Written to the specification from Speca's own topic maps, then independently rechecked for accuracy. These are original practice questions, not past-paper questions. Spotted a mistake? Tell us at hello@speca.co.uk.

SPECA

GCSE Combined Science (AQA Trilogy) · Biology

Organisation · Mark Scheme

For use with the Worksheet. Marking points are indicative, not exhaustive: award equivalent correct answers.

Digestion and enzymes (Q1 to 5)

1) Cells → tissues (similar structure and function) (1); → organs (perform a specific function) (1); → organ systems working together to form the organism (1) [3]

2) Carbohydrases: break starch into simple sugars (1); proteases: break proteins into amino acids (1); lipases: break fats into glycerol and fatty acids (1) [3]

3) An enzyme's active site has a specific shape that only matches (fits) the shape of one particular substrate (1), so it will not break down substrates of a different shape (1) [2]

4) Bile neutralises stomach acid (made acidic by the stomach) so enzymes further down the gut can work at the right pH (1); bile emulsifies fat into droplets, increasing surface area for lipase to act on (1) [2]

5) 24 ÷ 6 (1) = 4 cm³ per minute (1) [2]

The heart, blood and circulation (Q6 to 11)

6) The right side pumps deoxygenated blood to the lungs for gas exchange (1); the left side pumps oxygenated blood to the rest of the body (1); this means blood passes through the heart twice per full circuit: a double circulation (1) [3]

7) Any three of: aorta, vena cava, pulmonary artery, pulmonary vein, coronary arteries (1 each, max 3) [3]

8) Resting heart rate is set by a natural pacemaker: a group of cells in the right atrium (1); an artificial pacemaker corrects irregularities in heart rate electrically (1) [2]

9) Arteries have thick, muscular, elastic walls to withstand high pressure as they carry blood away from the heart (1); veins have thinner walls and contain valves to keep low-pressure blood flowing in one direction back to the heart (1); correct structure-function link for at least one vessel (1) [3]

10) Plasma: the liquid that carries blood cells, nutrients, and other dissolved substances (1); red blood cells: carry oxygen (1); white blood cells: defend against pathogens/infection (1); platelets, help blood clot (1) [4]

11) Speed = distance ÷ time = 90 ÷ 45 (1) = 2 cm per second (1) [2]

Health, disease and cancer (Q12 to 17)

12) Fatty material builds up in the coronary arteries (1), narrowing them and reducing blood flow to the heart muscle (1), which starves the heart muscle of oxygen (1) [3]

13) Advantage: a stent physically holds the artery open, restoring blood flow quickly (1); disadvantage: it is a surgical/invasive procedure carrying risks such as infection or complications (1) [2]

14) Statins are a drug that lowers blood cholesterol, reducing the rate at which fatty material builds up (1); unlike a stent, which is a mechanical device, statins act chemically and reduce future risk rather than immediately restoring blood flow (1) [2]

15) A risk factor with a proven causal mechanism has been shown to directly cause the disease, e.g. smoking and lung disease (1); a risk factor that is only statistically associated occurs more often alongside the disease without a proven causal link (1); correct example given for at least one (1) [3]

Free from speca.co.uk/gcse-science-questions-by-topic. Original questions written by Speca, not past papers.
Speca is not affiliated with, endorsed by, or sponsored by AQA.

16) A benign tumour is contained in one area, usually within a membrane, and does not invade other tissue (1); a malignant tumour invades neighbouring tissue and can spread via the blood to form secondary tumours (1) [2]

17) A weakened immune system is less able to fight off pathogens (1), so the body becomes more susceptible to infections it would otherwise resist (1) [2]

Plant tissues and transport (Q18 to 22)

18) Any four of: epidermal tissue, covers/protects the plant surface; palisade mesophyll, main site of photosynthesis; spongy mesophyll, allows gas diffusion; xylem, transports water and minerals; phloem, transports dissolved sugars; meristem tissue, produces new cells for growth (1 each, max 4) [4]

19) Upper epidermis (1); palisade mesophyll then spongy mesophyll (1); lower epidermis, with xylem/phloem and guard cells surrounding stomata (1) [3]

20) Root hair cell: long, thin extension increases surface area for water uptake by osmosis and mineral ion uptake by active transport (1); xylem: hollow, lignin-strengthened tubes carry water and minerals from root to leaf (1); phloem: tubes of elongated cells with pores in their end walls carry dissolved sugars around the plant (1) [3]

21) Guard cells change shape to open or close the stomata (1); this controls how much carbon dioxide/oxygen and water vapour can pass in or out of the leaf (1) [2]

22) Any two of: temperature, higher temperature increases the rate of evaporation/diffusion; humidity, lower humidity increases the concentration gradient for water loss; air movement, more air movement removes water vapour faster, increasing the rate; light intensity, more light opens more stomata, increasing water loss (2 marks each for factor + correct reason, max 4) [4]

Total: 59 marks

Speca is an independent product and is not affiliated with, endorsed by, or sponsored by AQA. This mark scheme is originally authored by Speca and is not an AQA document.

Free from speca.co.uk/gcse-science-questions-by-topic. Original questions written by Speca, not past papers.
Speca is not affiliated with, endorsed by, or sponsored by AQA.