1.1 Cells and Organisation: Test Pack

Calculator allowed · about 50 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)**

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

(a) Give the consideration, explain it briefly and suggest one practical step to reduce the problem. **(3)**

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3 Give two differences between bacteria cells and plant cells.

(a) Give one difference, stating the feature of each type of cell. **(2)**

(b) Give a second difference, stating a different feature of each type of cell. **(2)**

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4 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 substance the student should use to make the cells more visible. **(1)**

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. **(1)**

6 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/dm^3 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. **(1)**

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7 The trachea (windpipe) is lined with ciliated cells and goblet cells.

(a) State the function of goblet cells in the trachea. **(1)**

(b) Describe how the structure of a ciliated cell is adapted to its function of keeping the airways clear. **(2)**

(c) Suggest one effect on the lungs if a person's ciliated cells were damaged, for example by smoking. **(1)**

8 Which statement about cells is correct?

- ☐ A) All living organisms are made of at least one cell.
- ☐ B) All cells contain chloroplasts.
- ☐ C) Cells can only be seen with the naked eye, without a microscope.
- ☐ D) Animal cells have a rigid cell wall.

9 Cells, tissues, organs, organ systems and organisms show increasing levels of organisation.

(a) Put these in order of increasing size and complexity: organ, cell, tissue, organism, organ system. **(2)**

(b) Define the term "tissue". **(1)**

(c) Define the term "organ". **(1)**

(d) Name one organ system that contains the heart. **(1)**

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10 Cells can be specialised for a particular function.

(a) Sperm cells are specialised for reproduction. Describe two adaptations of a sperm cell that help it carry out its function. **(2)**

(b) Root hair cells are specialised for absorbing water and minerals. Describe how the structure of a root hair cell is adapted to its function. **(2)**

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11 A student counts the number of whole cells visible in the field of view at different magnifications.

Magnification	Number of whole cells visible
x100	20
x200	9
x400	2

(a) Describe the pattern shown by the data. **(1)**

(b) Suggest an explanation for this pattern. **(2)**

12 Red blood cells, root hair cells and nerve cells are all cells that are specialised for their function. Explain how the structure of each of these three cell types is adapted to help it carry out its function.

(6)

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Mark scheme · 1.1 Cells and Organisation: Test Pack

Question 1

(a) chloroplasts or chloroplast cao **B1**

(a) Answer: **Chloroplasts**

(b) glucose or sugar or oxygen, oe **B1**

(b) Answer: **Glucose**

Question 2

(a) identifies concern such as not damaging habitat or taking too much pondweed **M1**

(a) explains impact such as disrupting animals that live there or reducing oxygen for fish **A1**

(a) suggests practical step such as take small samples, ask permission or replace plants **A1**

(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 3

(a) one side of a valid paired comparison: bacteria cells have no nucleus, are usually smaller, have no chloroplasts, or lack a large permanent vacuole **B1**

(a) matching contrasting feature in plant cells: a nucleus, usually larger, may have chloroplasts, or have a large permanent vacuole; the comparison must use the same feature **B1**

(a) Answer: **Bacteria cells have no nucleus, whereas plant cells have a nucleus.**

(b) one side of a valid paired comparison using a different cell feature from the comparison credited in part a: bacteria cells have no nucleus, are usually smaller, have no chloroplasts, or lack a large permanent vacuole **B1**

(b) matching contrasting feature in plant cells: a nucleus, usually larger, may have chloroplasts, or have a large permanent vacuole; the comparison must use the same feature **B1**

(b) Answer: **One possible second difference is that bacteria cells have no chloroplasts, whereas plant cells may have chloroplasts. This uses a different feature from the nucleus comparison in part a.**

Question 4

(a) they have cell walls which give a fixed rectangular shape **B1**

(a) Answer: **The cells have cell walls that give them a fixed rectangular shape.**

(b) onion tissue from underground does not have chloroplasts / is not photosynthetic **B1**

(b) Answer: **Onion bulb tissue grows underground and so its cells lack chloroplasts.**

