

Chapter 2 SELF-TEST Biological background

This is a quick test to check that you have remembered some of the fundamental biological material in this Chapter.

1. Which of the following are pyrimidines?

- A. Adenine and thymine
- B. Cytosine and thymine
- C. Cysteine and guanine
- D. Cytosine and guanine

B

2. Which of the following contain phosphorous atoms?

- A. Proteins, DNA and RNA
- B. DNA and RNA
- C. DNA only
- D. Proteins only

B

3. Which of the following contain sulphur atoms?

- A. Histidine
- B. Lysine
- C. Methionine
- D. All of the above

C

4. Which of the following is not a valid amino acid sequence?

- A. EINSTein
- B. CRICK

- C. FARADAY
- D. WATSON

D – because the O is not a standard amino acid abbreviation

5. Which of the following ‘one-letter’ amino acid sequences corresponds to the sequence Tyr-Phe-Lys-Thr-Glu-Gly ?

- A. YFKTEG
- B. WPKTEG
- C. WFLTGY
- D. YFLTDG

A – remember that Lys is K not L, and that Glu is E, etc. It is worth trying hard to remember these.

6. Which of the following peptides would have the largest positive charge in a solution at neutral pH?

- A. LYAIRT
- B. CTKPLH
- C. VEMDAS
- D. PHRYLD

R, K and H are basic (i.e. +ve charge) and D and E are acidic (-ve charge). Therefore the largest +ve charge is +2 on sequence B.

7. Consider the following DNA oligomers. Which two are complementary to one another? All are written in the 5' to 3' direction.

(i) TTAGGC (ii) CGGATT (iii) AATCCG (iv) CCGAAT

- A. (i) and (ii)
- B. (ii) and (iii)
- C. (i) and (iii)
- D. (ii) and (iv)

B – remember complementary sequences pair in opposite directions

8. Which of the following statements about transcription is correct?

- A. Transcription is initiated at a start codon.
- B. Transcription is carried out by aminoacyl-tRNA synthetases.
- C. RNA sequences must be spliced prior to transcription.
- D. Transcription involves the complementary pairing of a DNA strand and an RNA strand.

A – wrong. *Translation* is initiated at a start codon.

B – wrong. Transcription is carried out by RNA polymerases

C – wrong. RNA sequences are spliced after transcription and prior to translation.

D – correct

9. Which of the following components of a cell does not contain RNA?

- A. The nucleus
- B. The ribosome
- C. The spliceosome
- D. The cell membrane

D – there is lots of RNA in the nucleus, and the ribosome and spliceosome both contain specific RNAs.

10. Which of the following statements about ribosomes is correct?

- A. During translation, a ribosome binds to a messenger RNA near its 5' end.
- B. Ribosomes are essential for DNA replication.
- C. Ribosomes can be synthesized by *in vitro* selection techniques.
- D. Inside a ribosome there is one tRNA for each type of amino acid.

A – correct

B – Wrong – ribosomes are responsible for protein synthesis not DNA replication

C – Wrong – *ribozymes* are synthesized *in vitro*.

D – Wrong – there are many types of tRNA in the cell but they are not all associated with the ribosome at the same time

11. Which of the following statements about the genetic code is correct?

- A. Cysteine and tryptophan have only one codon in the standard genetic code.
- B. Serine and arginine both have 6 codons in the standard genetic code.
- C. The fMet tRNA is a special tRNA that binds to the UGA stop codon.
- D. All of the above.

A – Wrong – Cysteine has 2

B – Correct

C – Wrong – the fMet tRNA binds to the AUG start codon

D – Wrong

12. Which of the following statements about polymerases is correct?

- A. RNA polymerase has a much lower error rate than DNA polymerase due to proof-reading.
- B. DNA polymerases move along an existing DNA strand in the 5' to 3' direction.
- C. DNA polymerase I makes a primer onto which further nucleotides are added by DNA polymerase III.
- D. None of the above.

A – Wrong – it is the other way round

B – Wrong – they move from the 3' to the 5' direction, hence the new strand is synthesized from the 5' to the 3' end.

C – Wrong – DNA polymerase I replaces the RNA primer by DNA

D - correct