Resource list: mapping Level 3 Applied General Science to A-level Science approved textbooks – Unit 4

The mapping document has been created to support the teaching and delivery of Unit 4 The human body. AQA approved A-level text books have been used to map the depth of teaching required for content in this unit. Where there are no matches suitable teaching resource links have been identified.

Unit 4: The human body

1 (a) The digestive system and diet

The key components of the digestive system, including the liver, gall bladder and pancreas

- Oxford A-level Year 1 and AS: page 151.
- Hodder Biology for A-level Year 1 and AS: page 141.
- Collins Year 1 book: pages 157-159.

The roles of each organ in the digestive system and how they play a part in mechanical and/or chemical digestion

- Oxford A-level Year 1 and AS: pages 151-2 and 155.
- Hodder Biology for A-level Year 1 and AS: pages 142, 147 and 150.
- Collins Year 1 book: page 157-159.

The role of condensation and hydrolysis reactions in bond-making and -breaking of carbohydrates, proteins and lipids in digestion and assimilation

- Oxford A-level Year 1 and AS: pages 8, 13, 16, 19 and 152-154.
- Hodder Biology for A-level Year 1 and AS: pages 2, 3, 9 and 11.
- Collins Year 1 book: pages 12 and 162.

The roles of carbohydrases, proteases and lipases in the digestion of carbohydrates, proteins and lipids

- Oxford A-level Year 1 and AS: pages 152-157.
- Hodder Biology for A-level Year 1 and AS: pages 142-151.
- Collins Year 1 book: page 159.

The roles of carbohydrases, proteases and lipases in the digestion of carbohydrates, proteins and lipids

- Oxford A-level Year 1 and AS: pages 152-157.

- Hodder Biology for A-level Year 1 and AS: pages 142-151.
- Collins Year 1 book: pages 157-159.

The role of the small intestine in absorption of the small soluble products of digestion

- Oxford A-level Year 1 and AS: pages 155-157.
- Hodder Biology for A-level Year 1 and AS: pages 142-151.
- Collins Year 1 book: page 160.

The process of co-transport used to absorb glucose and amino acids

- Oxford A-level Year 1 and AS: pages 95-96.
- Collins Year 1 book: page 113.

1(b) The musculoskeletal system and movement

Structure and functions of synovial joints:

- adaptations for movement
- types of synovial joint and range of movement:
- gliding
- hinge
- ball and socket
- hinge.

- Hodder PE Year 1: pages 37-42.

The main features of a myofibril, including:

- myosin filaments (thick filaments
- actin filaments (thin filaments) Z line, A band, H band and I band.

- Oxford A-level Year 2: pages 103-104.
- Hodder Biology 2: pages 91-93.
- Collins Year 2 book: pages 125-127.

The sliding filament theory for muscle contraction, including:

- myosin heads attaching to actin, forming a cross bridge
- myosin head changing shape to slide the actin further along the myosin
- cross bridges forming and breaking at a rate of up to 100 times per second
- how this mechanism shortens the sarcomere
- cross bridges (actinomyosin formation) in the presence of calcium ions
- how adenosine triphosphate (ATP) releases the energy needed by this mechanism.

- Oxford A-level Year 2: pages 107-108.
- Hodder Biology 2: pages 93-95.
- Collins Year 2 book: pages 127-129.

The role of calcium:

- tropomyosin (in the thin/actin filaments) prevents myosin heads from attaching to actin by blocking the binding sites
- nerve impulses (action potentials) cause calcium ions to be released
- calcium ions bind with troponin (in the thin/actin filaments)
- causing tropomyosin to change shape and unblock the binding sites
- when action potentials stop arriving, calcium ions are actively transported out of sarcoplasm and muscle stops contracting (relaxes).

- Oxford A-level Year 2: pages 109-111.
- Hodder Biology 2: pages 92-93.
- Collins Year 2 book: pages 129-131.

Fast-twitch (white) and slow-twitch (red) fibres

- Hodder Biology for A-level Year 1 and AS: pages 88-89.
- Hodder Biology 2: pages 98-99.

How slow-twitch fibres do not produce ATP very quickly so are not very powerful

- Hodder Biology 2: pages 98-99.

How fast-twitch fibres generate ATP very quickly and are used for short bursts of explosive action

- Hodder Biology 2: pages 98-99.

The adaptations of slow-twitch fibres, to include:

- ability to function over long periods
- ability to respire aerobically
- ability to store glycogen as a metabolic fuel store
- ability to respire fat stores in the body
- myoglobin
- good blood supply
- high density of mitochondria.

- Hodder Biology 2: page 98.
- Collins Year 2 book: pages 132-134.
- Hodder PE Year 1: pages 30-31.

The adaptations of fast-twitch fibres, to include:

- ability to function for short periods of time
- ability to respire anaerobically
- storage of creatine phosphate for anaerobic respiration
- fatiguing quickly due to anaerobic respiration of lactate.

- Hodder Biology 2: page 98.
- Collins Year 2 book: pages 132-134.
- Hodder PE Year 1: pages 30-31.

