Molecular Biology Quiz Name: James Jedediah Smith

BIFX 504

1. What is the difference between genotype and phenotype?

Phenotype is just physical appearance. Genotype are the genes someone has in them.

1. Can two different individuals have the same phenotype but different genotypes? If so, how?

Yes. If a trait is dominant, then individuals that are either heterozygous dominant or homozygous dominant genotypes may display the same dominant trait phenotype.

1. What is the F1 generation in a genetic cross?

The F1 generation is the first filial generation. It is produced by the original two parents, the F0.

1. Before the human genome was sequenced, how was the distance between genes measured?

Recombination frequency via Centimorgans.

1. Which DNA nucleotides pair with each other?

A pairs with T and C pairs with G.

1. Which ribonucleotides pair with which deoxyribonucleotides?

U pairs with A.

1. What is the central dogma of molecular biology?

DNA makes RNA which makes protein.

1. What important group of molecules does the central dogma leave out?

Amino acids!

1. What do you call the process that makes RNA?

Transcription.

1. What do you call the process that makes proteins?

Translation.

1. How many nucleotides are in a codon?

Three.

1. What kind of molecule has an anticodon? What does it do?

Anticodons found on the tRNA. It pairs with the actual codon to ensure that the right the amino acids get attached.

1. How many codons code for each amino acid (give a number range).

There are usually 2 – 6 different codons that code for a given amino acid. This redundancy functions as a sort of failsafe against codon mutations.

1. Name three things that must happen to a pre-mRNA before it is functional.

Pre-mRNA needs to be spliced, receive a 5’ cap, and a 3’ tail.

1. How is DNA organized in the cell (say what other mechanisms/molecules are involved)?

DNA are stored inside chromosomes located in both the cell nucleus and mitochondria.

1. Name **three** mechanisms that affect gene expression and say how they affect it

Hormones, epigenetic modification, and transcription factors. Epigenetic factors can impact the density of the chromatin, thus influencing which genes get transcribed. Transcription factors bind to the promoter site to influence the transcription of certain genes. Hormones are chemical messengers that utilize various mechanisms, including upstream enhancers and transcription factors to influence gene expression.

1. Name **three** ways that different mRNAs can be made from the same gene.

Alternative splicing via exon inclusion, intron retention, and mutually exclusive exons.

1. What are the regions that are **upstream** and **downstream** of the open reading frame on an mRNA?

Promoter and terminator.

1. How is epigenetics **different** from genetics? How is it the **same**?

They both involve the study of genes, but epigenetics incorporates the effects of environment.

1. The beginning of an RNA molecule is the \_\_\_\_\_\_\_\_ .

5-prime end.