Biology Multiple Choice

for HKDSE

(Supplement to Book 1-1st Edition)

Supplement to Book 1-1st Edition

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CONTENTS

Chapter 1 Molecules of life

A) The following questions are removed from Chapter 1 of the previous edition:

1.6 1.7 1.15 1.24 1.25 1.26 1.27 1.31
1.33 to 1.41 1.43 1.64 1.76 1.78 1.81 1.98
1.100 1.102

These removed questions are chiefly related with the following topics:

1. The molecular structure of carbohydrates. The different forms of carbohydrates.
2. Biuret test for proteins (Replaced by Albustix paper test)

B) The questions below are added to Chapter 1.

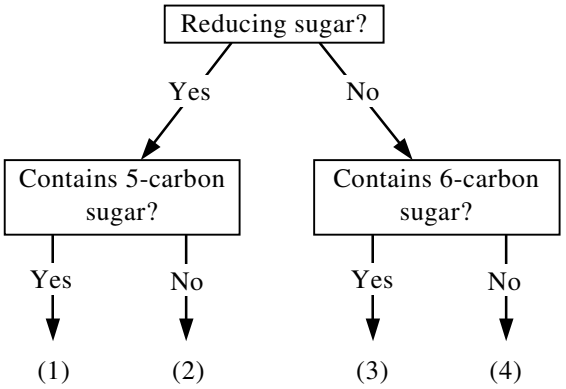
1.1 Which of the following carbohydrates can be made in animal cells?

(1) lactose (2) cellulose (3) glycogen

A. (1) and (2) only **B.** (2) and (3) only
C. (1) and (3) only **D.** (1), (2) and (3)

1.2 The diagram on the right is a key to four kinds of sugars. Which of them is sucrose?

A. (1)
B. (2)
C. (3)
D. (4)



1.3 Glycosidic bonds are the kind of bonds that link up sugar units. Which of the following carbohydrates does **not** contain glycosidic bond?

A. maltose **B.** fructose **C.** glycogen **D.** cellulose

1.4 Of the following polysaccharides, which is(are) made up of β-glucose units?

(1) cellulose (2) glycogen (3) starch

A. (1) only
B. (2) and (3) only
C. (1) and (3) only
D. (1), (2) and (3)

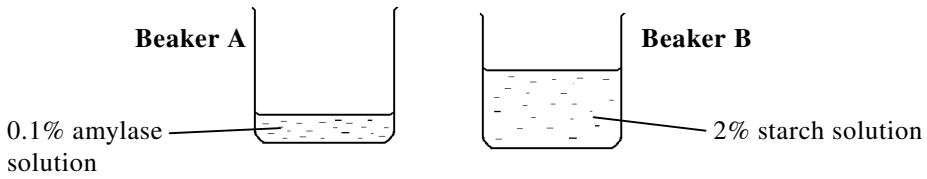
1.5 A liquid contains protease, maltose and starch. Which test on the liquid would yield a negative result?

A. Benedict's test
B. Albustix paper
C. iodine test
D. emulsion test

1.6 Which of the following describes the emulsion test for the presence of fat in a food?

A. Add ethanol to the food and then shake lightly.
B. Add water to the food, shake lightly and then add ethanol.
C. Add ethanol to the food, shake lightly and then add water.
D. Add water to the food, then add ethanol and shake lightly.

Directions: The diagram below shows two beakers containing two kinds of liquids. Answer **Questions 1.7** and **1.8** with reference to the diagram.



1.7 The liquid in beaker A is added to beaker B. Which of the following are the expected results when the mixture is immediately tested with the food tests indicated below?

Key: **–** : negative result **+** : positive result

	Benedict's test	Albustix paper	Iodine test
A.	+	+	–
B.	–	+	+
C.	+	–	–
D.	–	–	+

1.8 After the reaction in the mixture has completed, the liquid is again tested with the food tests. Which of the following are the expected results?

Key: **–** : negative result **+** : positive result

	Benedict's test	Albustix paper	Iodine test
A.	–	–	–
B.	–	–	+
C.	+	+	–
D.	+	–	–

1.9 A substance produced a blue-green colour on Albustix paper test. This test indicated the presence of which of the following types of bonds in the substance?

A. hydrogen **B.** ionic **C.** covalent **D.** peptide

1.10 Four food samples received three food tests as shown in the table below.

Which results confirmed that the sample contained sucrose and protein?

Sample	Albustix paper test	Benedict's test	Acid hydrolysis and then Benedict's test
A.	yellow colour	blue colour	red precipitate
B.	blue-green colour	red precipitate	red precipitate
C.	blue-green colour	blue colour	red precipitate
D.	yellow colour	red precipitate	red precipitate

1.11 Four different samples of fruit juices, (1), (2), (3) and (4), were each divided into two portions. The first portions were each tested with Benedict's solution. The second portions were each hydrolysed and then tested with Benedict's solution. The table below shows the mass of precipitates formed in each portion in each sample.

Sample	Mass of precipitate in the first portion (mg)	Mass of precipitate in the second portion (mg)
(1)	40	60
(2)	120	120
(3)	80	100
(4)	60	80

Of all the sugars in the fruit juices, which sample contained the highest proportion of non-reducing sugar?

A. (1) **B.** (2) **C.** (3) **D.** (4)

Chapter 2 Cellular organisation

Question 2.16 is cancelled from Chapter 2 and the questions below are added.

2.1 Which of the following statements about cytoplasm is **incorrect**?

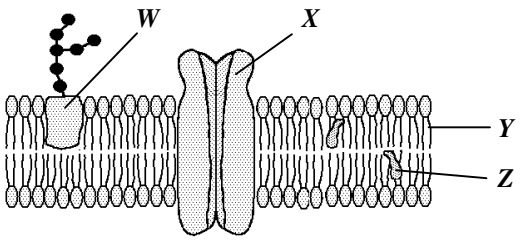
A. It contains nucleic acids.
B. It protects the nucleus.
C. It is composed of mostly water.
D. It is the site where proteins are synthesised.

2.2 Which of the following can be the functions of membrane proteins?

(1) as antigens for cell recognition (2) as enzymes for cellular metabolism
(3) as barriers preventing some substances to pass through

A. (1) and (2) only **B.** (1) and (3) only
C. (2) and (3) only **D.** (1), (2) and (3)

Directions: Questions 2.3 and 2.4 refer to the diagram on the right, which shows some components of the cell membrane.



2.3 Which part prevents the free movement of ions through the membrane?

A. *W* **B.** *X*
C. *Y* **D.** *Z*

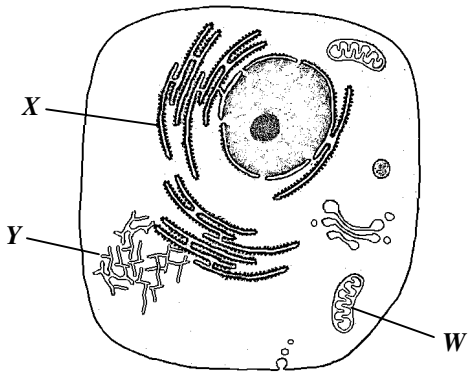
2.4 Which labelled structures in the diagram enables a hormone to recognise its target cell?

A. *W* **B.** *X* **C.** *Y* **D.** *Z*

2.5 The drawing on the right shows the ultrastructures of an animal cell. W, X and Y are organelles.

Which of the three organelles are particularly abundant in cells that secrete enzymes?

A. W and X only
B. X and Y only
C. W and Y only
D. W, X and Y



2.6 Which of the following types of human cells contains the highest density of mitochondria?

A. the cells on the epidermis of the skin
B. the cells on the inner wall of the small intestine
C. the cells on the wall of the air sacs at the lung
D. the cells on the wall of the blood capillaries

2.7 Which of the following human cells has the least amount of mitochondria?

A. egg cell
B. red blood cell
C. white blood cell
D. nerve cell

Directions: Questions 2.8 to 2.11 refer to the table below, which shows the relative amounts of three types of organelles in four types of cells.

