Module 13: Regulation of Gene Expression

1. Define operon.
2. Compare inducible operons (lac) vs. repressible operons (trp).
3. Gene expression is controlled at multiple levels. Briefly explain:
4. Chromatin remodeling (histone modification)
5. Transcriptional control (transcription factors)
6. Post-translational control (protein modification/degradation)
7. Define point mutation vs. frameshift mutation.
8. Why are frameshift mutations typically more damaging?
9. Scenario**: E. coli are growing in glucose-only medium.
10. Is the lac operon on or off? Is the repressor bound?
11. What happens when lactose is added?
12. Explain dosage compensation and Barr body formation.
13. How does X-inactivation explain calico cat coat patterns?
14. Cancer results from dysregulated gene expression.
15. Analyze how mutations in tumor suppressor genes or proto-oncogenes lead to uncontrolled cell division.
16. Environmental factors (diet, stress) can modify DNA methylation without changing the sequence.
17. Can these modifications be inherited? Discuss evidence.