2025 Bi H2 Q5

Section: DNA and the Genome

Topic: Gene Expression and Chromosome Mutations

Question Summary

This question allows a choice between: (A) writing notes on the transcription stage of gene expression, or (B) writing notes on chromosome mutations. Both sets of notes are provided below.

Worked Solution

Option A: Transcription

1. Transcription is the first stage of gene expression.
2. The DNA double helix unwinds at the gene and the bases separate.
3. RNA polymerase binds to the promoter at the start of the gene.
4. Free RNA nucleotides form complementary base pairs with the DNA template strand.
5. RNA polymerase joins RNA nucleotides to produce a primary mRNA transcript.
6. Introns are removed and exons joined during RNA splicing to form mature mRNA.
7. The mature mRNA leaves the nucleus through a nuclear pore and travels to the ribosome.

Option B: Chromosome Mutations

1. Chromosome mutations involve changes in the structure of chromosomes.
2. Types include: deletion, duplication, inversion, and translocation.
3. Deletion removes a section of chromosome, causing loss of genes.
4. Duplication repeats a section of chromosome, increasing gene number.
5. Inversion reverses the order of genes within a chromosome segment.
6. Translocation transfers a segment from one chromosome to another non-homologous chromosome.

7 Chromosome mutations often have large effects because they alter many genes at once.

Final Answer

1 Option A: Transcription produces an mRNA copy of a gene using RNA polymerase, complementary base pairing, and RNA splicing.

2 Option B: Chromosome mutations are large-scale structural changes: deletion, duplication, inversion, translocation.

Revision Tips

1 Remember: transcription happens in the nucleus; translation happens at ribosomes.

2 RNA contains U instead of T.

3 Chromosome mutations affect many genes at once, unlike point mutations.

4 Be ready to name and describe all 4 structural chromosome mutation types.