Cell type	Relative amount of the organelle		
	Endoplasmic reticulum	Mitochondrion	Chloroplast
P	+	+	+++
Q	+	+++++	–
R	++++	+++	–
S	+	+	–

Key: More "+" means greater amount; "–" indicates none.

2.8 Which type of cell is most likely the cell found in the blood capillary wall?

A. P
B. Q
C. R
D. S

2.9 Which type of cell is expected to secrete the greatest amount of enzymes?

A. P **B.** Q
C. R **D.** S

2.10 Of these four types of cell, which type(s) consume(s) oxygen in the process of respiration?

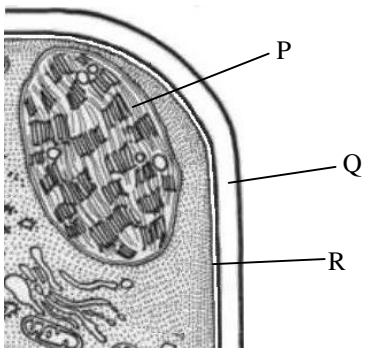
A. Q only **B.** Q and R only
C. Q, R and S only **D.** All of them

2.11 Of these three types of organelles, which type(s) convert(s) ADP to ATP?

A. mitochondrion only
B. mitochondrion and endoplasmic reticulum only
C. mitochondrion and chloroplast only
D. All of them

2.12 The diagram on the right is a drawing of an electronmicrograph on part of a cell. Of the labelled structures, which enable(s) this cell to be identified as eukaryotic?

A. P only
B. P and Q only
C. P and R only
D. P, Q and R



2.13 Which of the following comparisons of prokaryotic cells and eukaryotic cells is(are) true?

(1) Both groups have DNA as the genetic materials.
(2) Both have mitochondria for cellular respiration.
(3) All cells in these two groups have cell wall for protection.

A. (1) only **B.** (1) and (2) only
C. (2) and (3) only **D.** (1), (2) and (3)

2.14 Two membranes are 800 nm apart when seen under a light microscope with an objective lens of power 100x.

How far are the two membranes apart when the objective lens is changed to a power of 400x?

A. 2 µm **B.** 200 nm **C.** 800 nm **D.** 3200 nm

2.15 Which of the following structures are visible in a suitably stained non-dividing plant cell using a light microscope of magnification 600x?

(1) chromosome (2) starch grain
(3) mitochondrion

A. (2) only **B.** (1) and (2) only
C. (1) and (3) only **D.** (2) and (3) only

2.16 On using the high power of a microscope, we usually focus on the specimen first with a low power objective before switching to the high power objective. The low power is used first because under low power,

(1) the view is brighter. (2) the field of view is larger.
(3) focusing is easier.

A. (1) and (2) only **B.** (1) and (3) only
C. (2) and (3) only **D.** (1), (2) and (3)

2.17 A student focused on a leaf epidermis with a microscope and obtained the view as that in Diagram 1.

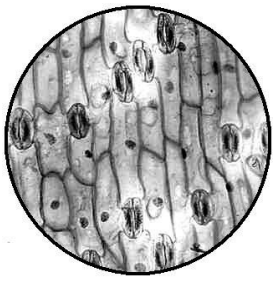


Diagram 1

Diagram 2

In order to obtain the view as that in Diagram 2, which of the following steps are necessary?

(1) Turning the nosepiece (2) Turning the fine adjustment knob
(3) Adjusting the iris diaphragm and condenser

A. (1) and (2) only **B.** (1) and (3) only
C. (2) and (3) only **D.** (1), (2) and (3)

2.18 Which of the following factors limits the resolution of the light microscope?

A. the wavelength of the visible light
B. the maximum curvature of glass lenses
C. the transparency of glass to light
D. the refractive ability of glass

2.19 Some plant cells were seen under an electron microscope of magnification 1500x. The same type of plant cells was then seen under light microscope with a 15x eyepiece lens and a 100x objective lens.

Which microscope can give better details of the image and what is the reason for the difference?

	Which microscope gives better details?	**Reason**
A.	electron microscope	Electron beams can give a brighter image.
B.	electron microscope	Electron microscope can achieve a higher resolution.
C.	light microscope	There is no electronic interference.
D.	light microscope	The image is viewed directly by the eyes.

Chapter 3 Movement of substances across a membrane

The questions below are added to Chapter 3.

(In this revised edition, L replaces dm^3.)

3.1 Which of the following processes enable movement of substances both in and out of a cell through the cell membrane?

(1) active transport (2) facilitated diffusion (3) osmosis

A. (1) only
B. (1) and (2) only
C. (2) and (3) only
D. (1), (2) and (3)

3.2 Some cells on the stomach wall produce enzymes. Which of the following about the release of the enzymes is correct?

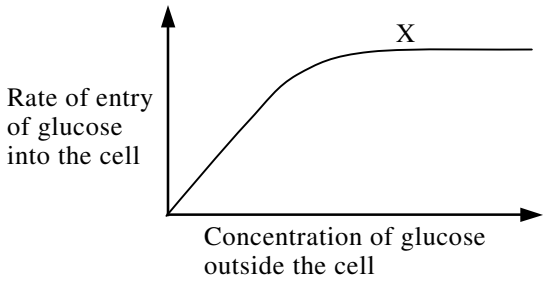
	The process releasing the enzymes	Whether ATP needed
A.	endocytosis	yes
B.	endocytosis	no
C.	exocytosis	yes
D.	exocytosis	no

3.3 The rate of diffusion of a molecule is affected by which of the following factors?

(1) size of the molecule
(2) concentration gradient
(3) temperature

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

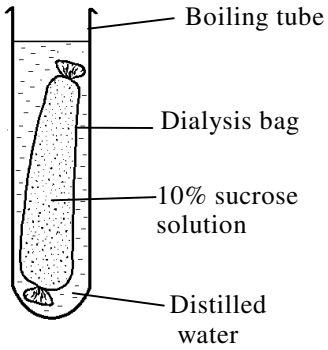
3.4 The graph below shows the change in the rate of entry of glucose into a cell when the concentration of glucose outside the cell increases.



Which of the following is the reason for the plateau at X?

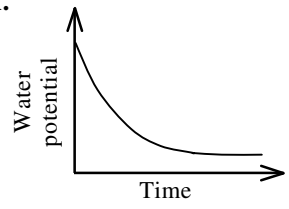
A. The glucose concentration inside the cell is the same as that outside.
B. All ATP in the cell has been used up.
C. All carrier proteins for glucose are saturated.
D. The drop of water potential slows down cellular activities.

3.5 The diagram on the right shows an experiment with a dialysis bag, which is formed from a dialysis tubing with knobs at both ends.

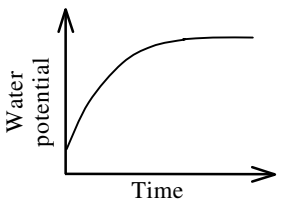


Which of the following graphs is most likely the one showing the change of water potential in the dialysis bag?

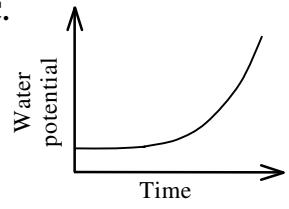
A.



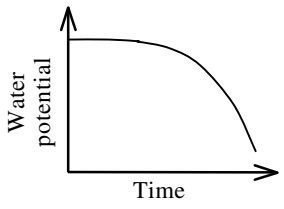
B.



C.



D.

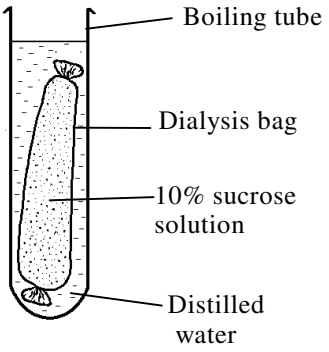


3.6 Two apples were picked from a tree. One apple was cut and a piece of flesh was weighed and then immersed in 5% sucrose solution. The flesh gained 5% in mass after four hours in the solution. This procedure was repeated with the other apple after it had been stored for one week. The flesh gained 9% in mass. (Assume the two apples were identical when freshly picked.)