How the breakdown of creatine phosphate transfers energy and releases phosphate ions which are used to make ATP

- Oxford A-level Year 2: page 111.
- Hodder Biology 2: pages 96-97.
- Collins Year 2 book: pages 131-132.

How creatine phosphate is regenerated during aerobic respiration

- Oxford A-level Year 2: page 111.
- Collins Year 2 book: pages 131-132.

The effect of exercise on the proportion of fast-twitch and slow-twitch muscle fibres

- Hodder Biology 2: page 88.
- Collins Year 2 book: page 134.

3. How oxygen is transported in the blood and how physiological measurements can be applied

How oxygen does not dissolve well so most oxygen is carried by haemoglobin (Hb) in the red blood cells

- Oxford A-level Year 1 and AS: page 161.
- Hodder Biology for A-level Year 1 and AS: page 160.
- Collins Year 1 book: pages 166-167.

The structure of haemoglobin

- Oxford A-level Year 1 and AS: pages 161-162.
- Hodder Biology for A-level Year 1 and AS: page 161.
- Collins Year 1 book: page 167.

How the degree of oxygenation depends on the partial pressure of oxygen p(O2)

- Oxford A-level Year 1 and AS: page 162.
- Collins Year 1 book: pages 167-168.

Using an oxygen dissociation curve to explain how oxygen is carried by haemoglobin

- Oxford A-level Year 1 and AS: pages 163-165.
- Hodder Biology for A-level Year 1 and AS: pages 162-164.
- Collins Year 1 book – 167/168
- Hodder PE Year 1: pages 13-14.

How the presence of carbon dioxide assists in the dissociation of oxygen and shifts the curve to the right (the Bohr effect)

- Oxford A-level Year 1 and AS: page 164.
- Collins Year 1 book: page 168.
- Hodder PE Year 1: pages 13-14.

How training at high altitudes affects oxygen transportation

- Hodder Biology for A-level Year 1 and AS: page 162.
  - Extension box discussed differences in partial pressure but not related to athletic training.
- Hodder PE Year 2: page 19.

How to use a sphygmomanometer to measure blood pressure

- Hodder Biology for A-level Year 1 and AS: page 175.
  - (partial information re calculation of blood pressure).

The function of extrinsic proteins

- Oxford A-level Year 1 and AS: pages 84-85.
- Hodder Biology for A-level Year 1: page 44.
- Collins Year 1 book: pages 99-100.

4. The structure and function of the nervous system and brain

The organisation of the nervous system into the central nervous system (CNS) and the peripheral nervous system (PNS)

- Oxford A-level Year 2: page 70.
- Collins Year 2 book: page 95.

The somatic and autonomic nervous systems, and the difference in their roles

- Oxford A-level Year 2: page 70.
- Collins Year 2 book: page 95.

The sympathetic and parasympathetic nervous systems

- Oxford A-level Year 2: page 76.
- Collins Year 2 book: page 95.

5. Nerve impulses

The sensory and motor nerves, including dendrites, cell body, myelin sheath and nodes of Ranvier

- Oxford A-level Year 2: page 82-84.
- Hodder Biology 2: pages 70-71.
- Collins Year 2 book: pages 102-103.

The movement of ions into and out of the neurone causing an action potential:

- resting potential
- the role of the sodium–potassium pump in maintaining resting potential
- action potential.

- Oxford A-level Year 2: pages 82-84 and 86-89.
- Hodder Biology 2: pages 70-74
- Collins Year 2 book: pages 102-103 and 106-108.

How nerve impulses travel rapidly along a nerve fibre

- Oxford A-level Year 2: page 92.
- Hodder Biology 2: page 75.
- Collins Year 2 book: page 110.

How the structure of myelinated nerve fibres enables them to conduct impulses more quickly

- Oxford A-level Year 2: pages 92-93.
- Hodder Biology 2: pages 76-77.
- Collins Year 2 book: page 110.

The components of a synapse:

- presynaptic membrane
- synaptic cleft
- postsynaptic membrane
- synaptic vesicles
- (neurotransmitter) receptors.

- Oxford A-level Year 2: page 96.
- Hodder Biology 2: page 77.
- Collins Year 2 book: page 111.

The sequence of events from when the action potential arrives at the presynaptic membrane

- Oxford A-level Year 2: pages 100-102.
- Hodder Biology 2: pages 78-79.
- Collins Year 2 book: pages 111-112.

The role of enzymes in recycling the neurotransmitter

- Oxford A-level Year 2: page 102.
- Hodder Biology 2: page 79.
- Collins Year 2 book: pages 111-112.

The wide range of different neurotransmitters, including acetylcholine, dopamine and serotonin

- Oxford A-level Year 2: page 100.

- Collins Year 2 book: pages 112-113.

Disorders arising from problems with neurotransmitters and synaptic transmission, such as:

- Alzheimer's – linked to a lack of acetylcholine
- Parkinson's – linked to a lack of dopamine
- depression – linked to a lack of serotonin.

- Oxford A Level Year 2: pages 100-101.
- Hodder Biology 2: pages 82-83.

The effects on synaptic transmission of drugs used to treat disorders, including:

- Alzheimer's
- Parkinson's
- depression.

- Oxford A-level Year 2: page 101.