



مركز القياس والتقويم التربوي
The Center for Educational Assessment and Measurement (CEAM)

امتحان دبلوم التعليم العام للمدارس الخاصة (ثنائية اللغة)

الفصل الدراسي الثاني - الدور الأول

للعام الدراسي ١٤٤٧/١٤٤٦ هـ - ٢٠٢٤ / ٢٠٢٥ م

تنبيه:
- المادة: الأحياء.
- الأسئلة في (١٧) صفحة.
- زمن الإجابة: ثلاث ساعات.
- الإجابة في الورقة نفسها.

تعليمات مهمة:

- يجب الحضور إلى قاعة الامتحان قبل عشر دقائق على الأقل من بدء زمن الامتحان.
- يجب إحضار أصل ما يثبت الهوية وإبرازها للعاملين بالامتحانات.
- يجب الالتزام بالزي (الدشداشة البيضاء والمصر أو الكمة للذكور) والزي المدرسي للطالبات ، ويستثنى من ذلك الدارسون من غير العمانيين بشرط الالتزام بالذوق العام، ويمنع على جميع المتقدمات ارتداء النقاب داخل المركز وقاعات الامتحان.
- يحظر على الممتحنين اصطحاب الهواتف النقالة وأجهزة النداء الآلي وآلات التصوير والحواسيب الشخصية والساعات الرقمية الذكية والآلات الحاسبة ذات الصفة التخزينية والمجلات والصحف والكتب الدراسية والدفاتر والمذكرات والحقائب اليدوية والآلات الحادة أو الأسلحة أياً كان نوعها وأي شيء له علاقة بالامتحان.
- يجب على الممتحن الامتثال لإجراءات التفتيش داخل المركز طوال أيام الامتحان.
- يجب على الممتحن التأكد من استلام دفتر امتحانه، مغلفاً بغلاف بلاستيكي شفاف وغير ممزق ، وهو مسؤول عنه حتى يسلمه لمراقبي اللجنة بعد الانتهاء من الإجابة.
- يجب الالتزام بضوابط إدارة امتحانات دبلوم التعليم العام وما في مستواه وأية مخالفة لهذه الضوابط تعرضك للتدابير والإجراءات والعقوبات المنصوص عليها بالقرار الوزاري رقم ٥٨٨ / ٢٠١٥.
- يقوم المتقدم بالإجابة عن أسئلة الامتحان المقالية بقلم الحبر (الأزرق أو الأسود).
- يقوم المتقدم بالإجابة عن أسئلة الاختيار من متعدد بتظليل الشكل (⬭) وفق النموذج الآتي:

س – عاصمة سلطنة عمان هي:

⬭ القاهرة ⬭ الدوحة

⬬ مسقط ⬭ أبوظبي

ملاحظة: يتم تظليل الشكل (⬬) باستخدام القلم الرصاص وعند الخطأ، امسح بعناية لإجراء التغيير.

صحيح ⬬ **غير صحيح** ⬭ ◉ ◒ ⊗ ✓

مُسَوَّدَة، لا يتم تصحيحها

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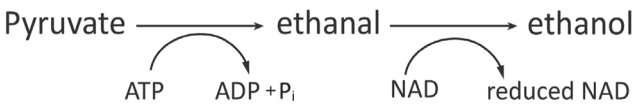
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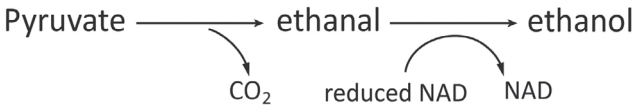
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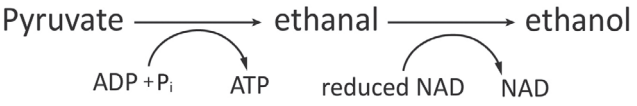
Question 1: Multiple Choice Items (14 marks)

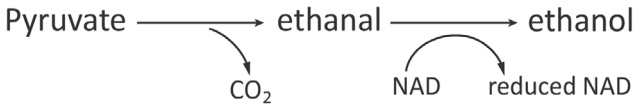
There are 14 multiple-choice items worth one mark each.
Shade in the bubble (⬭) next to the **correct** answer for each of the following items.

1) Which of the following equations represents the adaptation of rice roots that have been submerged in water?

⬭ 

⬭ 

⬭ 

⬭ 

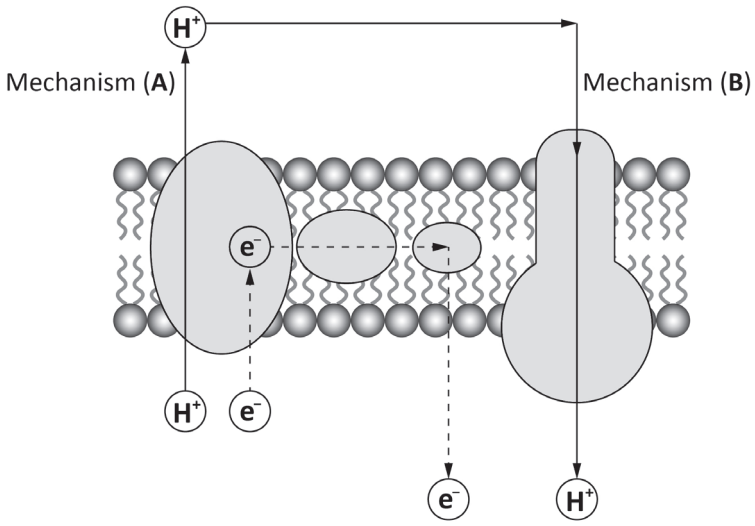
2) Which of the following represents the estimated number of mitochondria per cell and the estimated average length of cristae of a sample taken from the leg muscle of an Olympic 100 metre sprinter?

	Number of mitochondria per cell	Average length of cristae (nm)
⬭	500	100
⬭	1800	240
⬭	1800	100
⬭	500	240

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Question 1 continued

3) The figure below shows a stage of an aerobic respiration in the mitochondrion of a eukaryotic cell.



Identify the stage's location and the mechanisms (**A**) and (**B**).

	Stage's location	Mechanism (**A**)	Mechanism (**B**)
○	Matrix of the mitochondrion	Active transport	Facilitated diffusion
○	Matrix of the mitochondrion	Facilitated diffusion	Active transport
○	Inner membrane of the mitochondrion	Facilitated diffusion	Active transport
○	Inner membrane of the mitochondrion	Active transport	Facilitated diffusion

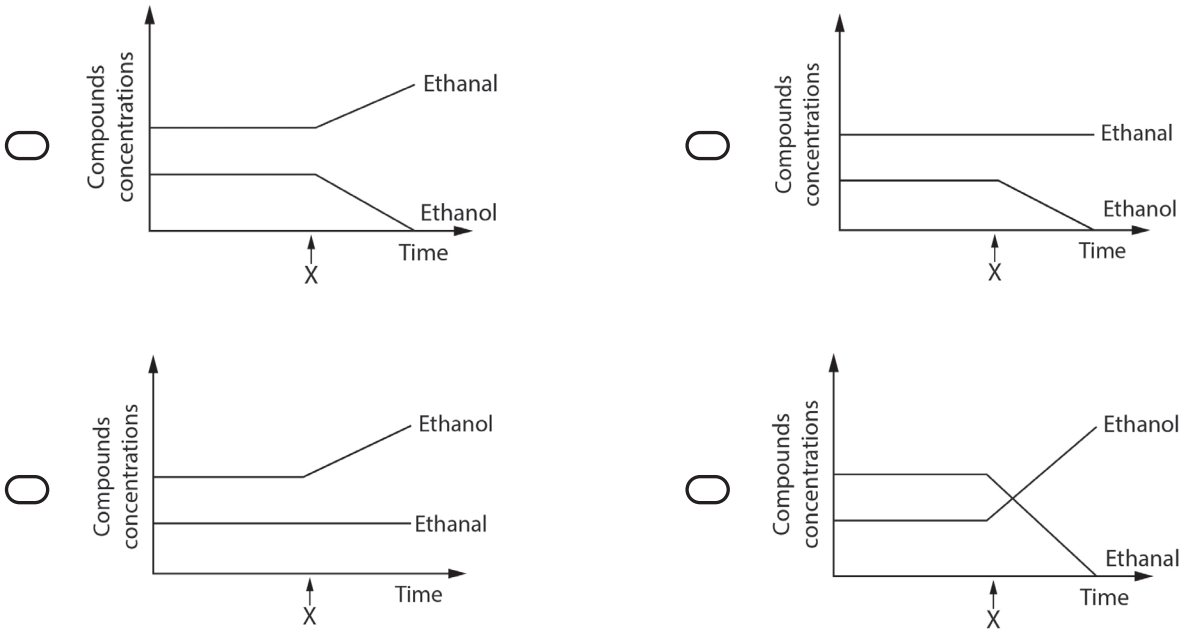
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Question 1 continued

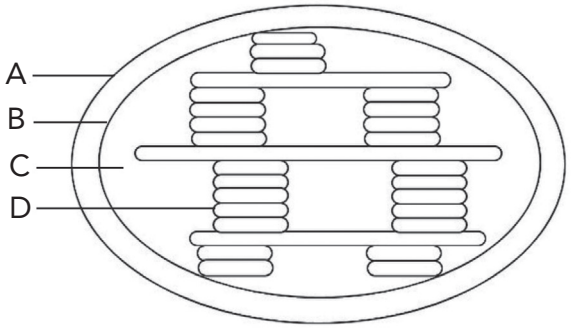
4) Which of the following graphs represents the concentrations of ethanal and ethanol if an inhibitor of the enzyme alcohol dehydrogenase is added to a cell at time (X)?



5) Which of the following describes the primary function of the stroma?

- A site where chlorophyll molecules absorb sunlight.
- A site where fructose is produced during photosynthesis.
- A site where water is split during light-dependent reactions.
- A site where an enzyme is involved in light-independent reactions.

6) The figure below shows the structure of chloroplast.



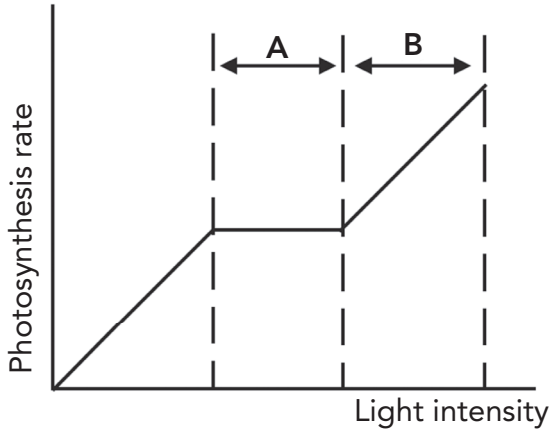
Which structure is directly involved in the synthesis of ATP?

- A
- B
- C
- D

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Question 1 continued

7) The graph below illustrates the rate of photosynthesis in the Calvin cycle which is affected by two environmental factors for 4 hours at mid-day.



Which of the following is correct about periods (**A**) and (**B**)?

	Period (**A**)	Period (**B**)
○	Low concentration of CO_2	High concentration of CO_2
○	High concentration of CO_2	Low concentration of CO_2
○	The light intensity decreases	The light intensity increases
○	The light intensity increases	The light intensity decreases

8) The following statements describe the ways that some infectious diseases can be transmitted:

1- Long lifespan of mosquitoes.

2- Uncooked meat.

3- Poor ventilation and crowded places.

4- Rainy weather conditions.

Which statements are considered transmission modes for malaria?