Which of the following were the change of water potential and the mostly likely reason for the change in the apple after storage?

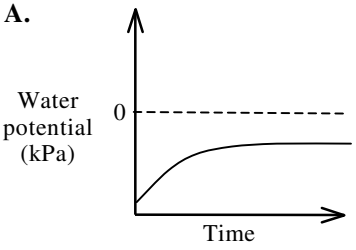
	Water potential of the apple flesh after storage	***Reason***
A.	decreases	The starch content in the apple decreased during storage
B.	decreases	The sugar content in the apple increased during storage.
C.	increases	The apple lost water due to evaporation during storage.
D.	increases	The hydrolysis of starch reduced the water in the apple.

3.7 The diagram on the right shows an experiment in which a 10% sucrose solution was contained in a dialysis bag formed from a dialysis tubing with knobs at both ends. The dialysis bag was immersed in distilled water, which has a water potential of 0 kPa.

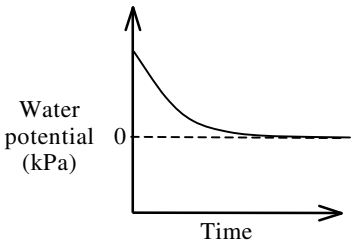


Which of the following graphs is most likely the one showing the change of water potential in the dialysis bag?

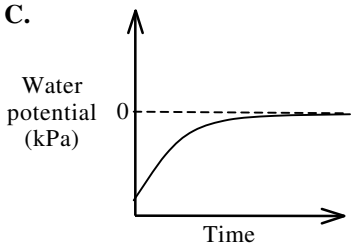
A.



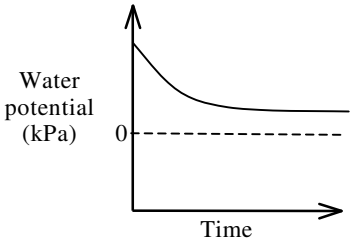
B.



C.



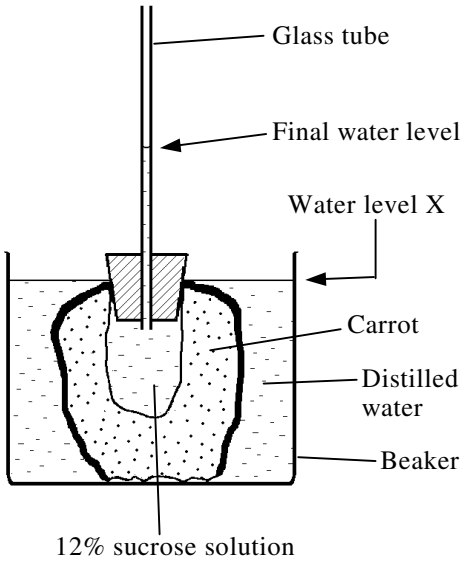
D.



Directions: Questions 3.8 to 3.10 refer to the diagram on the right, which shows the sectional view on the setup of an experiment on osmosis.

In this experiment, the base of an unpeeled carrot was cut and a cavity was scooped at the centre. A glass tube was inserted into the cavity through a stopper as shown in the diagram. The cavity in the carrot was filled with 12% sucrose solution. There was no leakage at the connections. After the set-up procedure, the water level in the glass tube rose.

(Assume water level X did not change during the experiment.)

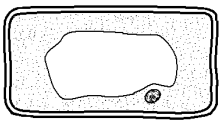


3.8 Which of the following change on the setup can lead to a higher final water level in the glass tube?

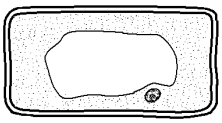
(1) Replacing the 12% sucrose solution with a 20% sucrose solution.
(2) Using a narrower glass tube.
(3) Removing also the skin of the carrot instead of just cutting the base.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

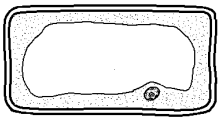
3.9 The diagram on the right shows the appearance of a cell in contact with the distilled water in the beaker at the start of the experiment. Which of the following should be the appearance of the cell at the end of the experiment?



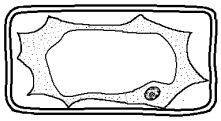
A.



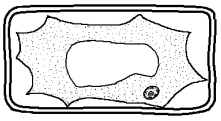
B.



C.



D.



3.10 The experiment was repeated with a larger beaker but with water level X kept at the same level. Which of the following results can be expected in the glass tube on comparing with the result when using a small beaker?

	The speed of rising of the water level	Final water level
A.	faster	higher
B.	faster	the same
C.	the same	the same
D.	slower	higher

Directions: Question 3.11 and 3.12 refer to an experiment in which three fresh strips cut from the same potato are immersed separately in three sucrose solutions, X, Y and Z, of three different concentrations. The ratios of the initial mass to final mass of the strips are recorded in the table below.

	Solution X	Solution Y	Solution Z
Ratio of initial mass to final mass	0.8	1.4	1.2

3.11 Which of the following can be deduced from the result?

A. There is a net movement of water from the potato strip to solution Z.

B. There is a net movement of water from solution Y into the potato strip.

C. The original water potential of the potato strip is higher than that of solution X.

D. Solution Z has a higher sucrose concentration than solution Y.

3.12 In this experiment, what is the reason of expressing the dependent variable as the ratio of initial mass to final mass instead of as the absolute change in mass?

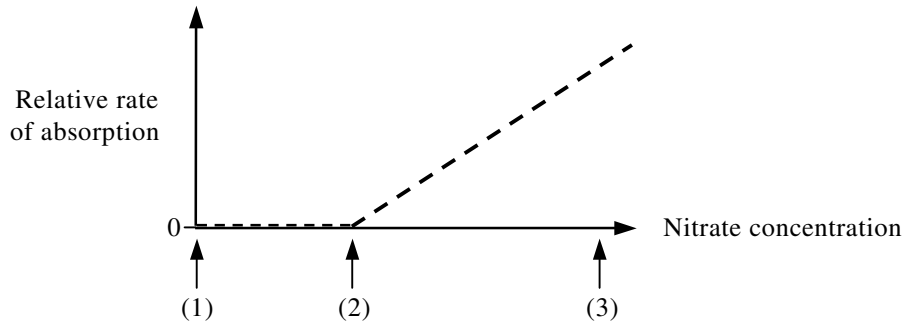
A. The potato strips may have different length.

B. The potato strips may have different initial mass.

C. The potato strips have different final mass.

D. The potato strips show different degrees of change in different solutions.

3.13 The graph below shows the rate of absorption of nitrate by a cell when it is immersed in solutions of increasing nitrate concentration.



Which of the following can be deduced from the graph?

A. From (1) to (2), the cell absorbs nitrate by active transport.

B. From (1) to (3), the cell absorbs nitrate by diffusion and by active transport.

C. From (2) to (3), the cell absorbs nitrate by diffusion.

D. From (2) to (3), the cell absorbs nitrate by active transport.

3.14 The following processes move substances across cell membranes. Which of them result(s) in an equilibrium?

(1) active transport (2) diffusion (3) facilitated diffusion

A. (1) only **B.** (2) only

C. (2) and (3) only **D.** (1), (2) and (3)

Chapter 4 Enzymes

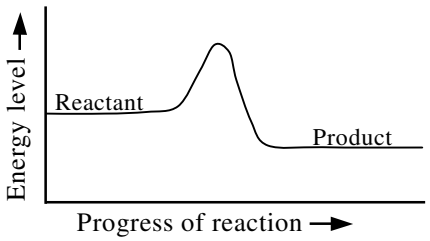
A) The following questions are removed from Chapter 4 of the previous edition:

4.56 and 4.57 4.59 to 4.62

These questions are chiefly related with the mechanisms competitive and non-competitive inhibitors.

B) The questions below are added to Chapter 4.

Directions: Question 4.1 and 4.2 refer to the graph on the right, which shows the change of energy level in a reaction catalysed by enzyme.



