



K1D Cells and Organisation: Exam Drill

AQA AQA KS3 Biology · Calculator allowed · about 75 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Which part of a plant cell contains chlorophyll and is the site of photosynthesis?
 - (a)** Name the cell part. (1)

 - (b)** State one substance made by photosynthesis inside chloroplasts. (1)

- 2** A student looks at a thin slice of onion under a light microscope. They draw what they see as many rectangular cells with clear cell walls and no green parts.
 - (a)** Suggest why the cells appear rectangular with clear edges. (1)

 - (b)** Suggest why there are no green parts in the onion cells. (1)

 - (c)** Name one piece of equipment the student should use to make the cells more visible. (1)

3 Complete the table with a single word: animal cell, plant cell, or both.

1) Has a cell wall. 2) Contains chloroplasts. 3) Has a nucleus.

(a) Has a cell wall. (1)

(b) Contains chloroplasts. (1)

(c) Has a nucleus. (1)

4 A student measures the length of several cheek cells using a microscope scale. Their measurements in micrometres are 45, 52, 47, 50, 46.

(a) Calculate the mean cell length. (2)

.....
(b) Suggest one reason why the measurements are not exactly the same. (2)

5 Complete the word equation for aerobic respiration in animals.

(a) Fill the blanks: glucose + oxygen -> _____ + _____ + energy (2)

(b) State where in an animal cell most respiration takes place. (2)

6 The table shows data from an investigation into the effect of temperature on the rate of diffusion of a dye across a membrane model. Time for dye to appear on the other side (seconds): 15 degrees C: 180 s, 25 degrees C: 120 s, 35 degrees C: 80 s, 45 degrees C: 60 s.

- (a) Plot the data as a simple statement: what happens to diffusion time as temperature increases? (1)
- (b) Calculate the percentage decrease in time from 15 degrees C to 35 degrees C. (3)
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7 Which organ system is responsible for transporting oxygen and nutrients around the body?

- (a) Name the organ system. (1)
- (b) Give two main components of the blood that help transport oxygen and nutrients. (2)
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8 Explain how root hair cells are adapted for absorbing water and minerals. Give two adaptations and a brief explanation for each.

- (a) Adaptation 1 and explanation. (2)
- (b) Adaptation 2 and explanation. (2)

9 An experiment tests how concentration of sugar solution affects osmosis in potato cylinders. Initial mass of a cylinder is 10.0 g. After 40 minutes in 0.2 mol/dm³ sugar solution the mass is 10.6 g.

(a) Calculate the percentage change in mass. Show your working. (3)

(b) State whether water moved into or out of the potato and give one reason. (1)

10 Extended response: A class investigates how light intensity affects the rate of photosynthesis in pondweed. They measure number of bubbles produced per minute at different light distances: 10 cm gives 40 bubbles/min, 20 cm gives 25 bubbles/min, 30 cm gives 16 bubbles/min, 40 cm gives 10 bubbles/min. The students think the graph should be a straight line but the results curve. Evaluate their conclusion, discuss variables they should control, suggest improvements and explain why each improvement would help. Refer to the data in your answer. You have 6 marks.

(6)

11 Describe one ethical or safety consideration when collecting samples of pondweed from a local pond for a school investigation.

(a) Give the consideration and explain it briefly. (3)

12 The diagram below shows a simplified animal tissue made of different cell types working together to perform a function: muscle cells that contract and blood vessels that supply oxygen and nutrients. Name this level of organisation.

(a) Name the level of organisation where groups of tissues perform a job. (3)

13 A blood vessel that carries blood away from the heart and usually has thick muscular walls is called an artery. True or false?

(a) True or false and give one reason. (2)

14 Name the process by which small molecules like glucose move from the blood into cells by passing through gaps in the cell membrane without using energy.

(a) Name the process. (2)

15 A souped-up microscope with higher magnification is described. Suggest one risk and one quality control step a student should take when using stronger lenses.