○ 1 and 2

○ 1 and 4

○ 2 and 3

○ 2 and 4

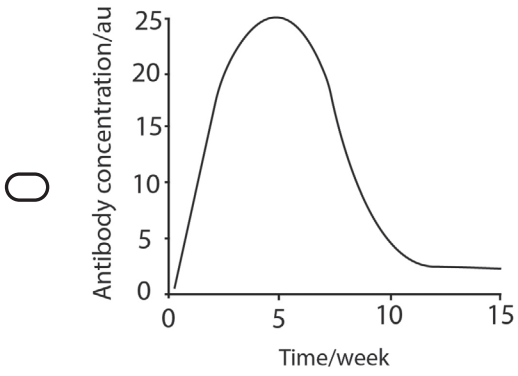
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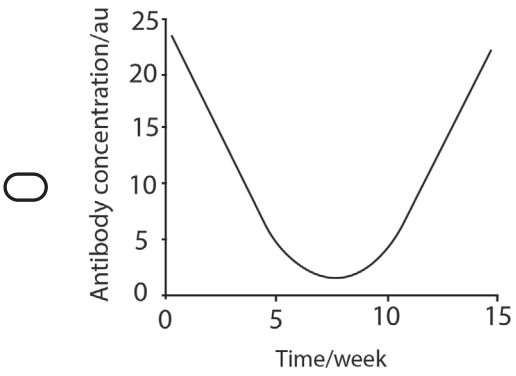
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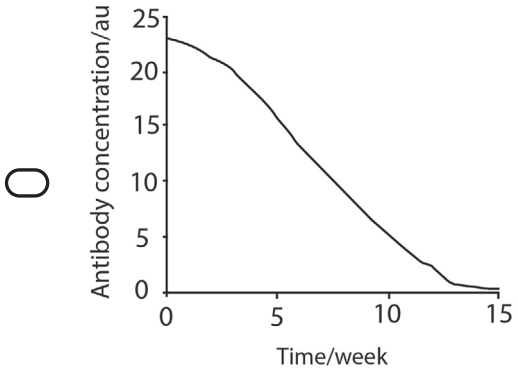
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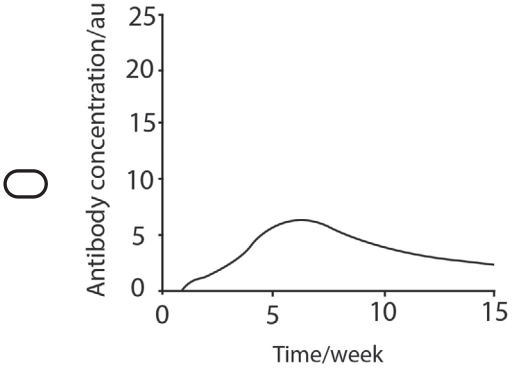
Question 1 continued

9) Which of the following graphs shows the result for a person's blood which received an injection of antibodies over a few weeks?









10) A group of researchers conducted three experiments to study the effect of the presence or destruction of surface proteins (on the membrane of lymphocytes) on the immune response in mice.

Experiment number	Procedure
1	Lymphocytes were extracted from a mouse and then injected into the same mouse.
2	Lymphocytes were extracted from a mouse and then injected into another type of mouse.
3	Lymphocytes were extracted from a mouse, the membrane proteins were destroyed and then injected into the same mouse.

Which of the experiments stimulated the immune response?

- 1 only
- 2 only
- 1 and 3
- 2 and 3

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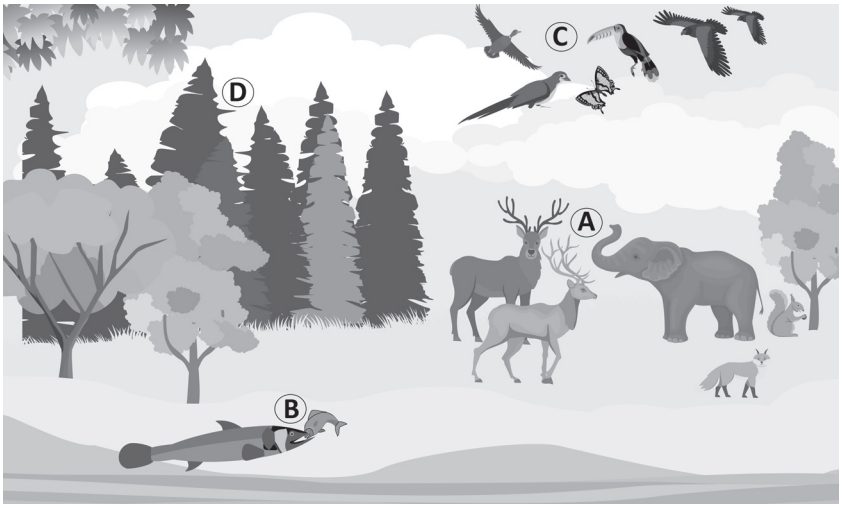
Question 1 continued

11) Which of the following describes the cell structure of the Kingdom Fungi?

	Nuclei	Chlorophyll	Cell wall
○	✓	✓	✗
○	✗	✗	✓
○	✓	✗	✓
○	✗	✓	✗

Key:
✓: present
✗: not present

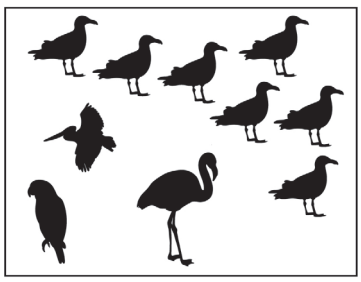
12) The picture below shows biodiversity at different levels.



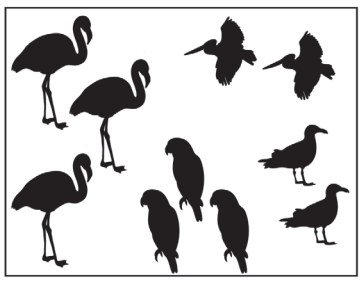
Which symbol in the picture indicates the niche?

○ A ○ B
○ C ○ D

13) Which of the following statements describes community (**Z**) and community (**W**)?



Community (Z)



Community (W)

○ Community **W** has the same risk of extinction as community **Z**.
○ Community **W** has a higher risk of extinction than community **Z**.
○ The species diversity of community **Z** is higher than community **W**.
○ The species diversity in community **Z** is the same as that in community **W**.

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Question 1 continued

14) **Figure 1** shows a section of a rocky shore and **figure 2** shows the results of an investigation into the availability of two species of seaweed (**A**) and (**B**) at certain positions on the rocky shore.

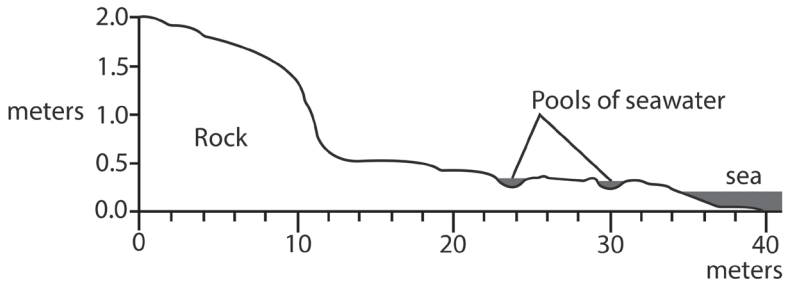


Figure (**1**): Section of the rocky shore

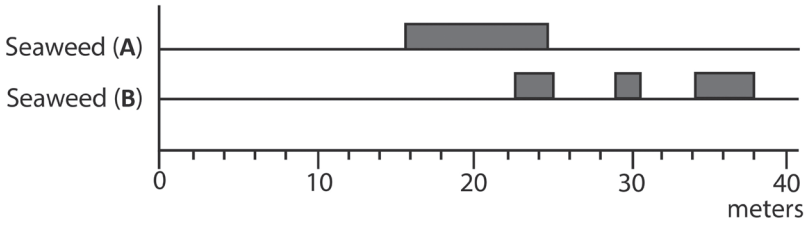


Figure (**2**): The results

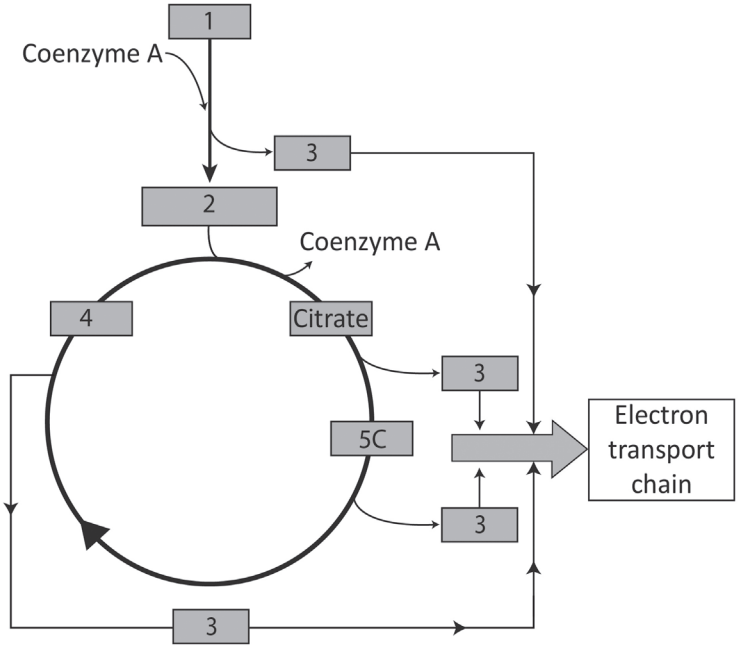
Which of the following identifies the sampling method used and the conditions of seaweed (**A**) and (**B**) across the rocky shore?

	Sampling method	Seaweed (**A**)	Seaweed (**B**)
○	Line transects	Dry conditions	Damp conditions
○	Random sampling	Dry conditions	Damp conditions
○	Line transects	Damp conditions	Dry conditions
○	Random sampling	Damp conditions	Dry conditions

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Question 2

15) The diagram below represents some steps of aerobic respiration.



a. Name compound (**3**) and the reaction in which it is produced.

- Compound (**3**): _____

- The reaction: _____ [2]

b. Describe how compound (**4**) acts as an acceptor.

_____

_____ [1]

c. Malonate is an inhibitor that limits the production of compound (**3**).
Predict the effect on the production of ATP, if malonate is added to a eukaryotic cell.

⬭ Increase ⬭ Decrease

Explain your answer.

_____

_____

_____ [1]

d. Name the gas that is produced in both the link reaction and the Krebs cycle.

_____ [1]

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Question 2 continued

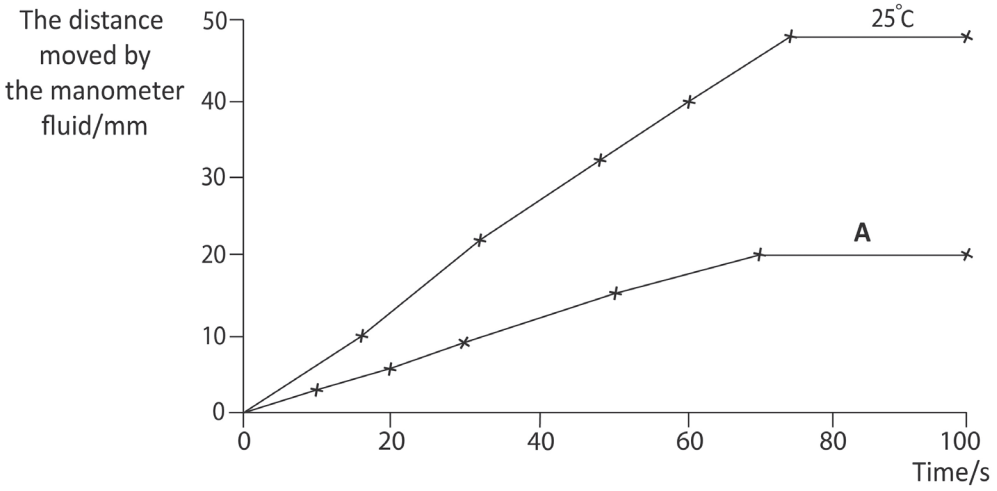
16) a. State two methods in which ATP is synthesized during aerobic respiration.