(c) stain or iodine solution or dye (iodine in potassium iodide) oe **B1**

(c) Answer: **Iodine solution**

Question 5

(a) two correct products named **M1**

(a) carbon dioxide and water cao **A1**

(a) Answer: **carbon dioxide + water**

(b) mitochondria (accept mitochondrion or in the mitochondria) cao **B1**

(b) Answer: **Mitochondria**

Question 6

(a) change = 10.6 - 10.0 = 0.6 **M1**

(a) percentage change = 0.6 / 10.0 x 100 **M1**

(a) 6% cao **A1**

(a) Answer: **6%**

(b) water moved into the potato (mass increased), or equivalent direction only **B1**

(b) Answer: **Water moved into the potato.**

Question 7

(a) produce/secrete mucus, which traps dust, bacteria and other particles breathed in with the air, oe **B1**

(a) Answer: **They produce mucus, which traps dust, bacteria and other particles.**

(b) ciliated cells have hair-like cilia on their surface **M1**

(b) the cilia beat/wave in a coordinated way to sweep the mucus, with trapped particles, up and away from the lungs toward the throat, oe **A1**

(b) Answer: **Ciliated cells have hair-like cilia that beat in a coordinated way to sweep mucus and trapped particles away from the lungs.**

(c) mucus (and trapped particles/bacteria) would build up in the airways/lungs instead of being removed, increasing the risk of infection or irritation, oe **B1**

(c) Answer: **Mucus and trapped particles would build up in the lungs instead of being cleared, increasing the risk of infection.**

Question 8

A only, cao **B1**

Answer: **A**

Question 9

(a) all five in the correct order, cao: cell, tissue, organ, organ system, organism (award B1 only if just one pair of adjacent items is transposed) **B2**

(a) Answer: **cell, tissue, organ, organ system, organism**

(b) a group of similar cells that work together to carry out a shared function, oe **B1**

(b) Answer: **A group of similar cells working together to perform a shared function.**

(c) a structure made of two or more different tissues working together to perform a specific function, oe **B1**

(c) Answer: **A structure made of different tissues working together for a specific function.**

(d) circulatory system (accept cardiovascular system), cao **B1**

(d) Answer: **Circulatory system**

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Question 10

(a) any one valid adaptation linked to function, e.g. long tail (flagellum) to swim to the egg; many mitochondria to release energy for swimming; acrosome containing enzymes to digest into the egg; streamlined head; nucleus with half the genetic material (haploid) **M1**

(a) a second, different valid adaptation from the same list, linked to function **M1**

(a) Answer: **A tail for swimming and many mitochondria for energy.**

(b) a valid structural feature, e.g. a long, thin, hair-like extension that increases the surface area; a thin cell wall; many mitochondria for active transport of minerals; a large vacuole; no chloroplasts (underground, so no light) **M1**

(b) linked to function, e.g. more water and mineral ions absorbed (by osmosis/diffusion/active transport), or a second valid feature linked to function, ft **M1**

(b) Answer: **A long hair-like extension increases surface area for water and mineral absorption.**

Question 11

(a) as magnification increases, the number of (whole) cells visible in the field of view decreases, oe **B1**

(a) Answer: **As magnification increases, fewer whole cells are visible.**

(b) increasing the magnification reduces the area of the specimen shown (the field of view becomes smaller) **M1**

(b) so fewer whole cells fit into/are visible within the smaller area seen, ft **M1**

(b) Answer: **Higher magnification shows a smaller field of view, so fewer whole cells fit within it.**

Question 12

Level 1 Basic, isolated statements about one or two of the cell types, with little or no link made between structure and function. Answers may simply name a cell or a structure without explanation. **1-2**

Level 2 Some clear links made between structure and function for at least two of the three cell types, using mostly appropriate scientific terms. **3-4**

Level 3 Clear, detailed and logically linked explanations of how structure relates to function for all three cell types, using accurate scientific terminology throughout. **5-6**

Indicative content:

- Red blood cells have no nucleus, which leaves more space to carry oxygen.
- Red blood cells contain haemoglobin, which binds to/carries oxygen.
- Red blood cells have a biconcave disc shape, which increases their surface area for gas exchange/oxygen uptake.
- Root hair cells have a long, thin, hair-like extension, which increases the surface area for absorbing water and mineral ions.
- Root hair cells may contain more mitochondria to provide energy for the active transport of mineral ions.
- Nerve cells have a long axon, which allows electrical impulses to travel quickly over long distances in the body.
- Nerve cells have branched dendrites, which allow them to connect with and receive impulses from many other neurones.
- Nerve cells may be covered in a myelin sheath, which insulates the axon and speeds up the transmission of impulses.

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