



Name: _____

Grade: 9 (A, B, C, D)

Date: ___ / ___ / ___

Subject: Biology

CHAPTER 4

1 ▶ D 2 ▶ A 3 ▶ D 4 ▶ B

5 ▶ a Starch: take a sample of the water in a spotting tile and add a drop of iodine solution. The colour changes from orange to blue-black.

Glucose: take a sample of the water in a test tube and add blue Benedict's solution. Place the tube in a water bath and heat until it boils. A brick-red precipitate results.

- b The starch molecules are too large to pass through the holes in the Visking tubing. Glucose molecules are smaller, so they can pass through.
- c The blood.
- d Large, insoluble food molecules are broken down into small, soluble ones.

6 ▶ a It is body temperature

b It had been broken down into smaller molecules called peptides (short chains of amino acids) forming the clear solution.

c The enzyme pepsin does not work in alkaline conditions, it is denatured.

d The experiment is looking at the effects of pepsin on the egg white. The Control is carried out without the enzyme; all other factors are the same. This shows that it is the enzyme that breaks down the protein. In other words, the egg white does not break down by itself.

e The enzyme works more slowly at a lower temperature. There are fewer collisions between enzyme and substrate molecules, because they have less kinetic energy.

f Hydrochloric acid kills bacteria in the food entering the stomach.

g By alkaline secretions in the bile and pancreatic juice.

7 ►

Enzyme	Food on which it acts	Products
(amylase)	starch	maltose
(trypsin)	protein	peptides
lipase	fats	(fatty acids and glycerol)

8 ► Descriptions of any four of the following:

- length, which increases time and surface area for absorption
- folds in lining, which increase surface area
- villi covering lining, which increase surface area
- microvilli on lining cells, which increase surface area
- capillary networks in villi, where products are absorbed
- lacteals in villi, which absorb fats.

9 ► The account should include full descriptions of most of the following points:

- digestion of starch to maltose in the mouth, action of saliva in moistening food
- mechanical digestion by the teeth
- movement through the gut by peristalsis (diagram useful)
- digestion of protein by pepsin in the stomach and the role of hydrochloric acid
- emulsifying action of bile from the liver on fats
- pancreatic enzymes (amylase, trypsin, lipase) and their role in digestion of starch, protein and fats
- adaptations of the ileum for the absorption of digested food (see question 4)
- role of the colon in absorption of water.

10 ► a Energy = $(20 \times 18 \times 4.2) = 1512$ joules = 1.512 kilojoules.b Energy per gram = $1.512 \div 0.22 = 6.872$ kJ per g.

c There are several errors involved. Some major ones include:

- some of the energy from the burning pasta is used to heat the test tube, thermometer, etc
- much energy will be lost when heating up the air near the tube, or when transferring the pasta
- not all the energy in the pasta will be released when it burns
- some energy will be lost when evaporating the water from the tube
- measurement errors such as measurement of the volume of water and temperatures (although these are probably small compared with the other reasons).

d One way is to shield the tube inside (for example) a metal can, to reduce heat losses to the air (or use a calorimeter).

e Peanuts contain a large proportion of fat, which has a high energy content. Pasta is largely carbohydrate, which contains less energy per gram.