4.1 What type of reaction is shown in the graph?

A. a catabolic reaction that releases energy

B. a catabolic reaction that absorbs energy

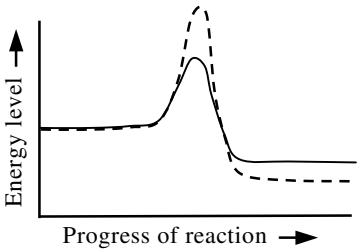
C. an anabolic reaction that releases energy

D. an anabolic reaction that absorbs energy

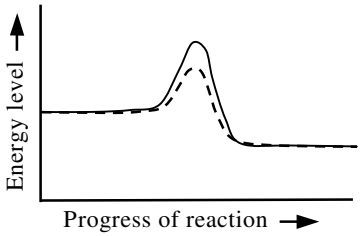
4.2 Which of the following curves represents the change of energy level when the reaction proceeds without the enzyme?

key: ——— with the enzyme ------- without the enzyme

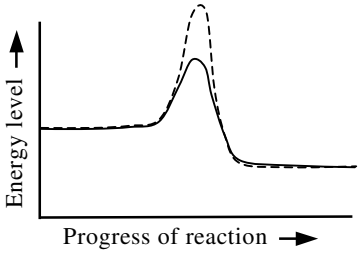
A.



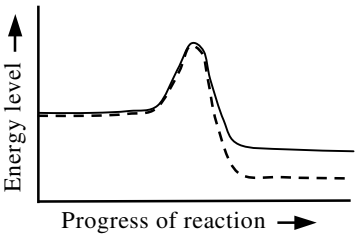
B.



C.

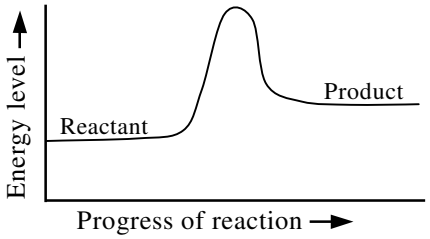


D.



4.3 The graph on the right shows the change of energy level in a reaction catalysed by enzyme. What type of reaction is shown in the graph?

A. a catabolic reaction that releases energy
B. a catabolic reaction that absorbs energy
C. an anabolic reaction that releases energy
D. an anabolic reaction that absorbs energy



Chapter 5 Essential life processes in plants- 1
(Nutrition and gas exchange in plants)

A) Question **5.22** is removed from the original version due to its ambiguity.

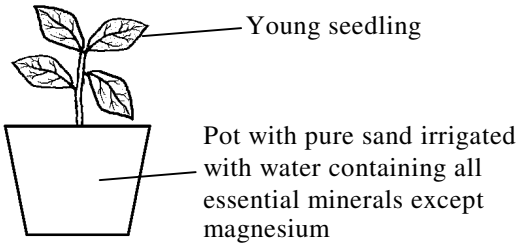
B) The questions below are added to Chapter 5.

5.1 Which of the following elements are normally absorbed by the roots of a plant from the soil?

(1) carbon (2) nitrogen (3) hydrogen

A. (1) and (2) only
B. (2) and (3) only
C. (1) and (3) only
D. (1), (2) and (3)

Directions: Questions **5.2** and **5.3** refer to the diagram on the right, which shows an experiment with potted plants to study the effect of magnesium deficiency on the growth of the seeding.



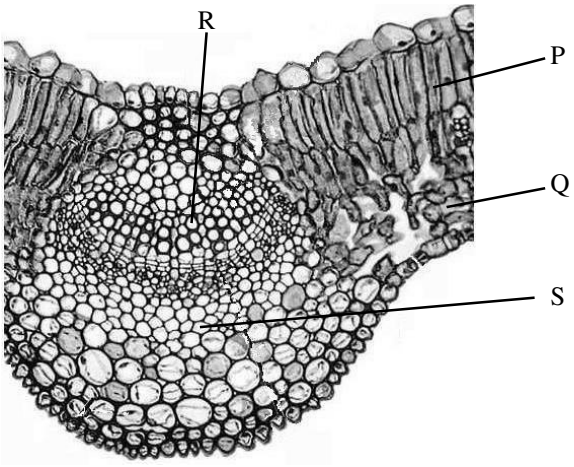
5.2 Young seedlings are used in this experiment instead of mature plants because

A. seedlings have little stored minerals.
B. seedlings are more resistant to diseases caused by fungi.
C. the roots of seedlings can grow faster.
D. seedlings are more tolerant to magnesium deficiency.

5.3 A control set-up is necessary in this experiment. The control should be the same as the experimental set-up except that in the control set-up,

A. the pure sand is replaced with normal fertile soil.
B. the seedlings are omitted.
C. the seedlings are irrigated with distilled water.
D. the seedlings are irrigated with water containing all essential minerals, including magnesium.

Direction: Questions **5.4** to **5.6** refer to the photograph on the right, which shows the cross section of part of a leaf at the midrib region.



5.4 Which types of cells shown in the diagram release gas when the leaf is placed under strong light?

A. P and Q only
B. P, Q and S only
C. R and S only
D. P, Q, R and S

5.5 Which types of cells shown in the diagram release gas when the leaf is placed in darkness?

A. P and Q only
B. R and S only
C. P, Q and S only
D. P, Q, R and S

5.6 Which of the following carbohydrate(s) can possibly be found in cell type P?

(1) glucose (2) starch (3) glycogen

A. (1) only
B. (2) only
C. (1) and (2) only
D. (1), (2) and (3)

5.7 Glucose is formed in photosynthesis. This glucose is required for the formation of which of the following substances?

(1) starch
(2) cellulose
(3) protein
(4) fat

A. (1) and (2) only
B. (1), (3) and (4) only
C. (1), (2) and (3) only
D. (1), (2), (3) and (4)

5.8 Which of the following is(are) the use(s) of the glucose formed in photosynthesis?

(1) to synthesise cellulose to be used as storage material
(2) to synthesise proteins to be a component of cell membrane
(3) to synthesise lipid to be a component of cell membrane

A. (1) only
B. (3) only
C. (2) and (3) only
D. (1), (2) and (3)

5.9 Which of the following are the significance of photosynthesis to plants?

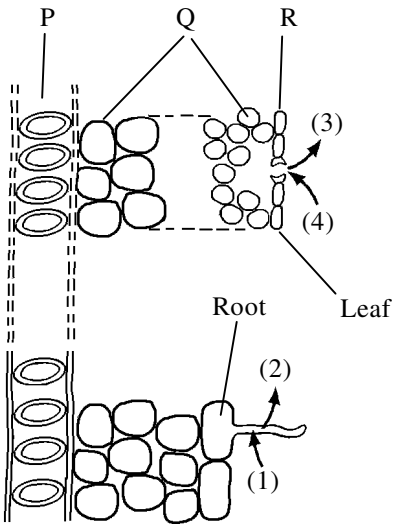
(1) Different carbohydrates can be synthesized from the photosynthetic products.

(2) Water is consumed to create transpiration pull.

(3) Fats can be formed from the photosynthetic products.

A. (1) and (2) only
B. (2) and (3) only
C. (1) and (3) only
D. (1), (2) and (3)

Directions: Questions **5.10** to **5.12** refer to the diagram on the right, which is a schematic drawing on the root, stem and leaf of a plant. (1), (2), (3) and (4) represent the movement of gases



5.10 Of the movements of gases labelled (2), (3) and (4), which represent(s) the diffusion of carbon dioxide at daytime with bright sunlight?

A. (3) only
B. (4) only
C. (2) and (3) only
D. (2) and (4) only

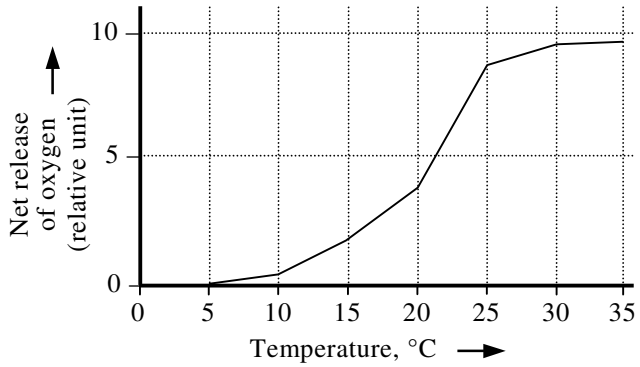
5.11 Of the movements of gases represented by (1), (3) and (4), which show(s) the direction of oxygen diffusion at midnight?

