAs is the fully functional tRNA molecule?
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44. The synthesis of phosphatidylcholine normally present in the cytoplasmic membrane takes place in the endoplasmic reticulum (ER)?
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		UUC	UCC	UAC	UGC	C	
		UUA	UCA	UAA Stop	UGA Stop	A	
		UUG	UCG	UAG Stop	UGG Trp	G	
	C	CUU	CCU	CAU	CGU	U	
		CUC	CCC	CAC	CGC	C	
		CUA	CCA	CAA	CGA	A	
		CUG	CCG	CAG	CGG	G	
	A	AUU	ACU	AAU	AGU	U	
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	G	GUU	GCU	GAU	GGU	U	
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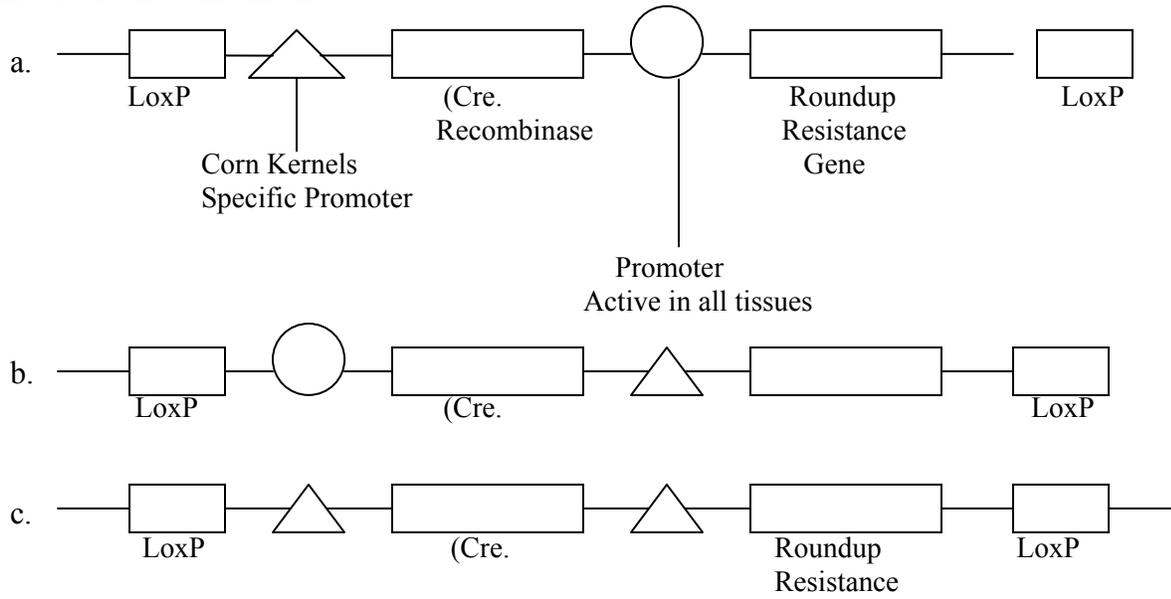
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13. Ultraviolet light results in the formation of?
- A cross linked A-A base pair
 - A cross linked T-T base pair
14. For the answer to question above, the cross linked bases are?
- On opposite strands
 - On the same strand
 - Both can occur
15. Human females have two X chromosomes while males have one, therefore they: **(think carefully)**
- Synthesize twice as many gene products coded by the X chromosome
 - They randomly inactivate half the genes on each X chromosome
 - They inactivate a specific set of genes in each X chromosome, so that each chromosome only expresses a different half of the X chromosome genes
 - None of the above is correct
16. When DNA is chemically damaged, DNA repair requires? (think carefully)
- Excision of both strands of damaged DNA
 - Excision of damaged nucleotides
 - Filing in gaps with DNA polymerase and sealing with DNA ligase
 - a and c apply
 - b and c apply
17. Mistakes in DNA synthesis are to a large extent avoided because DNA polymerase has?
- Proofreading function
 - Mismatch repair enzymes correct DNA after synthesis
 - Both a and b apply
18. The minimal components required for function of a eukaryotic chromosome are?
- Centromere
 - Replication origin
 - Telomere
 - All apply
19. Ribozymes are: (Read carefully)
- Enzymes that cleave ribonucleotide
 - RNAs with catalytic activity
 - Enzymes that cleave RNA at specific sequences
 - a and b apply
 - b and c apply
20. To create a transgenic cow that would synthesize a human protein in milk, you would?
- Inject total human DNA into the mammary gland
 - Select embryonal stem cells (ES) transfected with human gene under control of a promoter expressed in all somatic cells
 - Select ES cells transfected with a human gene under control of a DNA sequence specific for proteins secreted in milk such as lactalbumin and transfer these cells to early blastulas
 - None of the above
21. A cDNA library is prepared from muscle cells and liver cells. You expect the genes found in these two libraries to be:
- The same
 - Partially overlapping
 - Totally different
22. The ribosome contains?
- One binding site for tRNA
 - Three binding sites for tRNAs
 - Two binding sites for tRNAs

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		UUA } Leu	UCA } Ser	UAA Stop	UGA Stop	A	
		UUG } Leu	UCG } Ser	UAG Stop	UGG Trp	G	
	C	CUU } Leu	CCU } Pro	CAU } His	CGU } Arg	U	
		CUC } Leu	CCC } Pro	CAC } His	CGC } Arg	C	
		CUA } Leu	CCA } Pro	CAA } Gln	CGA } Arg	A	
		CUG } Leu	CCG } Pro	CAG } Gln	CGG } Arg	G	
	A	AUU } Ile	ACU } Thr	AAU } Asn	AGU } Ser	U	
		AUC } Ile	ACC } Thr	AAC } Asn	AGC } Ser	C	
		AUA } Ile	ACA } Thr	AAA } Lys	AGA } Arg	A	
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	G	GUU } Val	GCU } Ala	GAU } Asp	GGU } Gly	U	
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