_____

_____ [2]

b. An experiment was conducted using a respirometer to investigate the rates of aerobic respiration of invertebrates at two temperatures (**25°C**) and (**A**). The rate of respiration is measured by the distance the manometer fluid moved.

The graph below shows the results of the experiment.



Predict the value of temperature (**A**) and its effect on the rate of respiration.

- The value of temperature (°C): _____

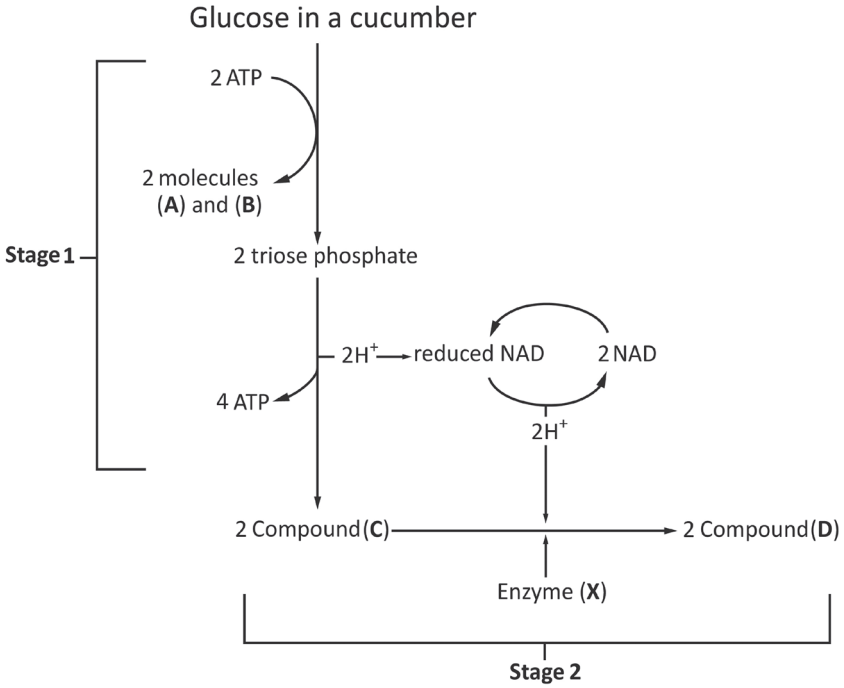
- The effect: _____ [2]

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Question 2 continued

17) The diagram below shows a process in *Lactobacillus* which is an anaerobic bacterium that grows well at low pH in a preserved cucumber



a. Where does **stage 1** in *Lactobacillus* occur?

_____ [1]

b. Name the following:

- Enzyme (**X**): _____

- The reaction in which molecules (**A**) and (**B**) are produced: _____ [2]

c. Name compound (**C**) and its role in **stage 2.**

- Compound (**C**): _____

- Role: _____ [2]

d. The accumulation of compound (**D**) in human muscle cells after high intensity exercise leads to cramps.
Give one possible method the body could take to lower the concentration of compound (**D**).

_____

_____ [1]

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Question 2 continued

18) a. Describe the following:

(i) The use of chromatography.

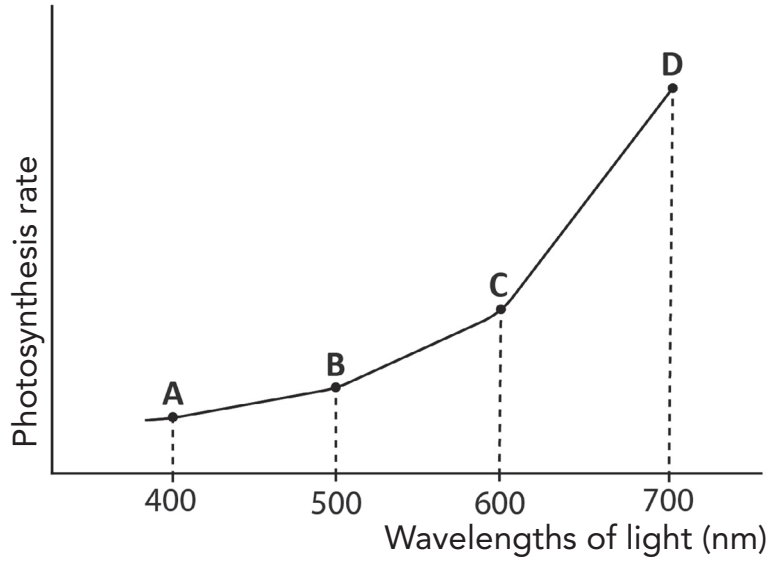
_____ [1]

(ii) The role of the pigment xanthophyll.

_____ [1]

b. The graph below illustrates the action spectrum in an aquatic plant.

(**Note**: the plant only contains two pigments)



(i) Compare between points (**A**) and (**D**) regarding the rate of photosynthesis and the absorption of the pigments.

_____

_____

_____

_____ [2]

(ii) If the carotene pigment is found in this plant, how will it affect the rate of photosynthesis at point (**B**)?

_____

_____ [1]

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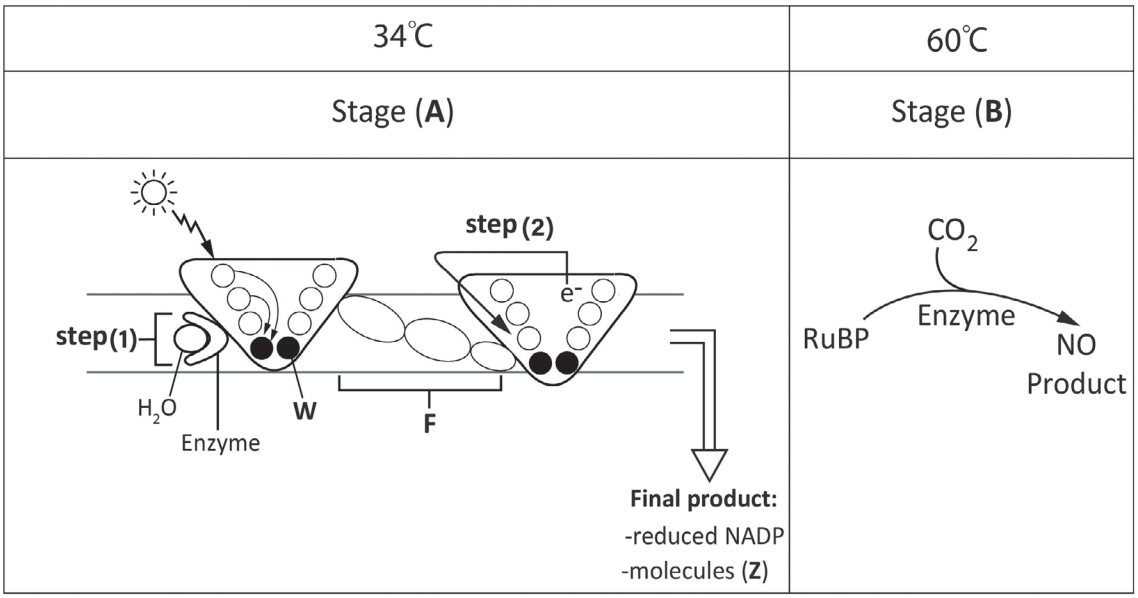
Question 2 continued

19) a. State where in the chloroplast the following reactions occur:

- Calvin cycle: _____

- Non-cyclic photophosphorylation: _____ [2]

b. The figure below shows two stages of photosynthesis (**A**) and (**B**) at different temperatures.



(i) Name the following:

- Structure (**W**): _____

- Molecule (**Z**): _____ [2]

(ii) From the figure above, explain why stage (**B**) does not take place.

_____

_____ [1]

(iii) Explain the roles of steps (**1**) and (**2**).

- Step (**1**): _____

- Step (**2**): _____ [2]

(iv) Predict **two** effects if structure (**F**) is inhibited.

_____

_____ [2]

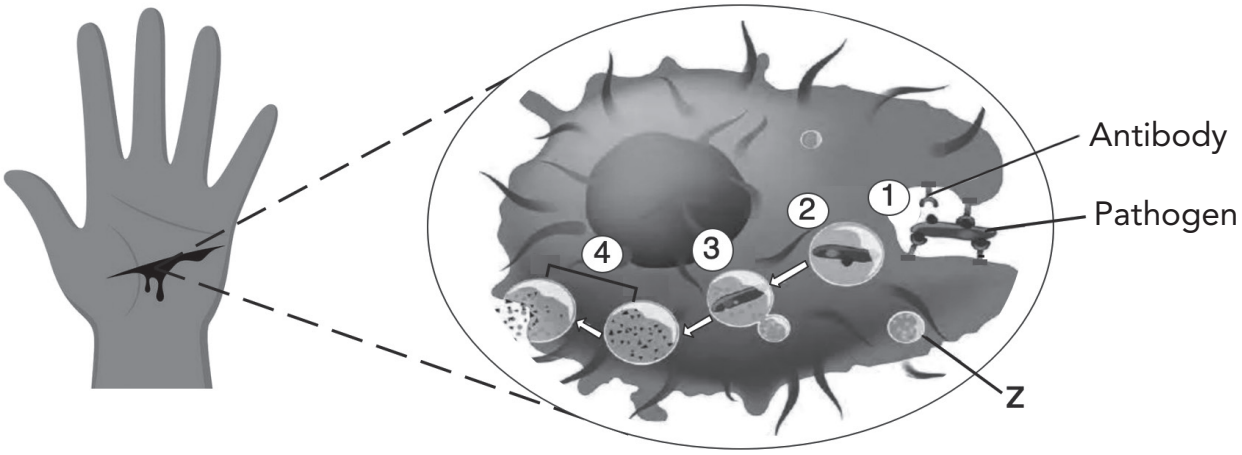
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Question 2 continued

20) The figure below illustrates the steps of the phagocytic process that occurs due to the entry of a pathogen.



a. State **two** types of phagocytic cells.

1. _____

2. _____ [2]

b. In step (**1**), explain the relationship of the molecular structure of antibodies to their function.

_____

_____ [2]

c. Explain steps (**2**) and (**4**).

- Step (**2**): _____

_____

- Step (**4**): _____

_____ [2]

d. If a chemical substance inhibits structure labelled (**Z**), explain the effect on the efficiency of this cell.

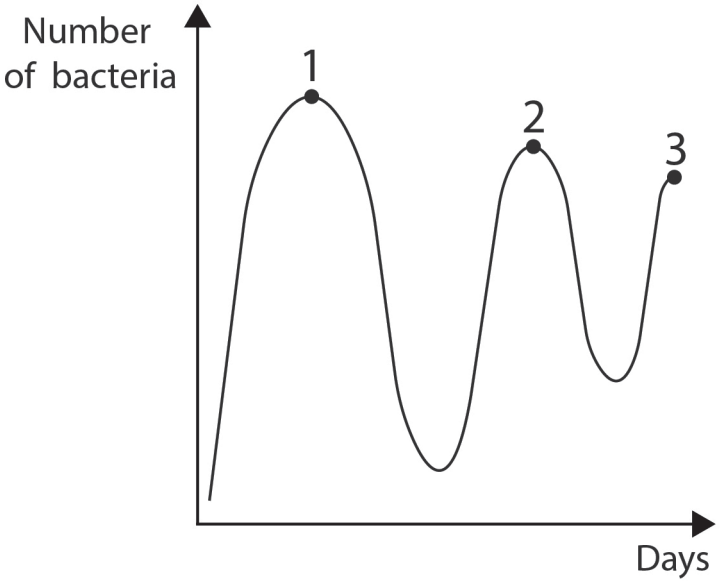
_____

_____ [1]

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Question 2 continued

21) The antibiotic penicillin was added at three different times to a bacterial culture containing one type of bacteria. The results are shown in the graph below.



a. Describe how the cell wall of the bacteria is affected when the antibiotic penicillin is added.

