

Nucleic acids

Specification reference	Checklist questions	
3.1.5.1	Can you explain that deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) are important information-carrying molecules?	<input type="checkbox"/>
3.1.5.1	Can you describe how DNA holds genetic information in all living cells?	<input type="checkbox"/>
3.1.5.2	Can you describe how RNA transfers genetic information from DNA to the ribosomes?	<input type="checkbox"/>
3.1.5.2	Can you describe how ribosomes are formed from RNA and proteins?	<input type="checkbox"/>
3.1.5.2	Can you explain that both DNA and RNA are polymers of nucleotides?	<input type="checkbox"/>
3.1.5.2	Can you describe how nucleotides are formed from a pentose, a nitrogen-containing organic base and a phosphate group?	<input type="checkbox"/>
3.1.5.2	Can you draw the structure of a nucleotide?	<input type="checkbox"/>
3.1.5.2	Can you list the components of a DNA nucleotide: deoxyribose; a phosphate group; one of the organic bases adenine, cytosine, guanine, or thymine?	<input type="checkbox"/>
3.1.5.2	Can you list the components of an RNA nucleotide: ribose; a phosphate group; one of the organic bases adenine, cytosine, guanine, or uracil?	<input type="checkbox"/>
3.1.5.2	Can you explain how a phosphodiester bond is formed from a condensation reaction between two nucleotides?	<input type="checkbox"/>
3.1.5.2	Can you describe the structure of a DNA molecule: a double helix with two polynucleotide chains held together by hydrogen bonds between specific complementary base pairs?	<input type="checkbox"/>

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3.1.5.2	Can you describe the structure of an RNA molecule: a relatively short polynucleotide chain?	<input type="checkbox"/>
3.1.5.2	Can you explain how the relative simplicity of DNA led many scientists to doubt that it carried the genetic code?	<input type="checkbox"/>
3.1.5.2	Can you explain that the semi-conservative replication of DNA ensures genetic continuity between generations of cells?	<input type="checkbox"/>
3.1.5.2	Can you describe the process of semi-conservative replication of DNA: <ul style="list-style-type: none"> • the double helix unwinding • hydrogen bonds between complementary bases in the polynucleotide strands breaking • DNA unwinding and breaking its hydrogen bonds (and the role of DNA helicase in this) • attraction of new DNA nucleotides to exposed bases on template strands and base pairing • the condensation reaction that joins adjacent nucleotides (and the role of DNA polymerase in this)? 	<input type="checkbox"/>
3.1.5.2	Can you evaluate the work of scientists in validating the Watson–Crick model of DNA replication?	<input type="checkbox"/>
3.1.6	Can you describe how a single molecule of adenosine triphosphate (ATP) is a nucleotide derivative?	<input type="checkbox"/>
3.1.6	Can you describe how a single molecule of adenosine triphosphate (ATP) is formed from a molecule of ribose, a molecule of adenine and three phosphate groups?	<input type="checkbox"/>
3.1.6	Can you draw the structure of a single molecule of adenosine triphosphate (ATP)?	<input type="checkbox"/>
3.1.6	Can you describe Hydrolysis of ATP to adenosine diphosphate (ADP) and an inorganic phosphate group (Pi) is catalysed by the enzyme ATP hydrolase?	<input type="checkbox"/>

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3.1.6	Can you explain how the hydrolysis of ATP can be coupled to energy-requiring reactions within cells?	<input type="checkbox"/>
3.1.6	Can you explain that the inorganic phosphate released during the hydrolysis of ATP can be used to phosphorylate other compounds, often making them more reactive?	<input type="checkbox"/>
3.1.6	Can you explain how ATP is resynthesised by the condensation of ADP and P _i ?	<input type="checkbox"/>
3.1.6	Can you describe how the condensation of ADP and P _i is catalysed by the enzyme ATP synthase during photosynthesis, or during respiration?	<input type="checkbox"/>
3.1.7	Can you explain that water is a major component of cells?	<input type="checkbox"/>
3.1.7	Can you explain that water is a metabolite in many metabolic reactions, including condensation and hydrolysis reactions?	<input type="checkbox"/>
3.1.7	Can you explain that water an important solvent in which metabolic reactions occur?	<input type="checkbox"/>
3.1.7	Can you explain that water has a relatively high heat capacity, buffering changes in temperature?	<input type="checkbox"/>
3.1.7	Can you explain that water has a relatively large latent heat of vaporisation, providing a cooling effect with little loss of water through evaporation?	<input type="checkbox"/>
3.1.7	Can you explain that water has strong cohesion between water molecules; this supports columns of water in the tube-like transport cells of plants and produces surface tension where water meets air?	<input type="checkbox"/>
3.1.8	Can you describe how inorganic ions occur in solution in the cytoplasm and body fluids of organisms, in high or very low concentrations?	<input type="checkbox"/>
3.1.8	Can you explain that each type of ion has a specific role, depending on its properties?	<input type="checkbox"/>

Specification reference	Checklist questions	
3.1.8	Can you recognise the role of ions in the following topics: hydrogen ions and pH; iron ions as a component of haemoglobin; sodium ions in the co-transport of glucose and amino acids; and phosphate ions as components of DNA and of ATP?	<input type="checkbox"/>