A. (1) only
B. (4) only
C. (1) and (3) only
D. (1) and (4) only

5.12 Of the cell types labelled P, Q and R, which has(have) the function of supporting the plant?

A. P only
B. Q only
C. P and Q only
D. P, Q and R

5.13 The following graph shows the net release of oxygen from a leaf of a plant from 5°C to 35°C.



With respect to the photosynthesis in this leaf, which of the following can be deduced from the graph?

(1) Photosynthesis still occurs at 5°C.

(2) The highest rate of photosynthesis occurs at a temperature from 20°C to 25°C.

(3) The photosynthetic rate will drop when the temperature rises above 35°C.

A. (1) only

B. (3) only

C. (2) and (3) only

D. (1) and (3) only

Chapter 6 Essential life processes in plants- 2
(Transpiration, transport and support in plants)

A) The following questions are removed from Chapter 6 of the previous edition:
6.72 to **6.74** (symplast and apoplast not required.)
6.119 and **6.120** (mass flow hypothesis not required.)

B) The questions below are added to Chapter 6.

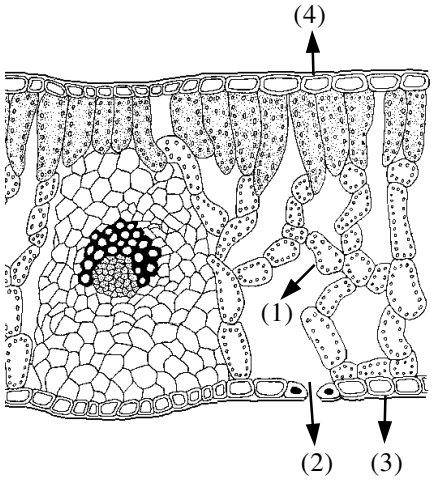
6.1 Which of the following structures are required for transpiration pull to develop in a plant?

(1) leaves (2) a complete root system (3) xylem vessels

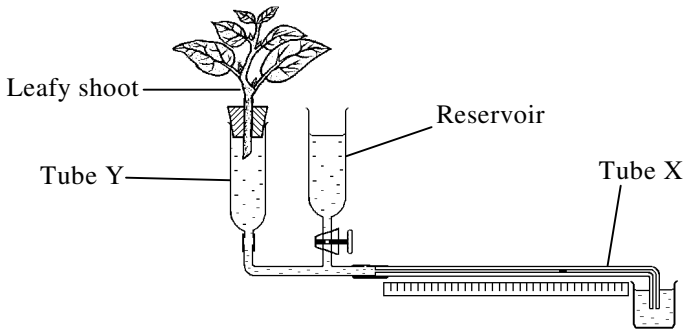
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

6.2 The drawing on the right is a transverse section on part of a leaf. Where does most water evaporate from the leaf during a hot sunny afternoon?

A. (1)
B. (2)
C. (3)
D. (4)



6.3 The following diagram shows a potometer used for measuring the transpiration rate of the leafy shoot.



Which of the following alteration on the potometer can increase the accuracy of the measurement?

(1) using a narrower tube for tube X

(2) adding an oil layer on the water in the reservoir

(3) using a bigger tube for tube Y

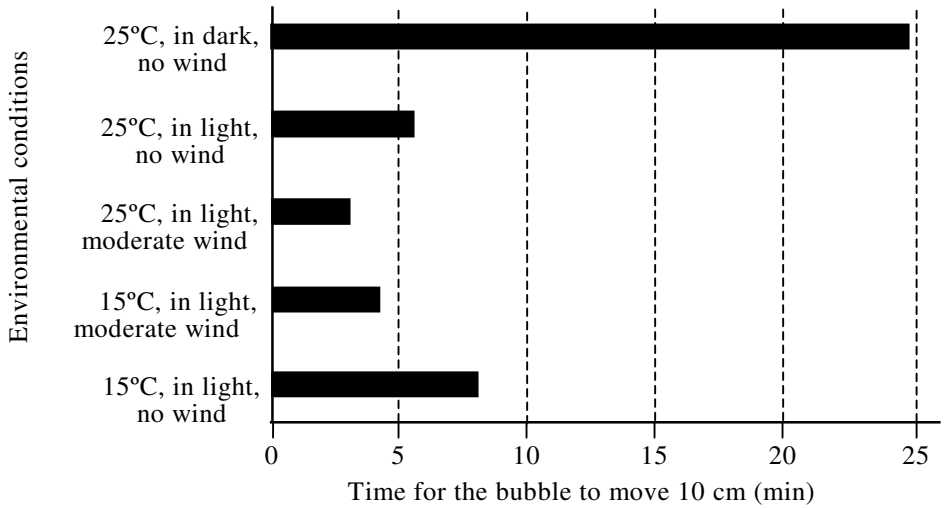
A. (1) only

B. (2) and (3) only

C. (1) and (3) only

D. (1), (2) and (3)

6.4 The rates of transpiration of a leafy shoot under different environmental conditions were measured by using the potometer shown in Question 6.3. The environmental conditions and the time taken for the bubble to travel 10 cm are shown in the bar chart below.



Which of the following treatments on the leafy shoot would result in the greatest drop of transpiration rate in the leafy shoot?

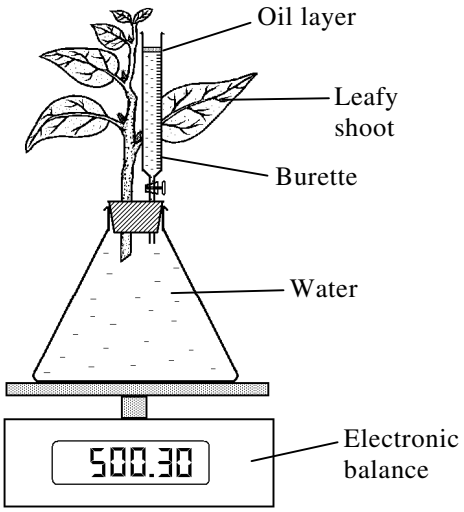
A. changing the temperature from 25ºC to 15ºC

B. changing no wind to moderate wind

C. changing moderate wind to no wind

D. changing from light to dark

6.5 A student performed an experiment with the potometer shown in the diagram. In part 1 of the experiment, he recorded the changes in mass shown in the balance and in the volume of water shown in the burette in a period of 2 hours. In part 2 of the experiment, he repeated the experiment with the same apparatus under the same environment conditions but with the lower surface of all leaves smeared with vaseline. The result is shown in the following table.



Treatment	Change in the reading on the balance (g)	Change in the reading on the burette (mL)
(1) No vaseline on the leaves	**p**	**q**
(2) Vaseline smeared on the lower surface of all leaves	**x**	**y**

(mass of 1 mL of water = 1 g)

From the result, it can be deduced that in the 2 hours of experiment, the amount of water

A. transpired from the upper surface of the leaves was (**p – x**) g.

B. transpired from the lower surface of the leaves was (**y – x**) g.

C. retained by the shoot in treatment (2) was (**x – y**) g.

D. retained in the shoot in treatment (1) was (**q – p**) g.

6.6 In the investigation shown in Question **6.5**, the end of the leafy shoot has to be cut under water immediately after the shoot is cut from the parent plant. The purpose of cutting under water is

A. To prevent air bubbles from forming in the xylem vessels.

B. To ensure the cut ends of the xylem vessels are sharp and smooth.

C. To prevent the drying of the cut end.

D. To prevent the loss of water through the cut end.

6.7 The following table shows the densities of stomata on the upper and lower surfaces of the leaves taken from four types of plants.