_____

_____ [2]

b. Explain why the number of bacteria will continue to increase when the antibiotic is added at point (**3**).

_____

_____ [2]

c. If the same antibiotic is added to a culture of the pathogen that causes AIDS, predict the effect on the number of this pathogen.

_____

Explain your answer.

_____

_____ [2]

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Question 2 continued

22) The table below illustrates four attempts used by scientists to assess biodiversity for a group of organisms.

Attempt	Description
A	Presence of mutated genes.
B	Differences in DNA base sequences.
C	Probability of crossing over.
D	Differences in amino acid sequences.

a. State the term that describes the interaction between living organisms and non-living organisms as part of their environment.

_____ [1]

b. According to the table, which level did they use to assess the biodiversity of the organisms? Explain how they were assessed at this level.

- The Level: _____

- Explanation: _____

_____

_____

_____ [2]

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Question 2 continued

23) The picture below represents The Arabian Dragon Tree (*Dracaena serrulata*) which is a rare and distinctive species native to the Dhofar Mountains in Oman. The table below represents the hierarchical classification of the tree.



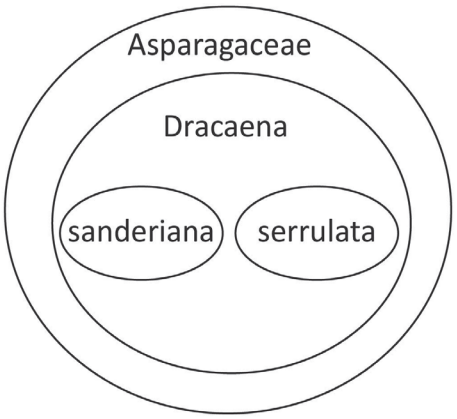
Taxon	Name of Taxon
Domain	Eukarya
Kingdom	Plantae
Phylum	Tracheophyta
(**A**)	Liliopsida
(**B**)	Asparagales
Family	Asparagaceae
(**C**)	Dracaena
(**D**)	*Dracaena serrulata*

a. Identify the taxons (**A**) and (**B**) in the hierarchical classification.

- Taxon (**A**): _____

- Taxon (**B**): _____ [2]

b. The circles in the diagram below represent the hierarchy of taxonomic groups for the classification of the Lucky Bamboo (*Dracaena sanderiana*).



Identify the taxon that differs in the hierarchy classification of the Lucky Bamboo and the Arabian Dragon Tree.

_____ [1]

c. State two reasons why these two species must be conserved.

1. _____

2. _____ [2]

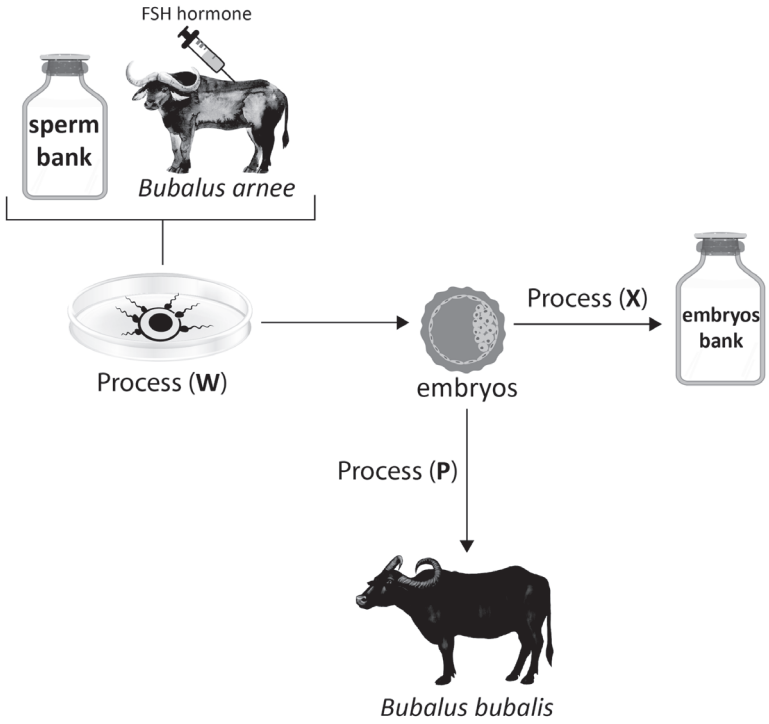
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Question 2 continued

24) The following diagram represents an assisted reproduction in the Wild Buffalo (*Bubalus arnee*).



a State two features of the Kingdom Animalia.

1. _____

2. _____ [2]

b. Identify the following:

- The name of process (**W**): _____

- The role of process (**P**): _____ [2]

c. The International Union for the Conservation of Nature (IUCN) considered the Wild Buffalo (Bubalus arnee) as endangered. Which process in the diagram would be the most effective method for conserving this species (*Bubalus arnee*)?

_____

Explain your answer.

_____

_____ [2]

[End of Examination]

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مُسَوَّدَة

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نموذج إجابة امتحان دبلوم التعليم العام- المدارس ثنائية اللغة

للعام الدراسي: 1447/1446هـ - 2025/2024م

الفصل الدراسي: الثاني - الدور: الأول

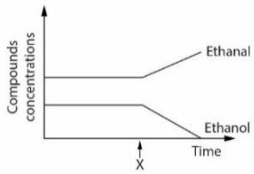
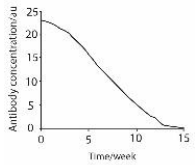
المـادة: الأحيـاء

سلطنة عمان
وزارة التربية والتعليم

مركز القياس والتقويم التربوي
The Center for Educational Assessment and Measurement (CEAM)

Note: Answer guide in (5) sheets. Total marks:70

Part 1: Multiple Choice **Each Question: 1 mark** **Total: 14 marks**

Ch	Q	Answer	Page Cambr	Page Hodd	L.O.	Level of learning
6	1	Pyruvate → ethanal → ethanol; CO_2; reduced NAD; NAD	320 / 322	259/ 261	6.4.3	Knowledge
	2	Number of mitochondria per cell: 1800; Average length of cristae (nm): 240	319-320	257	6.3.1	Application
	3	Stage's location: Inner membrane of the mitochondrion; Mechanism (**A**): Active transport; Mechanism (**B**): Facilitated diffusion	-316 317	252-254	6.2.8	Application
	4		320	259	6.4.1	Reasoning
7	5	A site where an enzyme is involved in light-independent reactions.	333	270	7.1.1	Knowledge
	6	D	337-338	278	7.1.2	Application
	7	Period (**A**): Low concentration of CO_2; Period (**B**): High concentration of CO_2	341	284	7.4.1	Reasoning
8	8	1 and 4	242	207	8.1.3	Knowledge
	9		277	236	8.5.1	Application
	10	2 only	267	225	8.3.1	Application
9	11	Nuclei: ✓; Chlorophyll: ×; Cell wall: ✓	502-503	422	9.1.5	Knowledge
	12	B	508	427	9.2.2	Application
	13	The species diversity in community **Z** is the same as that in community **W**.	508-509	430-431	9.2.1	Reasoning
	14	Sampling method: Line transects; Seaweed (**A**): Dry conditions; Seaweed (**B**): Damp conditions	515-516	432-434	9.2.4	Application

Part 2: Extended Response **Chapter 6 (15 marks):** *4 Knowledge 8 Application 3 Reasoning*

Q		Answer	Mark	Page		L.O.	Level of learning
				Cambr	Hodd		
15	a	Compound (**3**) : reduced NAD. (**1mark**) The reaction: reduction. (**1mark**)	2	315	251 - 252	6.2.6	Application
	b	It acts as an acceptor of the 2C compound from acetyl coenzyme A to form citrate (6C).	1	315-318	251 - 252	6.2.5	Application
	c	Decrease because hydrogen will not be carried to the inner membrane of the mitochondrion therefore no hydrogen ions (protons) can provide energy for ATP synthesis. ***Students should choose the correct answer and write the explanation to get one mark.***	1	-316 317	252 - 254	6.2.7 6.2.8	Reasoning
	d	CO_2	1	315-316	251 - 252	6.2.4 6.2.5	Knowledge
16	a	- Transfer of phosphate in substrate-link reactions. (**1 mark**) - Chemiosmosis. (**1 mark**)	2	313	250 / 253	6.1.3	Knowledge
	b	- Any value below 25°C is accepted. (**1 mark**) - The rate of respiration will decrease. (**1 mark**)	2	324	263 - 265	6.2.9	Reasoning
17	a	Cytoplasm.	1	313-314	257	6.2.1	Knowledge
	b	- Lactate dehydrogenase. (**1mark**) - Phosphorylation. (**1mark**)	2	320/ 314	259	6.4.1 6.2.2	Application
	c	- Pyruvate. (**1 mark**) - Acts as the hydrogen acceptor. (**1 mark**)	2	320	250	6.4.1	Application
	d	***Any one of the following:*** - Substance (**D**) is oxidised in the presence of oxygen and converted back to glucose / pyruvate. - Substance (**D**) is oxidised in the presence of oxygen and converted to polysaccharide to be stored as glycogen.	1	320-321	260 - 261	6.4.1	Application

Part 2: Extended Response. **Chapter 7 (14 marks)**: *4 Knowledge 7 Application 3 Reasoning*

Q		Answer	Mark	Page		L.O.	Level of learning
				Cambr	Hodd		
18	a	**(i)** Chromatography: separate substances in a mixture according to their solubility in a solvent. (**1 mark**)	1	335	271	7.1.5	Knowledge
		(ii) Helps to channel energy harvested from light to chlorophyll a. (**1 mark**)	1	334	276	7.1.3	Knowledge
	b	**(i)** The light absorption at that wavelength range at (**A**) is very low therefore the photosynthesis rate will be low. (**1mark**) In contrast to point (**D**) the absorption at that wavelength range is higher therefore, the rate of the photosynthesis will be higher. (**1mark**)	2	334-336	274	7.1.4	Application
		(ii) The photosynthesis rate will Increase.	1	334-335	274	7.1.3	Reasoning
19	a	- Stroma. - Thylakoid membranes.	2	333-334	278 - 208	7.1.2	Knowledge
	b	**(i)** - (**W**): Chlorophyll a. (**1 mark**) - (**Z**): ATP. (**1 mark**)	2	337 338	276 277	7.1.3 7.2.5	Application
		(ii) Because the enzyme rubisco which controls the reactions is denatured at high temperatures **or** reaction (**B**) is controlled by an enzyme which is affected by an increase in temperature.	1	371	284	7.4.1	Application
		(iii) - Step (**1**): It splits a water molecule into hydrogen ions (protons), electrons and oxygen, the hydrogen ions combine with electrons from photosystem I to produce reduced NADP. (**1 mark**) -Step (**2**): Excited electrons from the reaction centre in PSI are able to 'fall back' to where they came from which will gain extra ATP molecules. (**1 mark**)	2	338 337	277 279	7.2.4 7.2.2	Application
		(iv) - There will be no electron acceptor for the excited electrons. (**1 mark**) - No energy to pump the protons (hydrogen ions) from the stroma to the thylakoid spaces. (**1 mark**)	2	337	277	7.3.1	Reasoning

Part 2: Extended Response. **Chapter 8 (13 marks):** *4 Knowledge 6 Application 3 Reasoning*

