Biology: Cells, Transport and Cell Division

Student Name: Reem Al-Mansouri

Student ID: 2026-0847

Total Score: 25 / 30

83%

Q1 | Cell Biology | Recall | 1/1

Question:

Define the following terms: Osmosis

Student Answer:

Osmosis is the movement of water from a high concentration to a low concentration through a membrane.

Feedback:

Your definition of osmosis is accurate and includes the key elements: the substance (water), the direction of movement (down a concentration gradient), and the structure it moves through (a membrane). For even greater precision, you could specify 'partially permeable membrane'.

Reasoning:

The student correctly defines osmosis by identifying the movement of water molecules, the direction of movement from high to low concentration, and the involvement of a membrane. This covers all essential components for a full mark.

Q2 Cell Biology Recall 0/1

Question:

Define the following terms: Active transport

Student Answer:

Active transport is when molecules move using energy.

Feedback:

You're on the right track by including 'energy' in your definition. To fully define active transport, remember that it's the movement of molecules from an area of lower concentration to an area of higher concentration, which is 'against' the concentration gradient, and this process requires energy.

Reasoning:

0/1 marks. While you correctly identified that active transport involves the use of energy, you missed a crucial part of the definition. Active transport specifically moves substances against their concentration gradient.

Q3 Cell Biology Recall 2/2

Question:

Name two organelles found in plant cells but NOT in animal cells.

Student Answer:

Cell wall and chloroplasts.

Feedback:

Excellent work! You correctly identified both the cell wall and chloroplasts, demonstrating a clear understanding of the key structural differences between plant and animal cells.

Reasoning:

The student correctly identified two organelles unique to plant cells. Both 'Cell wall' and 'chloroplasts' are accurate examples of structures found in plant cells but not in animal cells, earning full marks.

Q4 Osmosis Understand 2/2

Question:

A student placed red blood cells in distilled water. After 10 minutes, the cells had burst. Explain why the red blood cells burst.

Student Answer:

The water moved into the cells because the concentration was higher outside than inside. The cells took in too much water and burst.

Feedback:

You've accurately explained why red blood cells burst in distilled water. You correctly identified the direction of water movement and the concentration gradient that drives it. For even greater precision, explicitly stating 'water concentration' instead of just 'concentration' would make your answer perfectly clear, as 'concentration' can sometimes refer to solute concentration.

Reasoning:

2/2 marks. The student correctly identified that water moved into the cells (1 mark). They also explained that this movement occurred because the water concentration was higher outside the cell than inside, leading to the cells taking in too much water and bursting (1 mark).

Q5 | Cell Biology | Understand | 1/1

Question:

Explain why plant cells do not burst when placed in distilled water.

Student Answer:

Plant cells don't burst because they have a cell wall that stops them from expanding too much.

Feedback:

Excellent explanation! You correctly identified the cell wall as the key structure that provides rigidity and prevents plant cells from lysing (bursting) due to water intake. This is a fundamental concept in plant biology.

Reasoning:

1/1 mark. You correctly explain that plant cells possess a cell wall, which is crucial in preventing them from bursting when placed in distilled water. This directly addresses the core concept of the question.

Q6 | Cell Transport | Analyze | 3/3

Question:

A student says: "Diffusion and osmosis are the same thing because neither uses energy." Explain why this statement is not fully correct.

Student Answer:

The student is partly right because both don't use energy. But they are different because diffusion is about any molecules moving from high to low concentration and osmosis is only about water. Also osmosis needs a membrane but diffusion doesn't always need one.

Feedback:

Excellent work! You've clearly articulated the crucial distinctions and shared characteristics of diffusion and osmosis. You correctly identified the energy requirement, the type of molecules involved, and the role of a membrane. This demonstrates a strong understanding of both processes.

Reasoning:

The student correctly identified three key differences and similarities between diffusion and osmosis. They noted that both are passive processes not requiring energy (1 mark). They distinguished that diffusion involves any molecules, while osmosis is specific to water (1 mark). Finally, they correctly stated that osmosis requires a membrane, while diffusion does not always (1 mark).

Q7 Diffusion Understand 1/1

Question:

Describe what has happened to the glucose concentration between Time 0 and Time 30 min.

