

Organisation practice questions

29 questions • 80 marks • mark scheme at the back

For AQA GCSE Biology 8461 and Combined Science: Trilogy 8464. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 80

Principles of organisation Spec 4.2.1

- 1** Which list shows the levels of organisation in order, from smallest to largest? [1 mark]
- A. ☐ Cell, tissue, organ, organ system
B. ☐ Tissue, cell, organ, organ system
C. ☐ Cell, organ, tissue, organ system
D. ☐ Organ system, organ, tissue, cell
- 2** The stomach contains muscular tissue, glandular tissue and epithelial tissue. Explain why the stomach is an organ. [2 marks]
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- 3** Each cell in a tissue is 20 μm wide. Calculate how many cells fit side by side across a width of 1 mm. (1 mm = 1000 μm) [2 marks]
- Answer =
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- 4** Which of these is an example of an organ system? [1 mark]
- A. ☐ The heart
B. ☐ The digestive system
C. ☐ Muscular tissue
D. ☐ Palisade mesophyll cell

Animal tissues, organs and organ systems Spec 4.2.2

5 Digestive enzymes are made in different places in the body. (a) Name two organs where amylase is made. (2) (b) Name the products when lipase breaks down fat. (1) **[3 marks]**

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6 Describe the roles of bile in digestion. **[3 marks]**

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7 A scientist heats a solution of amylase from 20 °C to 80 °C. The rate of reaction first increases and then falls to zero. Explain why the rate falls to zero at high temperatures. **[3 marks]**

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8 An enzyme produces 18 cm³ of product in 6 minutes. Calculate the rate of reaction in cm³ per minute. **[2 marks]**

Answer =

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9 A student has a sample of a food. Describe what the student would see in each test if the food contained starch, protein and sugar. Name the reagent used in each test. **[3 marks]**

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10 A student investigated the effect of pH on the rate of digestion of starch by amylase. **[3 marks]**

Describe how the student could find the time taken for all the starch to be digested at one pH value.

11 Describe the path taken by blood from the vena cava to the aorta. **[3 marks]**

12 Explain how the structure of an artery is related to its function. **[3 marks]**

13 Describe how the alveoli are adapted for gas exchange. **[3 marks]**

14 360 cm³ of blood flows through a blood vessel in 6 minutes. Calculate the rate of blood flow in cm³ per minute. **[2 marks]**

Answer =

15 A student looks at a photograph of a blood smear. Cell X is small, round and has no nucleus. Cell Y is much larger and has a purple-stained nucleus. (a) Identify cell X and cell Y. (2) (b) Give one way cell X is adapted to its function. (1) **[3 marks]**

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16 Describe how coronary heart disease can cause a lack of oxygen for the heart muscle. **[3 marks]**

[illegible]

17 A patient has a heart valve that has developed a leak. Explain how this affects the heart. [2 marks]

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18 Treatments for cardiovascular disease include drugs, mechanical devices and transplants. Evaluate the advantages and disadvantages of these three types of treatment. **[6 marks]**

[illegible]

19 Give two ways in which different types of disease can interact. **[2 marks]**

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20 Describe one effect of smoking and one effect of alcohol on human health. **[2 marks]**

21 Scientists collected data about smoking and lung disease from a small sample of people **[4 marks]** in one town. The table shows the results (data for practice only). (a) Describe the relationship shown by the data. (1) (b) A student says the data prove that smoking causes lung disease. Explain why the student may not be correct. (2) (c) Suggest how the scientists could improve their sampling. (1)

Smoking and lung disease (data for practice only)	
Cigarettes smoked per day	People with lung disease (%)
0	2
10	6
20	12
30	18

22 Type 2 diabetes is a non-communicable disease. Discuss the human and financial costs **[2 marks]** of the disease to a nation.

23 Compare benign tumours and malignant tumours. **[3 marks]**

Plant tissues, organs and systems Spec 4.2.3

- 24

Which plant tissue is found at the growing tips of shoots and roots?