(a) Give one risk and one quality control step. (3)

16 State the main function of white blood cells.

(a) State the function. (2)

17 In a fair test into osmosis, list three variables that should be kept the same when comparing different sugar concentrations.

(a) List three control variables.

(3)

18 A bacteria sample can reproduce quickly. Give two differences between bacteria cells and plant cells.

(a) Difference 1.

(2)

(b) Difference 2.

(2)

Mark scheme • K1D Cells and Organisation: Exam Drill

Question 1

- (a) **B1** chloroplasts or chloroplasts
- (a) Answer: **Chloroplasts**
- (b) **B1** glucose or sugar or oxygen, or
- (b) Answer: **Glucose**

Question 2

- (a) **B1** they have cell walls which give a fixed rectangular shape
- (a) Answer: **The cells have cell walls that give them a fixed rectangular shape.**
- (b) **B1** onion tissue from underground does not have chloroplasts / is not photosynthetic
- (b) Answer: **Onion bulb tissue grows underground and so its cells lack chloroplasts.**
- (c) **B1** stain or iodine solution or dye (iodine in potassium iodide) or
- (c) Answer: **Iodine solution**

Question 3

- (a) **B1** plant cell or
- (a) Answer: **Plant cell**
- (b) **B1** plant cell or
- (b) Answer: **Plant cell**
- (c) **B1** both or
- (c) Answer: **Both**

Question 4

- (a) **M1** method: $45+52+47+50+46 = 240$ and divide by 5
- (a) **A1** 48 micrometres or
- (a) Answer: **48 micrometres**
- (b) **M1** measurement error or natural variation or sample not identical, or
- (b) **A1** linked explanation such as differences in cell stage or human error when reading the scale
- (b) Answer: **Natural variation between cells or small measurement errors when reading the microscope scale.**

Question 5

- (a) **M1** two correct products named
- (a) **A1** carbon dioxide and water or
- (a) Answer: **carbon dioxide + water**
- (b) **B1** mitochondria or
- (b) **B1** accept 'in the mitochondrion' or 'in mitochondria'
- (b) Answer: **Mitochondria**

Question 6

- (a) **B1** time decreases as temperature increases
- (a) Answer: **Diffusion time decreases as temperature increases.**
- (b) **M1** method: $\text{change} = 180 - 80 = 100$; then $100/180$
- (b) **A1** 55.6% or
- (b) **A1** award answer rounded to 55.6% or 55.56% or 56% with working
- (b) Answer: **55.6%**

Question 7

- (a) **B1** circulatory system cao
- (a) Answer: **Circulatory system**
- (b) **B1** red blood cells for oxygen transport
- (b) **B1** plasma or blood plasma for carrying nutrients (or platelets not acceptable here)
- (b) Answer: **Red blood cells and plasma**

Question 8

- (a) **M1** gives adaptation such as large surface area due to hair like projection
- (a) **A1** explains that larger surface area increases water uptake
- (a) Answer: **Root hair cells have long thin projections giving a large surface area, which increases water absorption.**
- (b) **M1** gives adaptation such as thin cell wall or many mitochondria
- (b) **A1** links thin wall to short diffusion distance or mitochondria to active transport of minerals
- (b) Answer: **They have a thin cell wall for a short diffusion distance, and many mitochondria to provide energy for active uptake of minerals.**

Question 9

- (a) **M1** method: change = $10.6 - 10.0 = 0.6$; percentage = $0.6/10.0 \times 100$
- (a) **A1** 6% cao
- (a) **A1** final answer given as 6% with correct working
- (a) Answer: **6%**
- (b) **B1** water moved into the potato because the solution was less concentrated than the potato sap so water entered by osmosis
- (b) Answer: **Water moved into the potato because the surrounding solution was less concentrated than the potato cells, so osmosis caused water to enter.**

