# Year 8 Digestion Worksheet - Mark Scheme

Year 8 · KS3 Biology · Nutrients, the digestive system and enzymes

## Section A: Nutrients and food tests [17 marks]

| | | |
|---|---|---|
| **1** | Carbohydrate: energy. Protein: growth and repair. Lipid: energy store / insulation / protects organs. Fibre: keeps food moving through the gut / prevents constipation. Water: solvent for reactions and transport (blood). Calcium: strong bones and teeth. Vitamin C: healthy skin and gums / prevents scurvy.<br>Guidance: 1 mark for each correct job. Allow any correct example of the main role. | **7** |
| **2** | Starch: iodine solution, blue-black. Glucose: Benedict's solution (heated in a water bath), orange or brick-red. Protein: biuret solution, purple or lilac. Lipid: ethanol then water (emulsion test), cloudy white emulsion.<br>Guidance: 1 mark for each correct reagent and 1 mark for each correct result. | **8** |
| **3** | Any two: wear eye protection; use a hot water bath, not a flame, or use tongs/holders for hot tubes; point the tube away from people; do not heat the tube directly.<br>Guidance: 1 mark each. | **2** |

## Section B: The digestive system and enzymes [22 marks]

| | | |
|---|---|---|
| **4** | mouth, oesophagus, stomach, small intestine, large intestine, anus<br>Guidance: 3 marks all correct; 2 marks for one pair swapped; 1 mark for mouth first and anus last. | **3** |
| **5** | Oesophagus; stomach; small intestine; large intestine; liver; pancreas.<br>Guidance: 1 mark each. | **6** |
| **6** | Amylase: starch into sugars (maltose or glucose). Protease: proteins into amino acids. Lipase: lipids (fats) into fatty acids and glycerol.<br>Guidance: 1 mark for each correct substance. | **6** |
| **7** | Large molecules are insoluble and cannot pass through the gut wall (1). Enzymes break them into small, soluble molecules that can be absorbed into the blood (1). | **2** |
| **8** | It breaks large fat droplets into smaller droplets (emulsifies) (1). This increases the surface area for lipase (1). It also neutralises acid from the stomach, giving the right pH for enzymes in the small intestine (1). | **3** |
| **9** | Kills bacteria in the food (1). Provides the right (acidic) pH for stomach protease to work (1). | **2** |

## Section C: Absorption [6 marks]

| | | |
|---|---|---|
| **10** | Any two: many villi give a large surface area; thin wall (one cell thick) gives a short diffusion distance; good blood supply carries absorbed food away and keeps a steep concentration gradient.<br>Guidance: 1 mark each explanation. | **2** |
| **11** | Absorbs water from the undigested food. | **1** |
| **12** | Smaller pieces have a larger surface area (1) so enzymes can work faster / digestion is quicker (1). | **2** |
| **13** | Egestion (defecation). | **1** |

## Section D: Data and enzyme investigation [11 marks]

| | | |
|---|---|---|
| **14** | Protein 20 × 17 = 340 kJ; carbohydrate 50 × 17 = 850 kJ; fat 10 × 37 = 370 kJ (1 each or 1 for method). Total = 1560 kJ (1).<br>Guidance: Allow 3 marks for 1560 kJ. Allow 2 marks if one multiplication is wrong. | **3** |
| **15** | Constipation / difficulty moving food through the gut (1). Wholegrain bread, fruit or vegetables (1). | **2** |
| **16(a)** | 37 °C | **1** |
| **16(b)** | The high temperature changes the shape of the active site (1) so the enzyme is denatured and cannot digest the starch (1). | **2** |
| **16(c)** | Orange-brown (iodine stays the same colour). | **1** |
| **16(d)** | Any two: volume or concentration of starch; volume or concentration of amylase; pH; time between testing drops.<br>Guidance: 1 mark each. | **2** |

**Total: 56 marks. Accept any scientifically correct alternative wording.**