Q		Answer	Mark	Page		L.O.	Level of learning
				Cambr	Hodd		
20	a	Macrophages. (**1 mark**) Neutrophils. (**1 mark**)	2	268	225	8.4.1	Knowledge
	b	The antibody has a variable site form a specific shape (**1 mark**) that is complementary to the pathogen. (**1 mark**)	2	275	231	8.4.4	Application
	c	- Step (**2**): Phagosome formed by pseudopodia traps antigen within a phagocytic vacuole in a process called endocytosis. (**1 mark**) - Step (**4**): Digested products are released by exocytosis or digestion of bacterial cells and the absorption of products into neutrophils. (**1 mark**)	2	268	225	8.4.1	Application
	d	The macrophage will not be able to digest the antigen and disease will spread in the body.	1	268	225	8.4.1	Reasoning
21	a	Penicillin prevents the synthesis of the cross-links between the peptidoglycan polymers in the cell walls of bacteria (**1 mark**) by inhibiting the enzymes that build these crosslinks. (**1 mark**)	2	253	217	8.2.1	Knowledge
	b	Because the bacteria develop resistance (**1 mark**) due to using the same antibiotic three times. (**1 mark**)	2	255	221	8.2.2	Application
	c	The number of pathogens that caused AIDS will continue to increase. (**1 mark**) Because the antibiotic is not affecting the viruses. (**1 mark**)	2	254	217	8.2.1	Reasoning

Part 2: Extended Response. Chapter 9 (14 marks): *5 Knowledge 7 Application 2 Reasoning*

Q		Answer	Mark	Page		L.O.	Level of learning
				Cambr	Hodd		
22	a	Ecosystem.	1	507	426	9.2.2	Knowledge
	b	Genetic diversity. (**1 mark**) Assessed by finding out what proportion of genes have different alleles and how many alleles there are in each gene. (**1 mark**)	2	509	446	9.2.1	Application
23	a	- Class. (**1 mark**) - Order. (**1 mark**)	2	497-498	420	9.1.2	Application
	b	The taxon species.	1	497-498	420	9.1.2	Application
	c	***Any two of the following:*** - Ecological reasons. - Aesthetic reasons. - Agricultural reasons. - Environmental reasons. - Moral and ethical reasons.	2	522-524	446 447	9.3.2	Knowledge
24	a	***Any two of the following:*** - Multicellular organisms, differentiated into tissues; many are motile organisms. - Cells are eukaryotic, with a distinct nucleus and membrane-bound organelles. - Nucleus contains linear chromosomes of DNA with histone protein attached. - Large ribosomes (80S) present. - Cells sometimes have cilia or flagella. - Nutrition is heterotrophic. - Cells do not have chloroplasts and cannot photosynthesise. - Cell vacuoles are small and temporary. - Cell walls are absent. - Communication is by the nervous system and chemical signalling. - Cells that are differentiated to form tissues and organs.	2	504	424	9.1.5	Knowledge
	b	- W: In-vitro fertilization or (IVF). (**1 mark**) - P: Conserves/ protects the endangered animal from the risks of pregnancy **or** the endangered animal can be a source of many offspring. (**1 mark**)	2	526-527	450-451	9.4.2	Application
	c	- Process (X) **or** freezing process (**1 mark**) - Because freezing embryos preserves the genetic integrity of Bubalus arnee **or** allows for future population restoration **or** provides a long-term strategy for maintaining the species. (**1 mark**)	2	527	451	9.4.1	Reasoning

[END OF THE MARKING GIUDE]





امتحان دبلوم التعليم العام للمدارس الخاصة (ثنائية اللغة)

الفصل الدراسي الثاني- الدور الثاني

للعام الدراسي ١٤٤٦ - ١٤٤٧ هـ - ٢٠٢٤ / ٢٠٢٥ م

تنبيه:
- المادة: الأحياء.
- الأسئلة في (١٦) صفحة.
- زمن الإجابة: ثلاث ساعات.
- الإجابة في الورقة نفسها.

تعليمات مهمة:

- يجب الحضور إلى قاعة الامتحان قبل عشر دقائق على الأقل من بدء زمن الامتحان.
- يجب إحضار أصل ما يثبت الهوية وإبرازها للعاملين بالامتحانات.
- يجب الالتزام بالزي (الدشداشة البيضاء والمصر أو الكمة للذكور) والزي المدرسي للطالبات ، ويستثنى من ذلك الدارسون من غير العمانيين بشرط الالتزام بالذوق العام، ويمنع على جميع المتقدمات ارتداء النقاب داخل المركز وقاعات الامتحان.
- يحظر على الممتحنين اصطحاب الهواتف النقالة وأجهزة النداء الآلي وآلات التصوير والحواسيب الشخصية والساعات الرقمية الذكية والآلات الحاسبة ذات الصفة التخزينية والمجلات والصحف والكتب الدراسية والدفاتر والمذكرات والحقائب اليدوية والآلات الحادة أو الأسلحة أياً كان نوعها وأي شيء له علاقة بالامتحان.
- يجب على الممتحن الامتثال لإجراءات التفتيش داخل المركز طوال أيام الامتحان.
- يجب على الممتحن التأكد من استلام دفتر امتحانه، مغلفاً بغلاف بلاستيكي شفاف وغير ممزق ، وهو مسؤول عنه حتى يسلمه لمراقبي اللجنة بعد الانتهاء من الإجابة.
- يجب الالتزام بضوابط إدارة امتحانات دبلوم التعليم العام وما في مستواه وأية مخالفة لهذه الضوابط تعرضك للتدابير والإجراءات والعقوبات المنصوص عليها بالقرار الوزاري رقم ٥٨٨ / ٢٠١٥.
- يقوم المتقدم بالإجابة عن أسئلة الامتحان المقالية بقلم الحبر (الأزرق أو الأسود).
- يقوم المتقدم بالإجابة عن أسئلة الاختيار من متعدد بتظليل الشكل (○) وفق النموذج الآتي:

س – عاصمة سلطنة عمان هي:

○ القاهرة ○ الدوحة

● مسقط ○ أبوظبي

ملاحظة: يتم تظليل الشكل (●) باستخدام القلم الرصاص وعند الخطأ، امسح بعناية لإجراء التغيير.

صحيح ● **غير صحيح** ▭ ◉ ◒ ✗ ✓

مُسَوَّدَة، لا يتم تصحيحها

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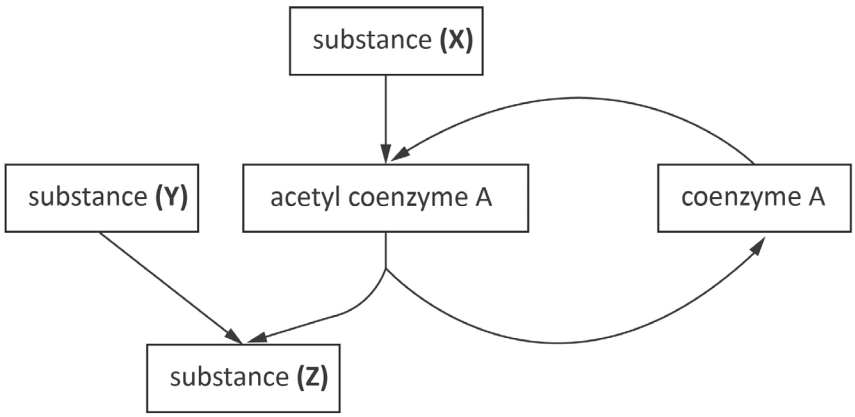
Question 1: Multiple Choice Items (14 marks)

There are 14 multiple-choice items worth one mark each.
Shade in the bubble (⬭) next to the **correct** answer for each of the following items.

1) Which of the following describes the reaction and its location during glycolysis?

	Reaction	Location
⬭	Reduced NAD is produced	Cytoplasm of the cell
⬭	Reduced NAD is produced	Matrix of mitochondrion
⬭	Carbon dioxide is released	Cytoplasm of the cell
⬭	Carbon dioxide is released	Matrix of mitochondrion

2) The diagram below represents some steps of cellular respiration.



Which of the following identifies substances (**X**, **Y** and **Z**)?

	Substance (**X**)	Substance (**Y**)	Substance (**Z**)
⬭	Pyruvate	Citrate	Oxaloacetate
⬭	Pyruvate	Oxaloacetate	Citrate
⬭	Acetyl group	Oxaloacetate	Citrate
⬭	Acetyl group	Citrate	Oxaloacetate

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Question 1 continued

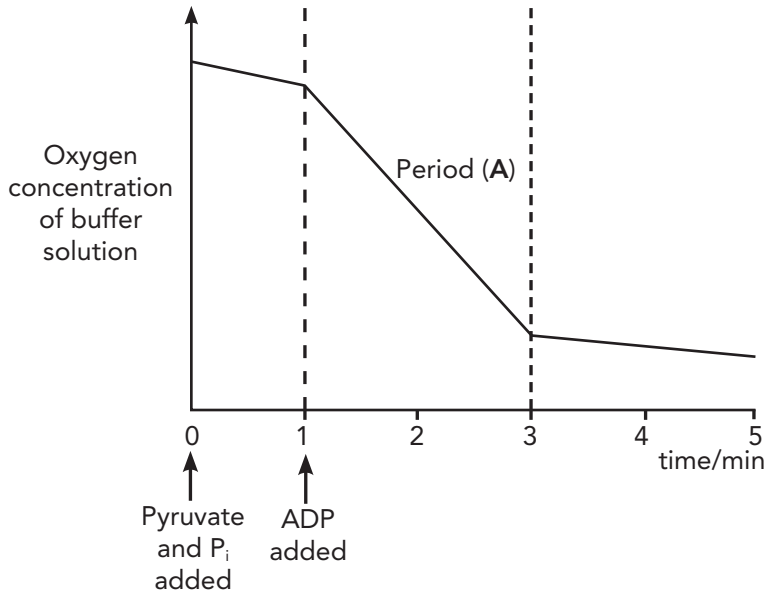
3) Mature red blood cells do not contain major organelles like nuclei and mitochondria to increase their oxygen-carrying capacity.

Which of the following processes can occur in mature red blood cells?

- ☐ Decarboxylation of pyruvate.
- ☐ Combining oxygen with hydrogen to form water.
- ☐ Dehydrogenation of reduced NAD and reduced FAD.
- ☐ Oxidation of triose phosphate molecules to pyruvate.

4) The diagram below represents the results of an experiment of a buffer solution containing mitochondria extracted from liver cells. The oxygen concentration in the buffer solution was measured over time.

- At time zero, pyruvate and inorganic phosphate (Pi) were introduced into the solution.
- After one minute, ADP was added.



Which of the following is correct about period (**A**)?

- ☐ The production of CO_2 is low.
- ☐ The production of ATP is high.
- ☐ The production of ADP is high.
- ☐ The production of reduced FAD is low.

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Question 1 continued

5) Which light-dependent reaction products are used in light-independent reactions?

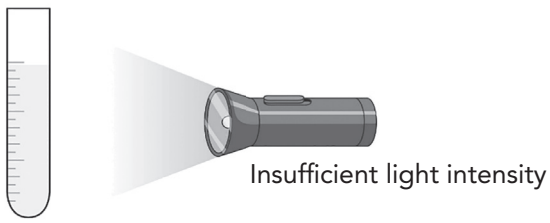
- ☐ ATP and NADP.
- ☐ Oxygen and NADP.
- ☐ ATP and reduced NADP.
- ☐ Oxygen and reduced NADP.

6) A plant was placed in a closed environment with an unknown concentration of oxygen (O_2) and carbon dioxide (CO_2).

Which of the following suggests the initial concentration of O_2 and CO_2, if the plant's rate of photosynthesis increased after a period of time?

	O_2 concentration	CO_2 concentration
☐	low	low
☐	high	high
☐	low	high
☐	high	low

7) The following figure shows an experiment measures the rate of reaction in light dependent stages in photosynthesis. The reaction uses the DCPIP indicator. (**Note**: the DCPIP indicator is blue colour changed to colourless when reduced).



Mixed isolated chloroplasts and DCPIP

According to the figure opposite, which of the following is correct about the result of the reaction?