Question 10

- **Level 3** (5-6): Detailed evaluation: links evidence from the data to a clear judgement about the students' conclusion; identifies several key variables to control and gives specific, practical improvements with scientific reasons; communicates clearly.
- **Level 2** (3-4): Partial evaluation: uses the data to suggest why the relationship is not linear and names at least two variables to control; gives some reasonable improvements with basic reasons.
- **Level 1** (0-2): Limited evaluation: makes a simple statement about the conclusion with little or no reference to the data; mentions one variable or a vague improvement.
- **Indicative content:**
 - Data shows bubble rate decreases as distance increases but curve levels off at larger distance, so relationship is not a straight line; light intensity falls with distance squared so a curved decrease is expected.
 - Variables to control: temperature, concentration of dissolved carbon dioxide, length and mass of pondweed, same species, same light source, time allowed to settle before measuring.
 - Improvements: use a light meter or keep light intensity measured rather than distance; repeat measurements and take mean to reduce random error; keep water temperature constant using a water bath; use a ruler to keep the same position; measure bubbles for longer and count total to reduce timing error.
 - Reasons: controlling temperature and CO₂ prevents them confounding bubble rate; using means reduces effect of anomalous results; measuring light intensity allows plotting rate against actual intensity which should show inverse square relationship.

Question 11

- (a) **M1** identifies concern such as not damaging habitat or taking too much pondweed
- (a) **A1** explains impact such as disrupting animals that live there or reducing oxygen for fish
- (a) **A1** suggests practical step such as take small samples, ask permission or replace plants
- (a) Answer: **Do not remove large amounts of pondweed because this can damage the habitat and reduce oxygen for animals; take small samples and get permission first.**

Question 12

- (a) **B1** organ cao
- (a) **B1** accept 'an organ is made of tissues' second B1 for naming or restating
- (a) **B1** accept example such as heart or stomach
- (a) Answer: **Organ**

Question 13

- (a) **B1** true cao
- (a) **B1** reason such as 'thick muscular elastic walls to cope with high pressure'
- (a) Answer: **True. Arteries carry blood away from the heart and have thick muscular walls to withstand high pressure.**

Question 14

- (a) **B1** diffusion cao
- (a) **B1** accept 'passive transport' as alternative
- (a) Answer: **Diffusion**

Question 15

- (a) **M1** identifies a risk such as damaging slides or eye strain or dropping lenses
- (a) **A1** states a control step such as start with low power, use coverslip, secure slide with clips, or use measured calibration slide
- (a) **A1** links control to how it reduces the risk
- (a) Answer: **Risk: high magnification can focus sharply and damage the slide or cause eye strain. Control: start on low power and secure the slide with clips, then carefully increase magnification to avoid damage and check focus.**

Question 16

- (a) **B1** defence against infection or fight pathogens cao
- (a) **B1** accept 'produce antibodies' or 'engulf microbes' as additional detail
- (a) Answer: **To defend the body against infection by attacking or destroying pathogens, for example by producing antibodies or engulfing microbes.**

Question 17

- (a) **B1** temperature
- (a) **B1** size / mass / surface area of potato cylinders
- (a) **B1** duration of time left in solution
- (a) Answer: **Temperature; size or mass of potato pieces; time left in the solution.**

Question 18

- (a) **M1** identifies that bacteria are prokaryotes without a nucleus whereas plant cells have a nucleus
- (a) **A1** states bacteria have circular DNA and no membrane bound organelles, plant cells have linear DNA in nucleus and organelles
- (a) Answer: **Bacteria are prokaryotes with no nucleus and circular DNA, whereas plant cells have a nucleus containing linear DNA and membrane-bound organelles.**
- (b) **B1** bacteria are usually smaller and single-celled
- (b) **B1** plant cells are larger and part of multicellular organisms and have cell walls and chloroplasts
- (b) Answer: **Bacteria are usually smaller single cells without chloroplasts; plant cells are larger, part of multicellular organisms and have chloroplasts and cell walls.**