Student Answer:

The glucose inside the cell went down from 0.8 to 0.5 and outside went up from 0.2 to 0.5 so they became equal.

Feedback:

You have provided a clear and accurate description of the changes in glucose concentration both inside and outside the cell, and correctly identified that they reached equilibrium. This shows a good understanding of the process.

Reasoning:

1/1 mark. The student accurately describes the decrease in glucose concentration inside the cell from 0.8 to 0.5 and the increase outside the cell from 0.2 to 0.5. They also correctly identify that the concentrations became equal, indicating equilibrium.

Q8 Cell Transport Recall 1/1

Question:

Name the process responsible for this change.

Student Answer:

Diffusion

Feedback:

Excellent work! You correctly identified the process as diffusion. This shows a clear understanding of how substances move from an area of higher concentration to an area of lower concentration.

Reasoning:

1/1 mark. The student correctly identified 'Diffusion' as the process responsible for the change, which directly matches the marking scheme.

Q9 Diffusion Understand 0/2

Question:

Explain why the glucose concentrations are equal at 30 minutes.

Student Answer:

Because the molecules kept moving until both sides had the same amount. There was no more concentration gradient so the molecules stopped moving.

Feedback:

You've correctly identified that molecules move until concentrations are equal. However, at equilibrium, molecules don't stop moving. Instead, they continue to move in both directions across the membrane at equal rates, resulting in no *net* change in concentration. This is known as dynamic equilibrium. For a complete explanation, remember to specify the molecule (glucose) and the process (diffusion from an area of higher concentration to lower concentration).

Reasoning:

0/2 marks. The student correctly identifies that molecules move until concentrations are equal, indicating an understanding of equilibrium. However, the explanation is fundamentally flawed as it states that molecules "stopped moving" once the concentration gradient was gone. This demonstrates a misconception of dynamic equilibrium, where molecules continue to move but with no net change. The answer also lacks specificity regarding the type of molecule (glucose) and the mechanism (diffusion from higher to lower concentration).

Q10 | Cell Transport | Recall | 1/1

Question:

If the cell needed to absorb glucose against the concentration gradient, what process would be required?

Student Answer:

Active transport

Feedback:

You correctly identified active transport. This process is crucial for cells to accumulate essential substances like glucose, even when their concentration is lower outside the cell, by expending energy.

Reasoning:

1/1 mark. The student correctly identified 'Active transport' as the process required to absorb glucose against a concentration gradient. This demonstrates accurate recall of biological transport mechanisms.

Q11 | Osmosis in Plants | Understand | 2/2

Question:

Predict what will happen to the length of Cylinder A. Explain your answer.

Student Answer:

Cylinder A will get longer because water moves into the potato by osmosis. The water concentration is higher in the distilled water than inside the potato cells so water enters the cells and they expand.

Feedback:

Excellent work! You have accurately predicted the outcome and provided a clear, scientifically correct explanation of the process of osmosis, including the crucial detail about water concentration differences. This demonstrates a strong understanding of the topic.

Reasoning:

The student correctly predicts that Cylinder A will get longer, earning 1 mark. They also provide a complete and accurate explanation, stating that water moves into the potato by osmosis because the water concentration is higher in the distilled water than inside the potato cells, leading to cell expansion. This earns the second mark.

Q12 | Osmosis in Plants | Understand | 2/2

Question:

Predict what will happen to the mass of Cylinder C. Explain your answer.

Student Answer:

Cylinder C will lose mass. The sucrose solution outside is very concentrated so water will leave the potato cells. But I'm not sure if it will get shorter or just lighter.

Feedback:

You correctly predicted the mass change and explained the process of osmosis. The concentrated external solution creates a water potential gradient, causing water to move out of the potato cells. This is a strong answer.

Reasoning:

2/2 marks. The student correctly predicts that Cylinder C will lose mass (1 mark). They also provide a correct explanation, stating that the concentrated sucrose solution outside will cause water to leave the potato cells (1 mark).

Q13 | Cell Structure | Understand | 1/2

Question:

Identify whether each student was looking at animal or plant cells. Give one reason for each.