	DCPIP colour	Reason
☐	Blue	Slow release of electrons
☐	Blue	High release of energetic electrons
☐	Colourless	Slow release of electrons
☐	Colourless	High release of energetic electrons

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Question 1 continued

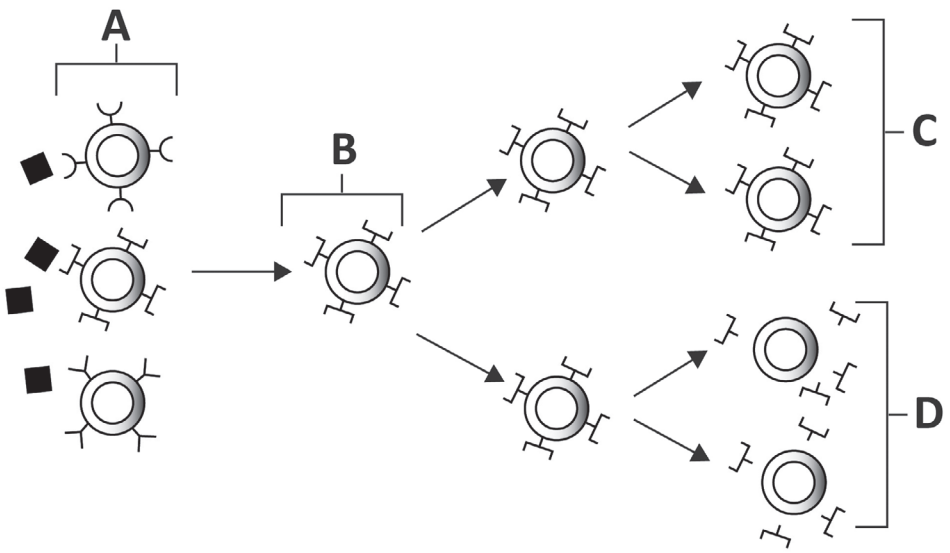
8) The following statements describe the biological factors that prevent infectious diseases:

1. *Antiretroviral therapy.*
2. *Use of BCG vaccine to protect children from getting a disease.*
3. *Testing livestock for an infectious disease.*
4. *Biological control and control of vectors that transmit disease.*

Which statements indicate the biological factors that can prevent (TB)?

- ☐ 1 and 2
- ☐ 1 and 4
- ☐ 2 and 3
- ☐ 2 and 4

9) The figure below illustrates the role of B-lymphocytes during an immune response.



Which part of this process allows for long-term protection against pathogens?

- ☐ A
- ☐ B
- ☐ C
- ☐ D

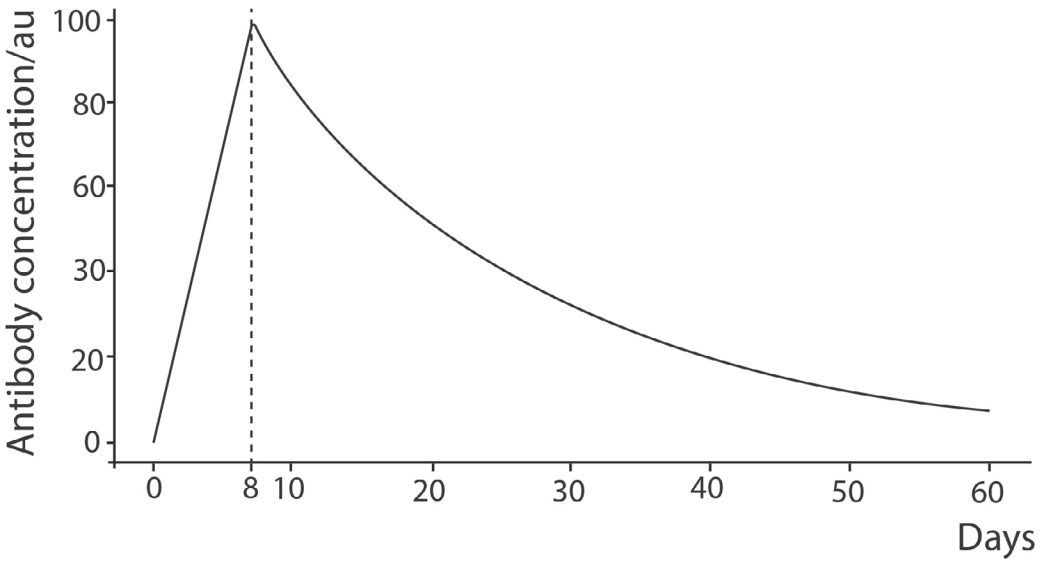
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Question 1 continued

10) Measles is caused by a virus that targets the respiratory system. The concentration of antibodies to the measles virus in a person's blood was measured for 60 days. The curve below shows the concentration of antibodies for 60 days.



Which one of the following could have occurred for the person on days (**0-8**)?

- ☐ Exposed to the measles virus.
- ☐ Given an oral dose of antibiotics.
- ☐ Given a vaccination for the measles virus.
- ☐ Injected with antibodies against the measles virus.

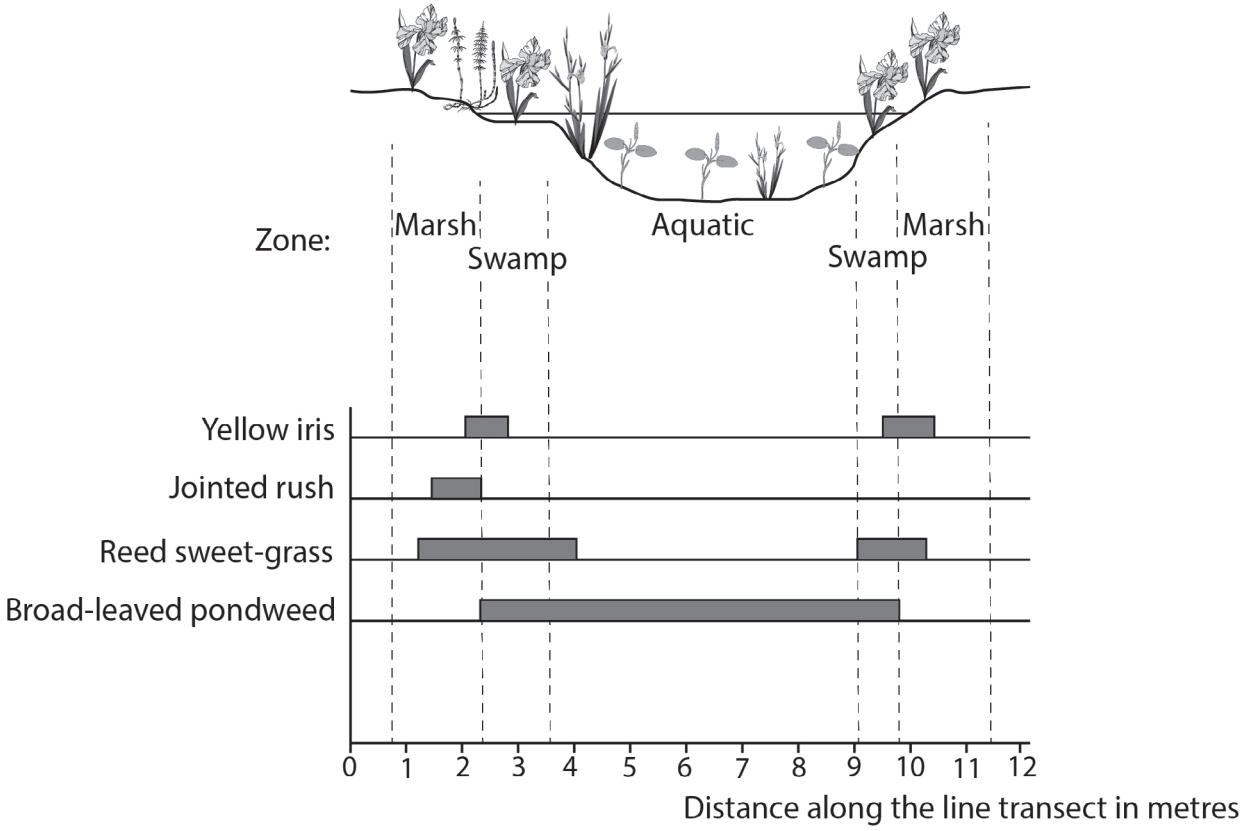
11) Which of the following domains contains 70S ribosomal RNA in the cytosol?

- ☐ Bacteria only.
- ☐ Eukarya only.
- ☐ Archaea and Eukarya.
- ☐ Archaea and Bacteria.

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Question 1 continued

12) The diagram below shows the distribution of some plants growing in and around a shallow stream. The plots represent the results of samples taken along the line transect across the stream.



Which plant grows only in swamp and marsh conditions?

- ☐ Yellow iris.
- ☐ Jointed rush.
- ☐ Reed sweet- grass.
- ☐ Broad-leaved pondweed.

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Question 1 continued

13) The mark-release-recapture is a method that is used to assess the distribution and abundance of biodiversity of an area. Scientists wanted to calculate the size of a green turtle population. They captured, marked, and released 230 turtles. Five weeks later, samples were collected from 190 unmarked turtles and 20 marked turtles at the same site. Calculate the population size.

Use the equation ($N = n_1 \times n_2 / m_2$)

- ☐ 20
- ☐ 22
- ☐ 2185
- ☐ 2415

14) The following table represents the DNA sequences for individuals (A, B, C, D) to assess the genetic variation within a community.

Individuals	Genes in DNA
A	
B	
C	
D	

Which of the following individuals are most closely related?

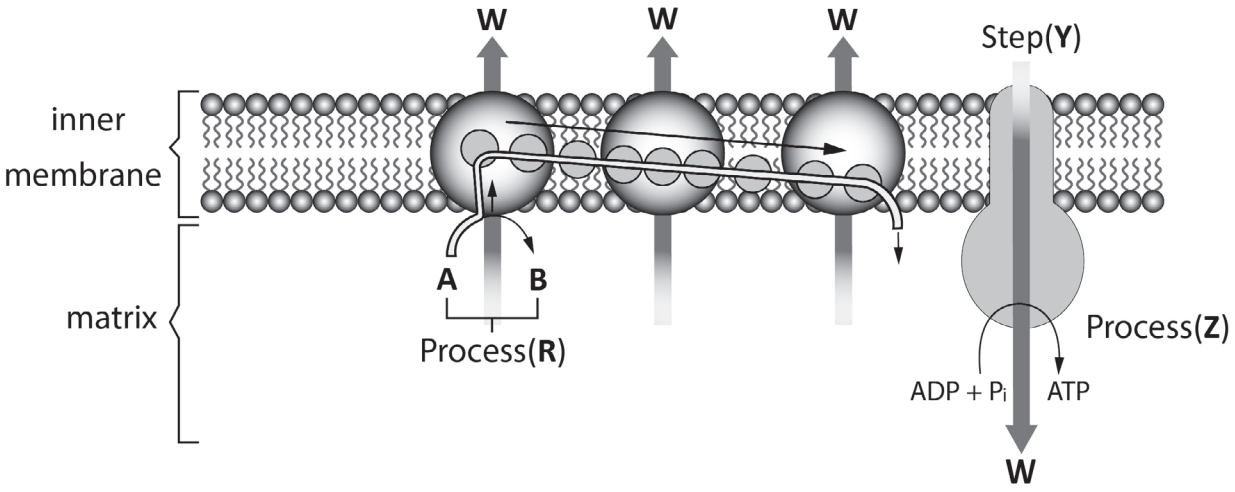
- ☐ A and B
- ☐ A and C
- ☐ B and C
- ☐ C and D

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Question 2: Extended Responses (56 marks)

Write your answer for each of the following questions in the space provided.
Be sure to show all your work, including the correct units where applicable.

15) The figure below shows the stage of the oxidative phosphorylation of aerobic respiration.



a. Describe the relationship between the electron transport chain and compound (**W**).