Plant	Density of stomata (number / cm^3)	
	Lower surface of the leaf	Upper surface of the leaf
(1)	26 000	3 000
(2)	24 000	7 000
(3)	18 000	8 000
(4)	2 500	0

Judging from these figures, which plant most likely will wilt first when transferred to a very dry environment?

A. (1) **B.** (2) **C.** (3) **D.** (4)

6.8 Which of the following is(are) adaptation(s) of the root hair cells for water absorption?

(1) with a permeable surface
(2) with the ability to absorb water by active transport
(3) with many branches

A. (1) only
B. (2) only
C. (2) and (3) only
D. (1), (2) and (3)

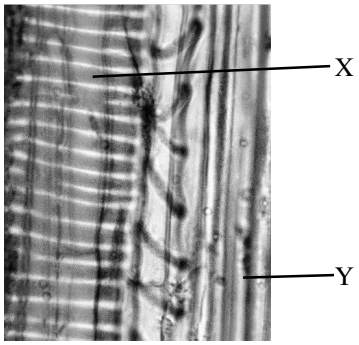
6.9 Cyanide is a chemical that inhibits cellular respiration. When cyanide is present in soil water, the root would absorb less water because

A. the cyanide inhibits also photosynthesis.
B. the root absorbs less mineral salts.
C. cyanide ions block the protein channels.
D. water cannot be absorbed by active transport.

6.10 Which of the following is the main factor that causes water to rise in a tree?

A. The absorption of water at the roots.
B. The root pressure at the roots.
C. The loss of water at the leaves.
D. The metabolic activities at the xylem vessels.

6.11 The diagram on the right shows the longitudinal section of the structures in the vascular bundle of a plant.



Which of the following is a correct comparison between structure X and structure Y?

	Structure X	Structure Y
A.	It is responsible for transport.	It is responsible for storage.
B.	It has no respiration.	It carries out respiration.
C.	It has a thick cell wall.	It has no cell wall.
D.	It can generate force to move water upward.	It can generate force to move sugar downward.

6.12 Sucrose is the form of sugar transported in the phloem. What is the reason for transporting sucrose instead of glucose?

A. Sucrose is a non-reducing sugar and so is less reactive than glucose.

B. Sucrose is a larger molecule and so the same volume of water contains more sucrose.

C. Sucrose is a larger molecule and so active transport is more effective.

D. Sucrose is a disaccharide and so can be converted to starch for storage more easily.

6.13 Which of the following plant cells do **not** contain a nucleus?

(1) sieve tubes
(2) companion cells
(3) xylem vessels

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1) (2) and (3)

Chapter 7 Energetics - photosynthesis and respiration

A) The following questions are removed from Chapter 7 of the previous edition:
7.59 7.60 7.61 7.104 7.114 7.125 7.132

B) The questions below are added to Chapter 7.

7.1 Which of the following descriptions on photosynthesis are true?

(1) High energy electrons are released from activated chlorophyll.
(2) Carbon dioxide is regenerated to be used in Calvin cycle.
(3) The hydrogen from the photolysis of water is used in the formation of NADPH.

A. (1) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

7.2 Which of the following are produced in the light-dependent stage of photosynthesis?

(1) NADPH (2) oxygen (3) ATP

A. (1) and (2) only
B. (2) and (3) only
C. (1) and (3) only
D. (1), (2) and (3)

7.3 The following are three successive steps in Calvin cycle.

(1) Carbon dioxide acceptors combine with carbon dioxide to produce the first 3-C compounds.
(2) These 3-C compounds are converted in a series of steps to glucose.
(3) The carbon dioxide acceptors are regenerated.

Which of these processes require the energy from ATP?

A. (1) and (2) only
B. (2) and (3) only
C. (1) and (3) only
D. (1), (2) and (3)

7.4 The following reactions occur in photosynthesis.

(1) NADP is converted to NADPH.

(2) Carbon dioxide acceptors are regenerated.

(3) Oxygen is released.

Which of these reactions occur(s) in the light-dependent stage and the product(s) is(are) required in the subsequent carbon fixation?

A. (1) only

B. (1) and (2) only

C. (1) and (3) only

D. (1), (2) and (3)

7.5 Which of the following occurs in Calvin cycle?

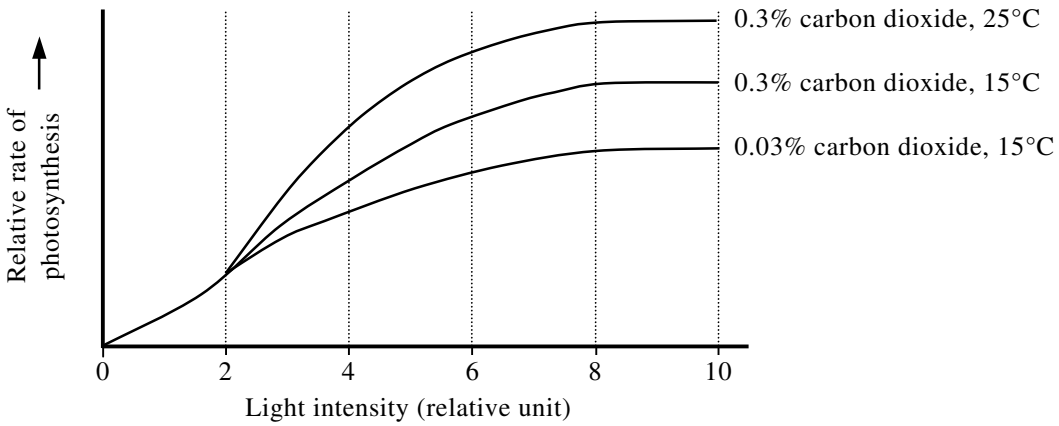
A. NADPH is converted to NADP.

B. Carbon dioxide is regenerated.

C. Oxygen is released.

D. One 3-carbon sugar combines with three CO_2 to form one 6-carbon sugar.

7.6 The graph below shows the rate of photosynthesis of a plant at different carbon dioxide concentration and temperature when the light intensity increases.



With respect to the rate of photosynthesis of the plant, which of the following can be deduced from the graph?

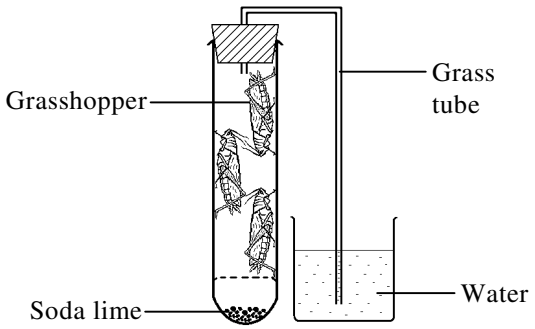
A. At 8 units of light intensity, light intensity is limiting the rate of photosynthesis.

B. At 8 units of light intensity and 0.03% carbon dioxide, temperature is limiting the rate of photosynthesis.

C. At 8 units of light intensity, 0.3% carbon dioxide and 25°C, carbon dioxide is limiting the rate of photosynthesis.

D. At 1 unit of light intensity, light intensity is limiting the rate of photosynthesis.

7.7 The diagram on the right shows a set-up to show the gas exchange of the grasshoppers. After two hours, the water level rose by 2 cm^3 in the grass tube.



Which of the following is the best conclusion from the result?

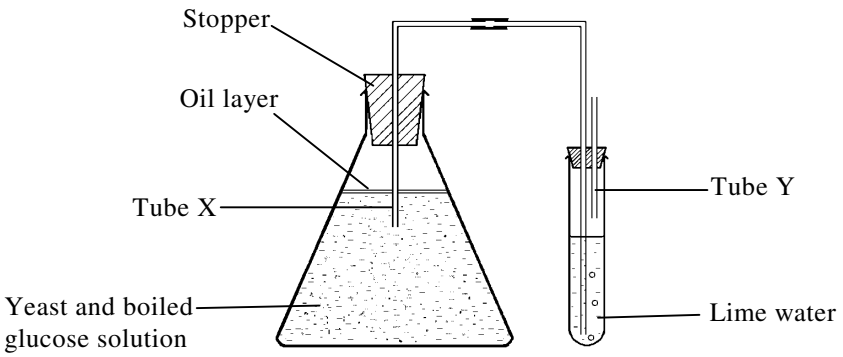
A. The grasshoppers had consumed 2 cm^3 of oxygen.

