

Saladin 7E
Answer Key
Chapter 4, Genetics and Cellular Function

Testing Your Comprehension

1. In the condensed form of a metaphase chromosome, genes would be tucked away, inaccessible to RNA polymerase, and therefore unable to carry out the cellular functions that occur in G_1 . The finely dispersed form of chromatin in G_1 makes the genes accessible for transcription, but it would be unsuitable for mitosis because it would become very tangled and difficult or impossible to divide evenly between daughter cells.
2. In order to code for anything, the uncoiling of the double helix of DNA must expose a variety of base sequences to the action of RNA polymerase. If the cross-bridges of the DNA molecule (the “rungs” from one backbone to the other) were all deoxyribose, then the RNA polymerase would read only a monotonous string of identical messages. There would be no diversity in the message—in effect, no code.
3. Mutation is unavoidable, mutation is genetic change, and genetic change in a population is evolution. Therefore, evolution is inevitable.
4. Such an mRNA would have to be at least 903 bases long. It would require a 3-base codon for each of the 300 amino acids, plus a stop codon.
5. First, while it is true that a single gene can code for a single polypeptide, all proteins that have quaternary structure are composed of more than one polypeptide, unless both chains are identical, there would need to be at least two genes (one for each polypeptide). Additionally, both posttranslational modification of polypeptides and the addition of a signal sequence can direct change both the structure and function of the final product or protein.