_____

_____

_____ [2]

b. Name the following:

- Compound (**B**): _____

- Process (**Z**): _____ [2]

c. Gboxin is a drug that targets cancer cells by inhibiting process (**R**).
Explain how Gboxin affects the production of ATP.

_____

_____

_____

_____ [2]

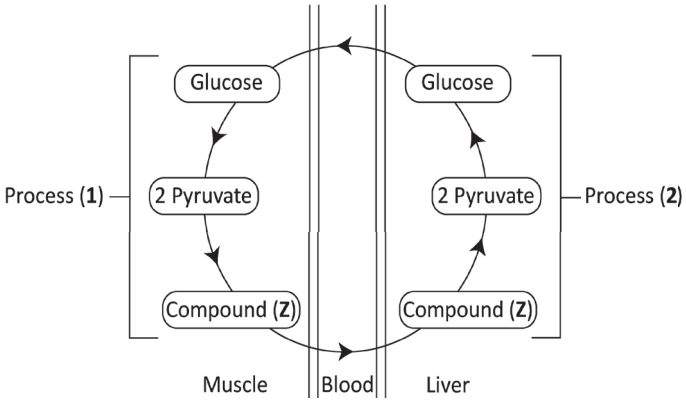
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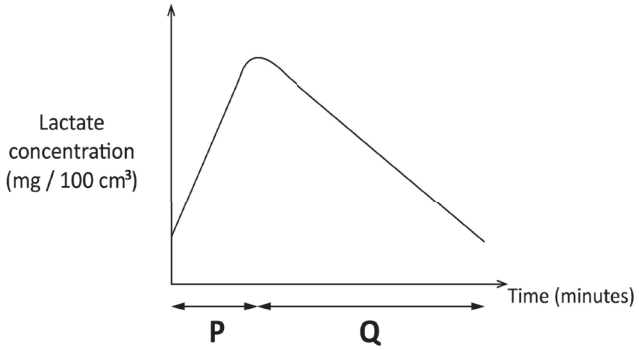
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Question 2 continued

16) The figure below shows processes (**1**) and (**2**) during high intensity exercise, while the graph illustrates the concentration of lactate in the blood during periods (**P** and **Q**).





a. State the reason why muscle cells produce lactate during high intensity exercise.

_____

_____ [1]

b. Describe how period (**P**) corresponds with process (**1**) in the figure above.

_____

_____ [1]

c. Explain why the concentration of lactate decreases during period (**Q**) in the graph above.

_____

_____ [1]

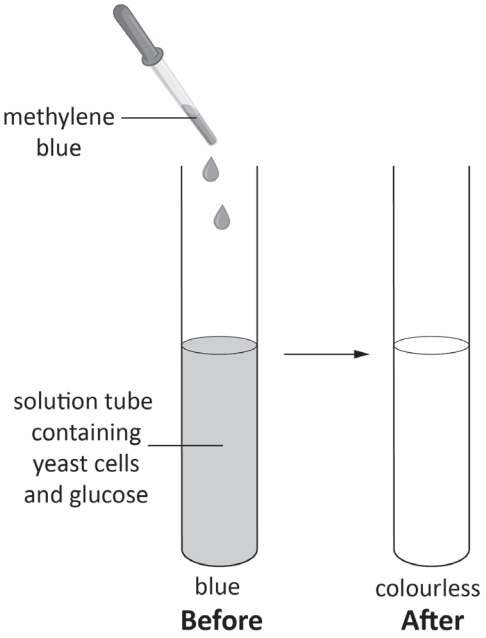
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Question 2 continued

17) a. State **three** adaptations for rice to grow with its roots submerged in water.

1. _____
2. _____
3. _____ [3]

b. Methylene blue solution is an example of a redox indicator which becomes colourless when it is reduced. The figure below represents when methylene blue is added to a solution of anaerobically respiring yeast cells in a (0.5%) glucose solution.



Yeast is an anaerobic organism that converts glucose to ethanol as follows:

glucose → pyruvate → compound (**X**) → ethanol

(i) Name the following:

- Compound (**X**): _____
- The molecule that causes the Methylene blue solution to be colourless:

_____ [2]

(ii) Predict the effect on the rate of respiration if the experiment is repeated with (1.0%) glucose solution.

_____ [1]

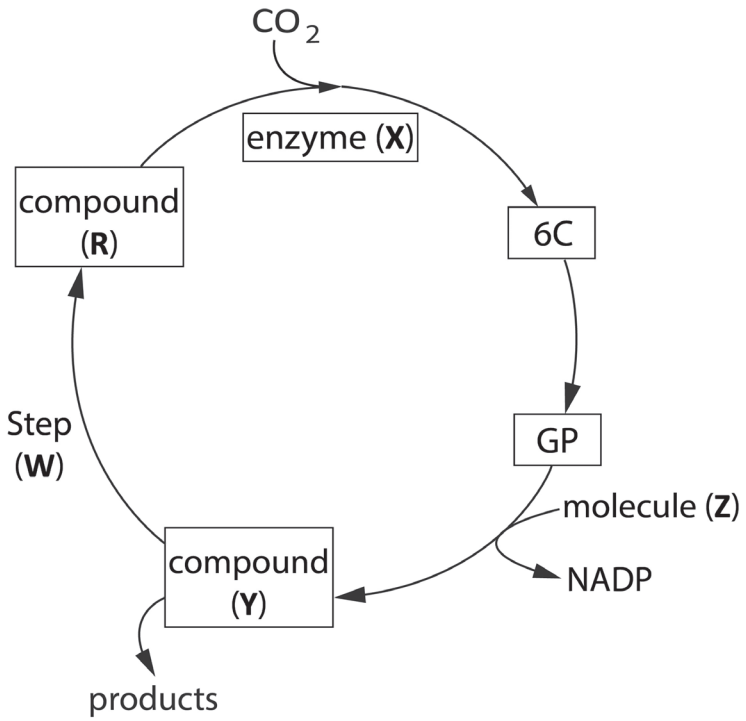
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Question 2 continued

18) The following diagram shows one stage of photosynthesis.



a. Name the following:

- The location of this stage: _____
- Enzyme (**X**): _____
- Source of molecule (**Z**): _____ [3]

b. State two products that can be produced from compound (**Y**).

_____

_____ [2]

c. What would be the effect of inhibiting step (**W**) on CO_2 concentration in the stomata?

_____

_____ [1]

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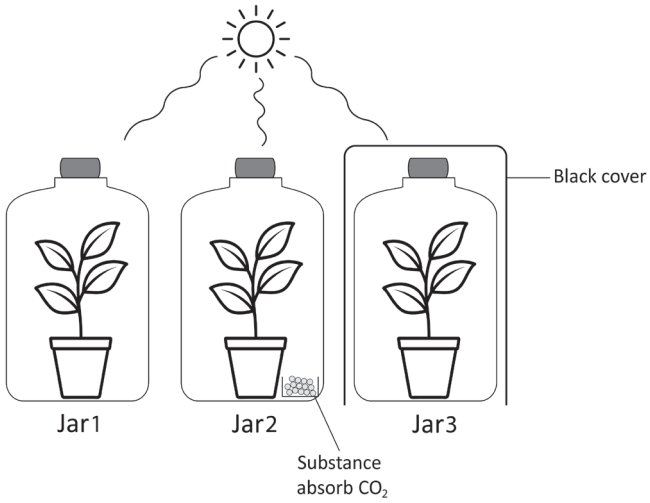
Question 2 continued

19) a. State the differences between cyclic and non-cyclic phosphorylation with regard to the type of photosystem and occurrence of photolysis of water.

	Cyclic phosphorylation	Non-cyclic phosphorylation
Type of photosystem		
Occurrence of photolysis of water		

[4]

b. The figure below shows three jars containing (0.1%) of CO_2 which have been exposed to the same light intensity to investigate the effect of these limiting factors on the rate of photosynthesis.



(i) Describe the rate of photosynthesis in jar (**1**) and jar (**2**).

- Jar (1): _____

_____

- Jar (2): _____

_____ [2]

(ii) Predict the production of ATP in jar (**3**) after a long time.

_____

Explain your answer.

_____

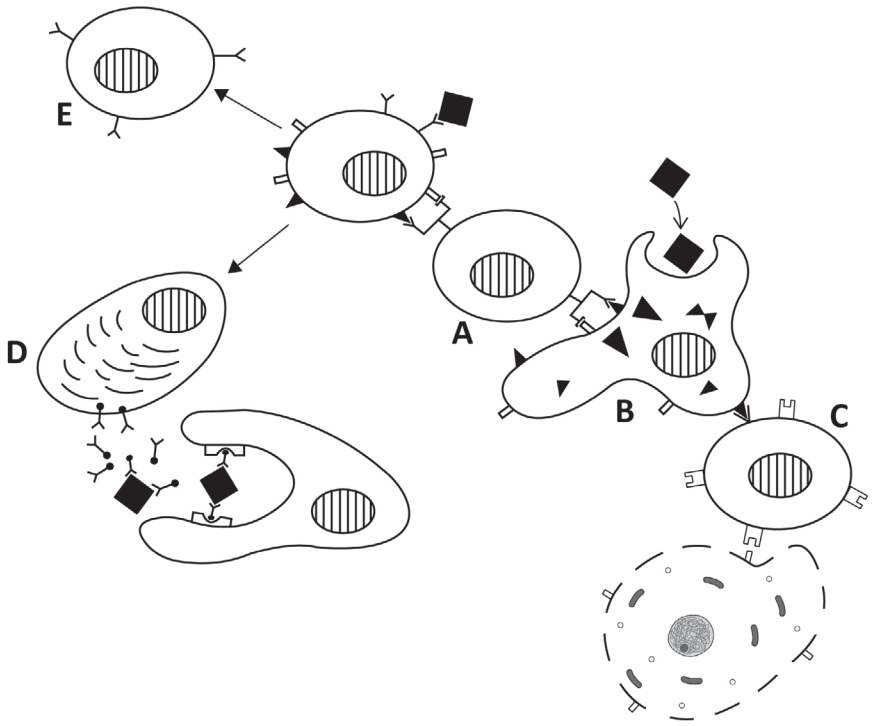
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Question 2 continued

20) The figure below shows the role of lymphocytes during an immune response.



a. State two types of T-lymphocytes.

1. _____

2. _____ [2]

b. Describe the role of each of the following cells labelled.

- (**C**): _____
- (**D**): _____
- (**E**): _____

_____ [3]

c. What event occurs at cell (**B**) that causes cell (**A**) to be stimulated?

_____ [1]

d. A mutation occurs due to the loss of part of the genetic material on chromosome 22 and leads to a defect in producing the cell labelled (**A**).

What is the effect of this on the immune response?

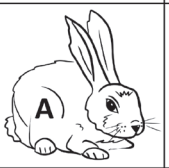
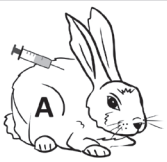
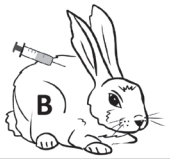
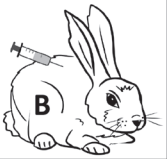
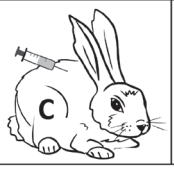
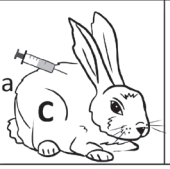
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_____ [1]

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Question 2 continued

21) The figure below shows the results of an experiment conducted on three different rabbits (**A**, **B** and **C**) to determine the effect of injecting them with tetanus and diphtheria vaccines.

Experiment's number	Beginning of experiment	After 15 days	Result (lived/Died)
1	control rabbit 	live pathogen of tetanus 	**Died**
2	toxoid tetanus 	live pathogen of tetanus 	**?**
3	toxoid tetanus 	live pathogen of diphtheria 	**?**

a. State two ways that vaccination programs can help control the spread of infectious diseases.

1. _____

2. _____ [2]

b. What type of acquired immunity is shown in the figure above?

