

Human nutrition: practice questions

7 questions · 24 marks · mark scheme at the back

For Pearson Edexcel International GCSE Biology 4BI1 and Science (Double Award) 4SD0. **Biology only** is not in the Double Award and is only examined on Paper 2.

Name

Total / 24

1 Which enzyme completes the digestion of starch to glucose? [1 mark]

- A. ☐ Amylase
- B. ☐ Maltase
- C. ☐ Protease
- D. ☐ Lipase

2 (a) Explain why a builder needs more energy from his diet than an office worker of the same age. (2) (b) Explain why a pregnant woman needs more energy than before she was pregnant. (1) [3 marks]

3 State one function of each of these in the diet. (i) calcium (ii) iron (iii) vitamin D (iv) dietary fibre [4 marks]

4 (a) Name the part of the alimentary canal where most water is absorbed from the remaining food. (1) (b) Describe how food is moved along the gut by peristalsis. (2) [3 marks]

- 5** (a) Name the enzyme that digests lipids and give the products of digestion. (2) (b) Explain how bile helps the digestion of lipids. (2) **[4 marks]**

[illegible]

- 6

Biology only

[3 marks]

A student burned 0.8 g of a food sample under a boiling tube containing 25 g of water. The temperature of the water rose from 20 °C to 36 °C. Calculate the energy released per gram of the food. The energy needed to raise the temperature of 1 g of water by 1 °C is 4.2 J.

Answer =

[illegible]

- 7** Explain how the small intestine is adapted for the absorption of the products of digestion. **[6 marks]**

[illegible]

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (1)

2. [3]

- the builder is more active / uses his muscles more (1)
- so more respiration is needed to release energy / his muscles contract more (1)
- extra energy is needed for the growth of the fetus (1) allow 'baby' for fetus

3. [4]

- calcium: for strong bones / teeth (1)
- iron: to make haemoglobin (1) allow to make red blood cells; to carry oxygen
- vitamin D: helps absorb calcium (1) allow for strong bones
- dietary fibre: provides bulk / helps food move through the gut / prevents constipation (1) do not accept 'provides energy'

4. [3]

- large intestine / colon (1)
- circular muscles contract behind the food and squeeze it forward (1)
- waves of muscle contraction / contraction and relaxation of muscles move along the gut (1) ignore 'muscles push food' without reference to contraction

5. [4]

- lipase (1)
- fatty acids and glycerol (1)
- bile emulsifies lipid / breaks lipid into small droplets (1) so the surface area is bigger for lipase to work (1)
- allow neutralises stomach acid so the pH is right for lipase (1) as an alternative to either mark in (b), max 2 for (b)

6. [3] **Biology only**

- temperature change = 16 °C and energy released = $25 \times 4.2 \times 16$ (1)
- = 1680 J (1)
- $1680 \div 0.8 = 2100$ J/g (1) allow 3 marks for the correct final answer. Allow error carried forward from the energy released.

7. [6]

Level 3 5-6	A clear, well-structured explanation covering at least four adaptations, including the structure of a villus, each linked to a reason (surface area, diffusion distance, concentration gradient). Scientific terms are used correctly.
Level 2 3-4	An explanation of at least two adaptations, with reasons given for most. Some links to absorption are incomplete.
Level 1 1-2	A limited answer that names one or two features, such as villi or capillaries, with little or no explanation.

Indicative content

- small intestine is long, and its wall is folded, giving a large surface area
- wall is covered in villi, and villi have microvilli, which increases surface area further
- epithelium of the villus is one cell thick, so there is a short diffusion distance
- network of blood capillaries in each villus carries absorbed glucose and amino acids away
- this keeps a steep concentration gradient so absorption continues by diffusion (and active transport)
- lacteal in the centre of each villus absorbs fatty acids and glycerol