Organisation and Digestion

GCSE Science • **Combined and Triple** • Grades 3–6

WORKED SOLUTIONS

Name: worked example Class: _____ Total: 54 / 54

Show all your working. Marks are given for correct method as well as the final answer.

1. Put these in order of size, smallest first: organ, cell, organ system, tissue. **[2 marks]**

cells make tissues, tissues make organs

Answer: cell, tissue, organ, organ system

2. Define a tissue. **[2 marks]**

SIMILAR cells -- an organ has several tissues

Answer: a group of similar cells with a shared function

3. Name the biological molecules that enzymes are made from. **[1 mark]**

long chains of amino acids folded into a shape

Answer: proteins

4. Explain what is meant by the active site of an enzyme. **[2 marks]**

its shape is complementary to the substrate

Answer: the part the substrate fits into

5. Explain why an enzyme only works on one type of substrate. **[3 marks]**

only a complementary substrate fits
this is the lock-and-key model
shape, not size -- say complementary

Answer: the active site has a specific shape

6. Describe what happens to an enzyme above its optimum temperature. **[3 marks]**

the bonds holding the shape break
the active site no longer fits the substrate
it DENATURES -- an enzyme is not alive, so it cannot be killed

Answer: the active site changes shape and it denatures

7. Describe what happens to the rate of an enzyme reaction as temperature rises to the optimum. **[3 marks]**

particles have more kinetic energy
more successful collisions per second

Answer: it increases, because collisions are more frequent

8. Explain why pepsin works in the stomach but not in the small intestine. **[3 marks]**

the stomach is about pH 2
the small intestine is alkaline
the wrong pH denatures the active site

Answer: it has an acidic optimum pH

9. Name the enzyme that breaks down starch and its product. **[2 marks]**

carbohydrase family

Answer: ____ amylase → glucose____

10. Name the enzyme that breaks down protein and its products. **[2 marks]**

made in the stomach and pancreas

Answer: ____ protease → amino acids____

11. Name the enzyme that breaks down lipids and its products. **[2 marks]**

two products, not one

Answer: ____ lipase → fatty acids and glycerol____

12. Describe two functions of bile. **[3 marks]**

it is alkaline, so it raises the pH for lipase
it breaks fat into droplets
bile is NOT an enzyme -- it has no active site

Answer: ____ neutralises stomach acid and emulsifies fats____

13. Explain why emulsifying fat speeds up digestion. **[3 marks]**

many small droplets have more surface than one large blob
so lipase can act on more of it at once

Answer: ____ it increases the surface area for lipase____

14. Name where most absorption of digested food happens. **[1 mark]**

through the villi

Answer: ____ the small intestine____

15. Give two adaptations of a villus. **[2 marks]**

also: a good blood supply to maintain the gradient

Answer: ____ large surface area and a thin wall____

16. Name the test for starch and the positive result. **[2 marks]**

say BOTH colours -- start and finish

Answer: ____ iodine; orange to blue-black____

17. Name the test for glucose and the positive result. **[2 marks]**

it must be heated in a water bath

Answer: ____ Benedict's, heated; blue to brick red____

18. Name the test for protein and the positive result. **[2 marks]**

no heating needed

Answer: ____ Biuret; blue to purple____

19. A student investigates how pH affects amylase.

(a) Name the independent and dependent variables. **[2 marks]**

independent: pH

dependent: time for the starch to disappear

(b) Give two variables that must be controlled. **[2 marks]**

temperature, enzyme concentration

starch concentration, volume of solution

Answer: ____ *pH and reaction time ; temperature and concentration* ____

20. The table shows how long amylase took to digest starch at different temperatures: 10°C took 120 s, 30°C took 60 s, 60°C did not finish.

(a) Work out how many times faster the reaction is at 30°C than at 10°C. **[2 marks]**

120 ÷ 60

= 2 times faster

(b) Explain the result at 60°C. **[3 marks]**

the enzyme has denatured

the active site has changed shape

so the starch can no longer bind to it

Answer: ____ *2 times ; the enzyme denatured* ____

21. The heart pumps blood around two circuits.

(a) Name the vessel carrying blood from the heart to the lungs, and say whether it is oxygenated. **[2 marks]**

the pulmonary artery

deoxygenated

the one artery that carries deoxygenated blood

(b) Explain why the left ventricle wall is thicker than the right. **[3 marks]**

the left side pumps to the whole body

the right side only pumps to the lungs

so the left needs more muscle to create a higher pressure

Answer: ____ *pulmonary artery, deoxygenated ; the left pumps further* ____

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