Chapter 29 – Answers to questions (for in-chapter questions)

1. a Aspartic acid and glutamic acid,
   b Tryptophan, asparagine, glutamine, histidine, lysine and arginine.

2. a Tryptophan, asparagine, glutamine, histidine, lysine and arginine
   b None.

3. a The intermolecular bonds holding the tertiary structure together break, changing the shape of the enzyme’s active site.
   b The linear shape of the α-helix gives keratin its fibrous properties.
   c Heating denatures the protein and changes its structure so that it is no longer soluble in water.

4. Enzymes are specific to a particular substrate whereas inorganic catalysts often work with many different substrates. Enzymes are much more efficient than inorganic catalysts, but they only work within a narrow temperature range.

5. Small changes in pH or temperature will denature the enzyme, changing the shape of the active site.

6. Jelly contains a protein which sets into a water-trapping gel. Protease in fresh pineapple breaks down the protein in jelly so that it no longer sets. However, in tinned pineapple the protease has been denatured by heating, so it will not break down the protein.

7. At low substrate concentrations there are more enzyme molecules than substrate molecules, so all substrate molecules will have an enzyme to bind to. At high substrate concentrations there is more substrate than enzyme, but an enzyme can only bind to one substrate at a time, so increasing the substrate concentration further will not increase the rate of reaction.

8. a Leu Asn Gly Arg, b Leu Asn Ala Arg.

9. During transcription the middle ‘A’ in the code for Glu is swapped for ‘T’ forming Val.

10. The double helix is held together by hydrogen bonds, and changes in pH and temperature will cause those bonds to break, destroying the structure.

11. a Covalent bonds are strong and will make it difficult for the helix to be separated for replication.
    b Induced dipole attractions are weak and so the structure will break apart too easily.