_____

Explain your answer.

_____

_____ [2]

c. Explain the results obtained from experiments (**2**) and (**3**) with regard to the immune response.

- (**2**): _____

_____

- (**3**): _____

_____ [2]

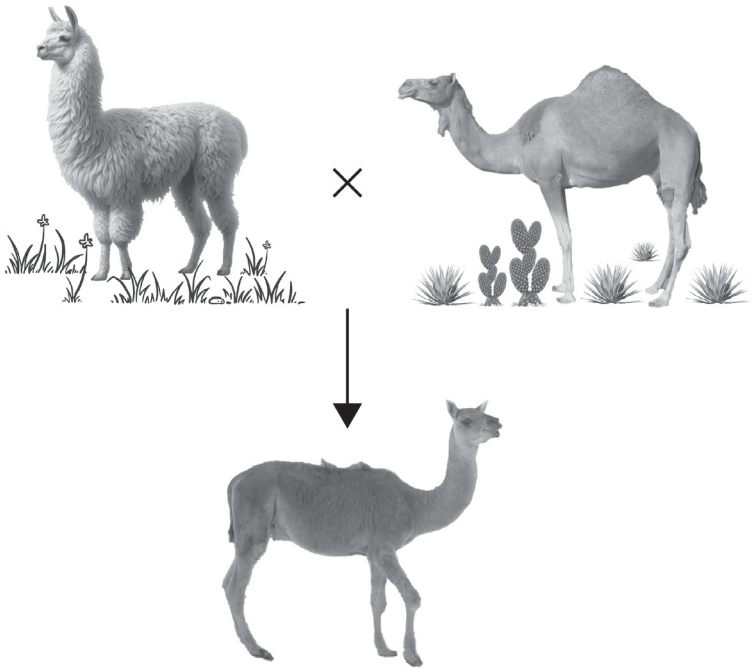
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Question 2 continued

22) The figure below shows the mating of two individuals of different species, a male Arabian camel (*Camelus dromedarius*) and a female South American lama (*Lama glama*), resulting in a sterile animal called a Cama.



a. How many species of living organisms are shown in the figure above?

_____ [1]

b. Suggest one level of biodiversity shown in the figure above.

_____ [1]

c. State two levels of taxonomy lower than the class taxon.

1. _____

2. _____ [2]

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Question 2 continued

23) The Arabian leopard is classified as a "critically endangered" species by the International Union for the Conservation of Nature (IUCN). There are around 50 individuals in the mountains in Dhofar.

a. State two reasons why the Arabian leopard is now threatened with extinction.

1. _____
2. _____ [2]

b. Describe how the Arabian leopard can be saved from extinction. (Give two points).

1. _____
2. _____ [2]

c. Suggest one reason why the mark-release- recapture method is not suitable for estimating the population size of Arabian leopards.

_____ [1]

24) **a.** Define the term biological species.

_____

_____

_____ [1]

b. The black rat (*Rattus rattus*) is a species originating in Southeast Asia. It was accidently introduced to Oman. It damages date palm crops, and due to the lack of natural predators, its population continues to grow aggressively.

(i) Why is it important to control the increase in the population size of *Rattus rattus* in Oman? (Give one reason)

_____ [1]

(ii) State three characteristics of black rat cells.

1. _____
2. _____
3. _____ [3]

[End of Examination]

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نموذج إجابة امتحان دبلوم التعليم العام- المدارس ثنائية اللغة

للعام الدراسي: 1447/1446هـ - 2025/2024م

الفصل الدراسي: الثاني - الدور: الثاني

المـادة: الأحيـاء

Note: Answer guide in (5) sheets. Total marks:70

Part 1: Multiple Choice **Each Question: 1 mark** **Total: 14 marks**

Q	Ch	Answer	Page		L.O.	Level of learning
			Cambr	Hodd		
1	6	Reaction: Reduced NAD is produced; Location: Cytoplasm of the cell	314	250	6.2.1	Knowledge
2	6	Substance (**X**): Acetyl group; Substance (**Y**): Oxaloacetate; Substance (**Z**): Citrate	315	251	6.2.4	Application
3	6	Oxidation of triose phosphate molecules to pyruvate.	319-320	257	6.2.2	Application
4	6	The production of ATP is high.	316-318	252-2254	6.2.8	Reasoning
5	7	ATP and reduced NADP.	332	270	7.1.2	Knowledge
6	7	O_2 concentration: low; CO_2 concentration: high	341	283-284	7.4.1	Application
7	7	DCPIP colour: Blue; Reason: Slow release of electrons	343	285-286	7.4.3	Reasoning
8	8	2 and 3	252	211	8.1.4	Knowledge
9	8	C	272	229	8.4.3	Application
10	8	Injected with antibodies against the measles virus.	277	236	8.5.1	Application
11	9	Archaea and Bacteria.	500	417	9.1.4	Knowledge
12	9	Yellow iris	515-516	432-434	9.2.4	Application
13	9	2415	513	435	9.2.4	Application
14	9	A and C	509	430	9.2.1	Reasoning

Part 2: Extended Response **Chapter 6 (15 marks):** *4 Knowledge 8 Application 3 Reasoning*

Q		Answer	Mark	Page Cambr	Page Hodd	I. O.	Level of learning
15	a	Energetic electrons release energy as they pass through the electron transport chain. (**1mark**) The released energy is used to transfer protons across the inner mitochondrial membrane. (**1mark**)	2	316-318	252 - 254	6.2.8	Application
	b	- NAD **or** FAD. (**1mark**) - Chemiosmosis. (**1mark**)	2	316-318	252 - 254	6.2.8	Application
	c	***Any one of the following:*** (**1 mark**) - No oxidation for hydrogen carriers. - Inhibits the splitting of the hydrogen atom into proton (H^+) and electron (e^-). - The electron carriers will stop releasing energy for protons carrier -The active move of protons from the matrix of the mitochondrion into the space between the inner and outer membranes will stop. - Stops the concentration gradient for protons - The protons cannot move passively down their concentration gradient through the ATP synthase No provided energy for ATP synthesis. (**1 mark**)	2	317	252 - 254	6.2.8	Reasoning
16	a	Deprived of oxygen **or** not enough oxygen reaches the muscle **or** conditions become anaerobic.	1	320	259	6.4.1	Knowledge
	b	Glucose is converted to <u>lactate</u> so the concentration of lactate will increase.	1	320-321	259	6.4.1	Application
	c	Lactate is oxidised **or** converted back to pyruvate **or** stored as glycogen.	1	320-321	260 - 261	6.4.1	Application
17	a	***Any three of the following:*** - The leaves always remain above water. - Aerenchyma tissue in the stems and roots. - The faster growth of stems. - Ethanol fermentation in roots.	3	321-322	261 - 262	6.4.3	Knowledge
	b	**(i)** - Ethanal (**1 mark**) - reduced NAD (**1 mark**)	2	320-321	259	6.4.1	Application
		(ii) The rate of respiration will increase.	1	325	258	6.4.4	Reasoning

Part 2: Extended Response. **Chapter 7 (14 marks)**: *4 Knowledge 7 Application 3 Reasoning*

	Q	Answer	Mark	Page Cambr	Page Hodd	L.O	Level of learning
18	a	- Stroma. (**1 mark**) - Rubisco / ribulose bisphosphate carboxylase**.** (**1 mark**) - light- dependent reaction. (**1 mark**)	3	339	280	7.3.1	Application
	b	***Any two of the following:*** - Lipids. - Amino acids. - Sugars. - Starch.	2	339	280	7.3.2	Application
	c	The CO_2 concentration is increase.	1	339	280	7.3.1	Reasoning
19	a	cyclic phosphorylation: -PSI only; - Photolysis of water does not occur non-cyclic phosphorylation: - PSI and PSII; - Photolysis of water occurs	4	337-338	279	7.2.2 7.2.4	Knowledge
	b	**(i)** - Jar (**1**): The photosynthesis rate will increase until the CO_2 decreases or finishes in the jar. (**1mark**) - Jar (**2**): The photosynthesis rate will stop because there is no CO_2. (**1mark**)	2	341	284	7.4.1	Application
		(ii) No ATP production. (**1mark**) Because the light- dependent reactions do not occur since the jar is covered from the light. (**1mark**)	2	341	284	7.4.1	Reasoning

Part 2: Extended Response. **Chapter 8 (13 marks):** *4 Knowledge 6 Application 3 Reasoning*

Q		Answer	Mark	Page		L.O	Level of learning
				Cambr	Hodd		
20	a	- T-helper cells. (**1mark**) - T-killer cells. (**1mark**)	2	275	230	8.4.2	Knowledge
	b	- (**C**): attach to the infected cell and secrete toxic substances to kill the body cell and pathogens inside **OR** destroy the infected cell. (**1mark**) - (**D**): Secreted antibodies. (**1mark**) - (**E**): Makes an early and effective response in the event of a re-infection of the body by the same antigen. (**1mark**)	3	271/ 276	229	8.4.2	Application
	c	Antigen presentation or exposing antigens on the surface of host cells/macrophages	1	275	228	8.4.2	Application
	d	The two types of lymphocytes will not be activated and therefore the primary immune response will not occur.	1	276	229	8.4.2	Reasoning
21	a	***Any two of the following***: - Enhances Herd immunity, which means vaccinating a large percentage of the population, which makes it difficult for the pathogen to be transmitted to those who have not been vaccinated or are susceptible to infection. - Vaccination programs work to ensure permanent coverage of 100% even if these diseases do not exist in the country. - Vaccination programs work to prevent the spread of diseases in what is called ring immunity, by vaccinating all the contacts of the infected person to prevent the transmission of the disease in the actual area. - Some vaccination programs for some diseases such as measles recommend taking booster doses to stimulate the secondary immune response that increases the number of memory cells.	2	279-280	237	8.5.3	Knowledge
	b	-Artificial active immunity **(1 mark)** -Because the injection of rabbits with antigens (such as those attached to killed or weakened pathogens). **(1 mark)**	2	277	236	8.5.1	Application
	c	- (**2**): The rabbit acquired immunity to tetanus when injected with tetanus toxoid. - (**3**): The rabbit acquired immunity to tetanus, but not to diphtheria	2	279	236	8.5.1 - 8.5.2	Reasoning

Part 2: Extended Response. Chapter 9 (14 marks): *5 Knowledge 7 Application 2 Reasoning*

Q		Answer	Mark	Page		L.O.	Level of learning
				Cambr	Hodd		
22	a	Two species.	1	497	416	9.1.1	Application
	b	Species diversity **or** ecosystem diversity.	1	508-509	429-430	9.2.1	Reasoning
	c	- Order. (**1 mark**) - Family. (**1 mark**)	2	498	420	9.1.2	Knowledge
23	a	***Any two of the following:*** -Climate change. -Competition. -Hunting by humans. -Degradation and loss of habitats.	2	521	440-445	9.3.1	Knowledge
	b	Conserved in zoos (**1 mark**) and they have had success with captive breeding programmes. (**1 mark**)	2	525	448	9.4.1	Application
	c	***Any one of the following:*** -Small sample. -Difficult to catch.	1	513	435	9.2.4	Reasoning
24	a	A group of organisms with similar morphology (structurally) and physiology (biochemically), which can breed together to produce fertile offspring and are reproductively isolated from other species (do not interbreed with members of other species).	1	497	416	9.1.1	Knowledge
	b	**(i)** Its presence leads to the decline of native species or native species become endangered **or** it decreases the genetic diversity **or** it transfers diseases.	1	530	451-452	9.4.3	Application
		(ii) ***Any three of the following:*** - Cells are eukaryotic with a distinct nucleus and membrane –bound organelles. - Cells don't have cell walls. - Cells don't have chloroplasts. - Cell vacuoles are small and temporary. - Some specialized cells have cilia or flagella.	3	504	424	9.1.5	Application

[END OF THE MARKING GIUDE]