

Annotation Worksheet: Review of Molecular Biology Topics

Due: _____

These are questions related to central topics in molecular biology that you will come across often in validation/annotation. Understanding them builds you a strong foundation which will make you a better annotator. Do your best to answer them through your own research. Once it has been completed, I will upload a video lecture explaining all of these topics to my YouTube channel and will provide you with a link. Feel free to type in your answers or print it out and fill it in by hand. Even if you don't have all of this memorized, this can be a good reference sheet to remind you of details should you forget later on down the line. Think of it like a study guide you would fill out for an exam in a class. A few sentences for each answer should be sufficient but this will vary. Use your own discretion but air on the side of being detailed. Feel free to include figures you find online or drawings you make if it is helpful in conveying an idea

1. What is the central dogma?
2. Describe the process of transcription. What is a transcript? Keep it general enough so that it can apply to both prokaryotic and eukaryotic systems.
3. DNA is transcribed into RNA in the _____ direction to the _____ direction.
4. What are 3 differences between DNA and RNA?
5. Compare and contrast hnRNA, mRNA and cDNA.
6. Compare and contrast Introns and Exons.
7. What is 5' and 3' UTR? What function does it serve?
8. Describe the process of mRNA processing. Be sure to include the functions of snurps and talk about how intron structure affects splicing.
9. What is alternative splicing? (keep it basic) What function does this serve?
10. What does it mean when I say Sense (aka coding) vs antisense (noncoding) DNA strand? Which sequence is similar to the mRNA transcript?
11. What is an open reading frame? How many possible reading frames are there for a double stranded piece of DNA where it is unclear which strand is the sense and which strand is the antisense strand?
12. What is the first amino acid in a polypeptide?

13. Describe the process of translation. Make sure to talk about pre-initiation, tRNA, how amino acids are added on in the APE sites and how translation ends. (Keep it general enough so that your explanation applies to prokaryotic and eukaryotic systems.)
14. What is the wobble position?
15. Why can 2 peptide sequences be equal but their mRNA / cDNA sequence be different? Use the following codon usage chart to answer the question. Provide an amino acid sequence 3 residues long and 2 possible mRNA / cDNA sequences that could encode for it.

		Second letter				
		U	C	A	G	
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } Ser UCC } UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G
	C	CUU } Leu CUC } CUA } CUG }	CCU } Pro CCC } CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } Arg CGC } CGA } CGG }	U C A G
	A	AUU } Ile AUC } AUA } AUG Met	ACU } Thr ACC } ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G
	G	GUU } Val GUC } GUA } GUG }	GCU } Ala GCC } GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } Gly GGC } GGA } GGG }	U C A G

16. Compare and contrast the terms residue, amino acid, polypeptide and protein.
17. Describe the levels of protein folding.
18. Compare and contrast a genome and proteome.