Student Answer:

Student X was looking at animal cells because they were round and had no visible structures inside. Student Y was looking at plant cells because they were rectangular and had green parts which are chloroplasts.

Feedback:

You did a great job identifying plant cells for Student Y, providing strong evidence with their rectangular shape and the presence of chloroplasts. For Student X, you correctly identified animal cells and noted their round shape, which is a key differentiator. To improve, be more specific when describing animal cells; instead of 'no visible structures inside,' focus on the *absence* of specific plant cell features like a cell wall, chloroplasts, or a large central vacuole. Animal cells do have a nucleus and other organelles that are visible.

Reasoning:

1/2 marks. The student correctly identified Student Y as looking at plant cells and provided two accurate distinguishing features: their rectangular shape and the presence of green chloroplasts. This fully meets the criteria for the plant cell marking point. However, for Student X, while the identification of animal cells and the 'round' shape were correct, the reason 'no visible structures inside' is imprecise and potentially inaccurate, as animal cells do contain visible organelles like the nucleus.

Q14 | Plant Cell Organelles | Understand | 1/2

Question:

Student Y's cells were from a leaf. Explain the function of the green layer and the large clear space she observed.

Student Answer:

The green layer is the chloroplasts which do photosynthesis to make food for the plant. The clear space is the vacuole which is filled with water.

Feedback:

You correctly identified the green layer as chloroplasts and explained their role in photosynthesis. You also correctly named the clear space as the vacuole and mentioned it's filled with water. To achieve full marks for the vacuole, remember to include its vital function in maintaining turgor pressure, which helps support the plant cell.

Reasoning:

1/2 marks. The student correctly identifies the green layer as chloroplasts and explains their function in photosynthesis to make food, earning 1 mark. However, while the clear space is correctly identified as the vacuole and its contents (water) are mentioned, the critical function of maintaining turgor pressure is omitted, preventing the award of the second mark.

Q15 Dialysis Understand 2/2

Question:

Explain why the dialysis fluid contains the same concentration of glucose as healthy blood.

Student Answer:

The dialysis fluid has the same glucose as blood so that the patient doesn't lose their glucose. If there was less glucose in the fluid the glucose would diffuse out of the blood and the patient would lose energy.

Feedback:

Excellent explanation! You clearly understand why the glucose concentration in dialysis fluid must match that of healthy blood, linking it to the principle of diffusion and the patient's energy needs. Keep up the great work!

Reasoning:

The student correctly explains that the dialysis fluid has the same glucose concentration as blood, which prevents a concentration gradient. This ensures that glucose does not diffuse out of the patient's blood, thereby preventing energy loss. Both marking points are fully addressed.

Q16 Dialysis Understand 2/2

Question:

Explain why the dialysis fluid contains no urea.

Student Answer:

There is no urea in the fluid so that the urea in the blood will move across the membrane into the fluid. This is because there is a concentration gradient from high urea in the blood to no urea in the fluid.

Feedback:

You have provided an excellent explanation. You correctly identified the crucial role of the concentration gradient, stating that the lack of urea in the fluid drives the movement of urea from the blood across the membrane. This demonstrates a strong understanding of the principles of diffusion in dialysis.

Reasoning:

The student correctly identifies that the absence of urea in the dialysis fluid creates a concentration gradient. This gradient is essential for the movement of urea from the blood into the fluid. The explanation clearly covers both key aspects of the marking scheme.

Q17 Dialysis Understand 3/3

Question:

A student suggests that active transport is used to remove waste from the blood during dialysis. Explain why this student is incorrect.

Student Answer:

Active transport needs energy from the cell and it needs special proteins. The dialysis machine is not alive so it can't do active transport. The waste is removed by diffusion because it moves from high concentration in the blood to low concentration in the fluid.

Feedback:

Excellent explanation! You've clearly articulated why active transport is not involved in dialysis and correctly identified diffusion as the mechanism, including the crucial role of the concentration gradient. This shows a strong understanding of both processes.

Reasoning:

The student correctly explains that active transport requires energy from living cells, which a dialysis machine lacks. They also accurately identify that waste removal in dialysis occurs via diffusion, driven by a concentration gradient from high in the blood to low in the fluid. All three marking points are addressed.

Performance by Topic