[1 mark]
- A . ☐

Xylem
- B . ☐

Phloem
- C . ☐

Meristem
- D . ☐

Epidermal tissue

- 25

Explain how a root hair cell is adapted for taking in mineral ions from the soil.

[3 marks]
-
- 26

Compare the transport of substances in xylem and phloem.

[3 marks]

27

Describe the role of stomata and guard cells in a leaf.

[3 marks]

28

A student used a potometer to measure the distance an air bubble moved in 5 minutes.

Three repeats gave: 24 mm, 27 mm and 21 mm. Calculate the mean rate of transpiration in mm per minute.

[3 marks]

Answer =

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29 Explain how temperature, humidity, air movement and light intensity affect the rate of transpiration in a plant. **[6 marks]**

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Mark scheme

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

1. [1]

A A (1)

2. [2]

- it is made of several / different tissues (1)
- that work together to perform a specific function / to digest food (1)

3. [2]

- $1000 \div 20$ (1)
- 50 (cells) (1)
- allow 2 marks for the correct answer with no working

4. [1]

B B (1)

5. [3]

- (a) any two from: salivary glands (1) allow mouth
- (a) pancreas (1)
- (a) small intestine (1)
- (b) glycerol and fatty acids (1) both needed
- Max 3: max 2 for (a)

6. [3]

- (bile is) alkaline so it neutralises hydrochloric acid from the stomach (1)
- emulsifies fat / breaks fat into small droplets (1)
- increases the surface area of the fat (1)
- so lipase breaks down fat faster / faster rate of fat digestion (1)
- do not accept bile is an enzyme / bile digests fat
- Max 3

7. [3]

- the enzyme / amylase is denatured (1)
- the shape of the active site changes (1)
- so the substrate (starch) no longer fits / cannot bind to the active site (1)
- do not accept 'enzyme is killed'

8. [2]

- $18 \div 6$ (1)
- $3 \text{ cm}^3/\text{min}$ (1)
- allow 2 marks for the correct answer with no working

9. [3]

- starch: iodine solution turns from orange-brown to blue-black (1)
- protein: Biuret reagent turns from blue to purple / lilac (1)
- sugar: Benedict's solution heated and turns from blue to green / yellow / orange / brick-red (1)
- each mark needs both the reagent and the colour change

10. [3]

- mix starch, amylase and a buffer of known pH, in a water bath at a constant temperature (1)
- take samples every 30 seconds and add them to iodine solution (1)
- record the time when the iodine stays orange-brown / no longer turns blue-black (1)

11. [3]

- (vena cava to) right atrium then right ventricle (1)
- pulmonary artery to the lungs, then pulmonary vein back to the heart / left atrium (1)
- left ventricle then aorta (1)
- ignore any reference to valves

12. [3]

- arteries carry blood away from the heart at high pressure (1)
- thick walls / walls with muscle (1) to withstand the pressure (1)
- elastic fibres allow the wall to stretch and recoil / spring back (1)
- Max 3

13. [3]

- many alveoli / large surface area (1)
- walls one cell thick / thin walls so short diffusion distance (1)
- surrounded by (a network of) capillaries / good blood supply (1)
- which maintains a steep concentration gradient (1)
- Max 3

14. [2]

- $360 \div 6$ (1)
- $60 \text{ cm}^3/\text{min}$ (1)
- allow 2 marks for the correct answer with no working

15. [3]

- (a) X is a red blood cell (1)
- (a) Y is a white blood cell (1)
- (b) any one from: biconcave shape / large surface area / no nucleus so more room for haemoglobin / contains haemoglobin (1)

16. [3]

- layers of fatty material build up inside the coronary arteries (1)
- narrowing the arteries (1)
- so less blood flows to the heart muscle / less oxygen is delivered (1)

17. [2]

- blood flows backwards through the valve (1)
- so less blood is pumped forward to the body / heart works harder / less oxygen reaches the body (1)

18. [6]

Level 3 5-6	A balanced evaluation of all three types of treatment, with advantages and disadvantages of each, linked to examples and ending with a reasoned judgement.
Level 2 3-4	Advantages and disadvantages given for at least two types of treatment, with some use of examples. A judgement may be missing or weak.
Level 1 1-2	A few simple statements about one or two treatments, with little evaluation.