B. The grasshopper had released 2 cm^3 of carbon dioxide.

C. The volume of oxygen consumed by the grasshopper was the same as the volume of carbon dioxide released.

D. The volume of oxygen consumed by the grasshopper was 2 cm^3 more than the volume of carbon dioxide released.

Directions: Questions **7.8** to **7.10** refer to the following diagram, which shows an experiment used to show that carbon dioxide is released during the anaerobic respiration of yeast.



7.8 Which of the following modifications on the set-up is necessary for the success of the experiment?

A. The end of tube X should be raised above the oil layer.

B. The lower end of tube Y should be lowered into the lime water.

C. The lime water should be replaced by concentrated sodium hydroxide solution.

D. The glucose solution should be replaced by distilled water.

7.9 If the setup shown in the diagram is not modified, the glucose solution would rise in tube X. This is mainly due to the release of

A. water. **B.** carbon dioxide. **C.** heat. **D.** ethanol.

7.10 Which of the following are necessary to keep the yeast under an anaerobic condition?

(1) Add an oil layer on the surface of the solution.
(2) Boil the glucose solution.
(3) Plug the flask with a stopper.

A. (1) only
B. (1) and (2) only
C. (2) and (3) only
D. (1), (2) and (3)

7.11 Which of the following comparisons on alcoholic fermentation and lactic acid fermentation is correct?

	Alcoholic fermentation	*Lactic acid fermentation*
(1)	produces carbon dioxide	does not produce carbon dioxide
(2)	produces less ATP	produces more ATP
(3)	occurs in plants only	occurs in animals only

A. (1) only
B. (2) only
C. (2) and (3) only
D. (1) and (3) only

7.12 During respiration, some energy in the substrate is released as heat, and the rest is transferred to ATP and to some by-products. With respect to this energy transfer and release, which of the following comparisons between aerobic and anaerobic respiration are correct?

(1) Aerobic respiration transfers more energy to ATP.
(2) Aerobic respiration transfers more energy to the by-products.
(3) Aerobic respiration releases more heat energy.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

7.13 Which of the following comparisons between the reactions in mitochondrion and the reactions in chloroplast is correct?

	reactions in mitochondria	*reactions in chloroplast*
A.	requires enzymes	does not require enzymes
B.	occurs when oxygen is present	occurs when oxygen is absent
C.	occurs in all living cells	occurs in all living plant cells
D.	occurs in darkness and in light	occurs only in the presence of light

7.14 In cellular respiration, which stage consumes oxygen and which stage releases carbon dioxide?

	Stage that consumes oxygen	*Stage that releases carbon dioxide*
A.	oxidative phosphorylation	glycolysis
B.	glycolysis	Krebs cycle
C.	oxidative phosphorylation	Krebs cycle
D.	Krebs cycle	oxidative phosphorylation

7.15 In which of the following stages is ATP finally produced?

(1) glycolysis (2) Krebs cycle

(3) oxidative phosphorylation

A. (3) only **B.** (2) and (3) only

C. (1) and (3) only **D.** (1), (2) and (3)

7.16 Some plants may survive for a long time in flooded water. Which of the following word equations shows the respiration in the roots of these plants during flooding?

A. glucose ⟶ carbon dioxide + water + ATP

B. glucose ⟶ lactic acid + water + ATP

C. glucose ⟶ ethanol + carbon dioxide + ATP

D. glucose ⟶ pyruvate + carbon dioxide + water + ATP

7.17 Which of the following word equations show(s) the processes occurring in the skeletal muscles of an athlete on a marathon run?

(1) glucose ⟶ lactic acid + ATP

(2) glucose ⟶ carbon dioxide + water + ATP

(3) glucose + oxygen ⟶ carbon dioxide + water + ATP

A. (1) only **B.** (1) and (2) only

C. (1) and (3) only **D.** (1), (2) and (3)

7.18 Which of the following substances are formed in Krebs cycle?

(1) water (2) carbon dioxide (3) NADH

A. (1) and (2) only **B.** (1) and (3) only

C. (2) and (3) only **D.** (1), (2) and (3)

Book 1 - Answer

1 Molecules of life

1.1 C Lactose can be found in milk. Glycogen can be found in liver and muscle.

1.2 C Sucrose is a non-reducing sugar containing six carbon sugars.

1.3 B This kind of bond is found between the units in disaccharides and polysaccharides, but not in monomer. So this question asks you which is a monomer.

1.4 A Only cellulose is composed of β-glucose units.

1.5 D

Option B: Protease is an enzyme. Enzymes are proteins and would give a positive result when tested with Albustix paper.

1.6 C The ethanol first dissolves the fat in food to form a clear solution. When water is added, water combines with ethanol and the fat leaves the solution as numerous droplets, causing the mixture to look milky.

1.7 B Amylase is an enzyme, and enzymes are proteins. The test with Albustix paper should be positive.

1.8 C Enzymes are not changed in a reaction. So the amylase remains there to give a positive result on Albustix paper test.

1.9 D This is a specific test for protein. Peptide is the bond that is present only in protein.

1.10 C

Option B: Reducing sugar is detected in the sample before acid hydrolysis. The red precipitate obtained after acid hydrolysis may be caused by the reducing sugar already present, and not from the reducing sugar derived from sucrose.

1.11 A The mass of precipitate in the second portion represents the total amount of sugars. The difference between the first portion and the second portion represents the amount of non-reducing sugar.

The proportion of non-reducing sugar:

sample (1) = 20/60;

sample (2) = 0/120;

sample (3) = 20 /100;

sample (4) = 20/80.

2 Cellular organisation

2.1 B A similar question in HKCEE considered the cytoplasm has no protective function on the nucleus, probably because it is just a fluid. This is ***controversial*** because the cytoplasm can be a buffer reducing possible damage on the nucleus when the cell moves or collides with other cells.

Option A: mRNA and tRNA are present in cytoplasm. Option D: The ribosomes in the cytoplasm are the site of protein synthesis.

2.2 A Option (3): Some substances with particular properties cannot pass through these protein channels. But the membrane proteins do not actively prevent them from passing through.

2.3 C Ions are polar. They cannot pass through the non-polar phospholipids.

2.4 A ***W*** is a glycoprotein with a special shape that enables it to act as a receptor to a specific hormone.

2.5 A W is a mitochondrion, X is rough ER, and Y is smooth ER.

Enzymes are proteins. X is responsible for the synthesis of proteins. W provides the energy for the synthesis. Y is responsible for the production of steroids and is not involved in the production of enzymes.

2.6 B These cells absorb nutrients by active transport, using the energy released at the mitochondria. The other three types of cells do not have functions that require a large amount of energy.

2.7 B Red blood cells have no organelles.

2.8 D The cells in the capillary wall are thin cells that passively allow substances to pass through. There are no special activities in the cells and so the cells have relative small amount of organelles.

2.9 C Enzymes are proteins. Cell R has the greatest amount of ER, which is responsible for protein synthesis.

2.10 D All living cells consume oxygen in respiration.

2.11 C At the chloroplast during the light-dependent stage, ADP is converted to ATP when the electron transport system is activated by light. This ATP can be used in the subsequent Calvin cycle.

2.12 A P, Q and R are chloroplast, cell wall and cell membrane respectively. Prokaryotes also have cell wall and cell membrane but have no membrane-bound organelles. The presence of a chloroplast indicates that the cell is eukaryotic.

2.13 A

Option (2): Prokaryotic cells have no mitochondria. Option (3): Some eukaryotic cells (e.g., animal cells) have no cell wall.

2.14 C The actual distance should be the same under different magnifications.

2.15 D Chromosomes can be seen only at some stages of cell division. Starch grains are large particles that can always be seen. Suitably stained mitochondrion can be seen although with no details.