Indicative content

- Drugs such as statins reduce cholesterol and slow fatty deposits; no surgery needed; but must be taken for a long time and may have side effects
- Mechanical devices such as stents or mechanical valves quickly restore blood flow; recovery faster than transplant; but surgery has risks such as infection, and blood clots can form on the device (patients with mechanical valves need anti-clotting drugs)
- Artificial hearts can keep a patient alive while waiting for a transplant, or give the heart time to rest, but are only used for limited periods
- Transplants replace a failed heart but donors are scarce, surgery is major and the immune system may reject the organ
- Judgement depends on the severity of the disease and the patient

19. [2]

- any two from: defects in the immune system make infectious diseases more likely (1)
- viruses living in cells can trigger cancer (1)
- immune reactions caused by a pathogen can trigger allergies such as skin rashes and asthma (1)
- severe physical ill health can lead to depression / mental illness (1)
- Max 2

20. [2]

- smoking: any one from: lung disease / lung cancer / cardiovascular disease / low birth weight or premature birth if smoking in pregnancy (1)
- alcohol: any one from: damages the liver / affects brain function / damages the development of an unborn baby (1)

21. [4]

- (a) as the number of cigarettes per day increases, the percentage with lung disease increases / positive correlation (1)
- (b) a correlation does not prove a cause (1)
- (b) a causal mechanism is needed / other factors may be involved / need to control other factors such as age (1)
- (c) use a larger sample / sample people from more places / use a representative sample (1)

22. [2]

- human: reduced quality of life / illness / early death for many people (1)
- financial: cost of treatment for the health service / lost working days / lost income for the nation (1)
- allow any other valid human or financial cost

23. [3]

- benign tumours are contained in one area / do not invade other parts of the body (1)
- malignant tumour cells invade neighbouring tissues (1)
- and spread to other parts of the body in the blood, forming secondary tumours (1)
- only malignant tumours are cancers (1)
- Max 3

24. [1]

C C (1)

25. [3]

- long root hair gives a large surface area (1)
- mineral ions are taken in by active transport (1)
- which needs energy from respiration / many mitochondria (1)

26. [3]

- xylem transports water and mineral ions (1)
- phloem transports dissolved sugars (1)
- xylem: from roots to stems and leaves; phloem: from the leaves to the rest of the plant (1)
- allow xylem has lignin / hollow tubes; phloem has pores in end walls

27. [3]

- stomata are pores that allow gases to move in and out / gas exchange (1)
- guard cells control the opening and closing of the stomata (1)
- closing stomata reduces water loss (1)

28. [3]

- mean distance = $(24 + 27 + 21) \div 3 = 24$ mm (1)
- $24 \div 5$ (1)
- 4.8 mm/min (1)
- allow 3 marks for the correct answer with no working

29. [6]

Level 3 5-6	A clear, correct explanation of the effects of all four factors, with reasons linked to evaporation, diffusion or stomata.
Level 2 3-4	Correct effects given for at least three factors, with some reasons.
Level 1 1-2	Some correct effects given, with few or no reasons.

Indicative content

- Higher temperature increases the rate: water evaporates and diffuses out faster
- Higher humidity decreases the rate: smaller concentration gradient of water vapour between the leaf and the air
- More air movement increases the rate: removes water vapour from around the stomata so the concentration gradient stays steep
- Higher light intensity increases the rate: stomata open wider so more water vapour escapes
- The opposite changes reduce the rate