2.16 C Option (2): The field is larger so it is easer to find the part to be seen under high power and move it to the centre of the view.

Option (3): After focusing with low power, the focus with high power can usually be obtained by just switching to the high power lens.

Option (1): It is true that the view on low power is brighter, but this does not help in focusing with high power.

2.17 D Option (1): Turning the nosepiece is to switch to a high power objective. Option (2): Only the fine adjustment, not the course adjustment, should be used for focusing under high power. Option (3): higher light intensity is required to yield a bright image under higher magnification.

2.18 A

2.19 B Both microscopes have the same magnification, but the clearness of the image of the light microscope is limited by resolution.

3 Movement of substances across a membrane

3.1 D

3.2 C The formation of vesicles in endocytosis or exocytosis requires energy.

3.3 D

3.4 C Glucose is absorbed by facilitated diffusion through special carrier proteins. At X, all carriers are engaged and so the absorption rate becomes constant.

Option A: The plateau indicates the rate is constant and glucose is still entering the cell at X.

3.5 B The entry of water into the bag raises the water potential inside the bag. The entry is rapid at first, but slows down when the difference of water potential between the two sides of the bag narrows.

3.6 B

Option A: Starch has virtually no effect on water potential.

3.7 C The curves finally flatten off, showing that equilibrium has been reached. At equilibrium, the water potential inside the bag should be equal to that of the distilled water outside, which is 0 kPa.

Although the liquid inside the bag still contains sucrose that lowers the water potential, hydrostatic pressure will gradually build up to raise the water potential to 0.

3.8 A The final water level depends on the hydrostatic force created by osmosis, and this in turn depends on the difference in the water potentials between the liquids in the cavity and the liquid in the beaker.

Removing the skin causes the water level to rise faster, but the final level will be the same.

3.9 B The cell should absorb water when it is in contact with the distilled water.

3.10 C The water potentials of the distilled water in the small beaker and in the large beaker are the same.

3.11 A Note the ratio is "initial mass to final mass". So a ratio greater than 1 means the potato strip has lost water.

3.12 B

3.13 C There is no absorption on concentration below (2). This shows that the absorption is by diffusion. There is no absorption when the nitrate concentration inside the cell is higher than that in the solution.

3.14 C Facilitated diffusion and simple diffusion are basically the same. Net diffusion will stop when concentrations have become uniform.

4 Enzymes

4.1 A The product has lower energy level, showing that energy is released. Energy is released in catabolic reactions.

4.2 C Without the enzyme, the energy levels of the reactant and the product remain unchanged. Only the activation energy is raised.

4.3 D Anabolic reactions absorb energy and this energy is stored in the synthesised product. The graph shows that the energy level of the product is higher; therefore this reaction absorbs energy and this is an anabolic reaction.

5 Nutrition and gas exchange in plants

5.1 B Carbon is absorbed as carbon dioxide mainly by the leaves in photosynthesis. Nitrogen and hydrogen are absorbed as nitrate and water respectively from soil water by the root.

5.2 A Seedlings have less stored minerals and so the effects of a deficiency of a certain mineral can show up faster.

5.3 D The difference between the experimental and control set-ups should be only the magnesium deficiency, which is the factor studied in this experiment.

5.4 B Under strong light, P and Q release oxygen. S releases carbon dioxide in the process of respiration. R is xylem. This is a dead tissue that does not release any gas.

5.5 C All living cells release carbon dioxide in cellular respiration.

5.6 C Glucose is produced in photosynthesis. Some glucose is converted to starch for temporary storage. Glycogen is the storage form in animal and fungi.

5.7 D Glucose is the building units of starch and cellulose. A part of the building units of fats and amino acids are derived from glucose. Proteins are built from these amino acids.

5.8 C Cellulose is the building material of cell wall, not storage material. See the answer in the previous question for the explanation on protein and lipid.

5.9 C

Option (2): The amount of water consumed in photosynthesis is negligible when compared with the amount lost in transpiration.

5.10 D` (2) is the release of carbon dioxide from the root hair in respiration.

5.11 D Respiration occurs both at the root and at the leaf.

5.12 C The cells of P (xylem) are rigid due to the thickened cell wall. The cells of Q (thin-walled cells) are rigid due to turgidity. Cell R is just a layer of epidermis on the leaf.

5.13 A Option (1) is correct because when the net release of oxygen is zero, the amount of oxygen produced in photosynthesis is equal to the amount used in respiration; therefore photosynthesis still occurs at 5°C.

Option (2): This is the interval in which the rate increases most rapidly. The rate is highest at 35°C.

Option (3): This is not shown in the graph. The rate may remain high up to 40°C or above.

6 Transpiration, transport and support in plants

6.1 B Transpiration pull can occur in a twig without root.

6.2 A

Option B: Water diffuses out through (2), not evaporates from (2).

6.3 A With a narrower tube, the bubble moves a greater distance in the same period of time. The error in measurement is proportionally smaller.

6.4 D The bar represents the time required for the bubble to travel 10 cm. The longer the bar, the lower is the transpiration rate. The greatest drop in rate occurs when "25ºC, in light, no wind" is changed to "25ºC, in dark, no wind".

6.5 D **q** is the amount of water absorbed and **p** is the amount lost in transpiration. (**q – p**) is the amount retained.

Option A: **x** is the amount transpired from the upper surface, so (**p – x**) is the amount transpired through the lower surface.

Option C: The amount of water retained should be (**y – x**).

6.6 A If the cut end is exposed to air, air may enter the xylem vessels and may block the vessels.

6.7 B Plant (2) has the highest density of stomata on lower and upper surfaces added up.

6.8 A

Option (2): No cell can absorb water directly by active uptake. Option (3): A root hair cell is a single cell without branches.

6.9 B Cyanide inhibits aerobic respiration, with the same effect as flooding. With less active transport, the root absorbs fewer mineral salts and so the water potential cannot be lowered for water to enter the root by osmosis.

6.10 C Transpiration at the leaves is the main factor causing water to rise in the xylem vessels.

6.11 B Structure X (xylem) is a dead tissue with no respiration.

Option A: Structure Y (phloem) is responsible for the transport of organic foods.

6.12 A Sucrose is less reactive than reducing sugars and so is less readily changed during transportation.

6.13 B The sieve tubes depend on the companion cells for their activities. The xylem vessels are dead tissues.

7 Energetics - photosynthesis and respiration

7.1 B The carbon dioxide is not regenerated. It is absorbed from outside.

7.2 D Oxygen is released in the photolysis of water. The energy in sunlight is absorbed by chlorophyll and is used to convert ADP to ATP and convert NADP to NADPH. ATP and NADPH will be used in carbon fixation.

7.3 B

7.4 A

Option (2) does not occur in the light-dependent stage. Option (3) occurs in the light-dependent stage but the oxygen released is not required in carbon fixation.

7.5 A NADPH is formed in the light dependent stage and is converted back to NADP in Calvin cycle.

Option B: It is carbon dioxide acceptor that is regenerated, not carbon dioxide. Option C: Oxygen is released in the light dependent stage. Option D: The carbon dioxide acceptor is a 5-carbon compound. It combines with one CO_2.

7.6 D At 1 unit light intensity, an increase of light intensity increases the rate.

Option A: If light intensity is the limiting factor, an increase of light intensity should increase the rate. Option B: There is no curve showing the result at 0.03% carbon dioxide and at other temperatures. Option C: There is no curve showing the result at 25°C and with a different carbon dioxide concentration.

7.7 A The reduction of the volume of gas in the test tube is due to the absorption of oxygen. There is no direct measurement on the volume of carbon dioxide released.

7.8 A The released gas cannot exit the flask if the end of tube X is immersed in the glucose solution.

7.9 B The carbon dioxide released in fermentation increases the pressure inside the flask, pushing the solution up in tube X.

7.10 B The oil layer already keeps the solution from air. The stopper is used to keep the flask air-tight so that any gas released will leave only through tube X.

7.11 A

Option (2): Both fermentations are essentially glycolysis, which has a net production of 2 ATP. Option (3): Lactic acid fermentation also occurs in bacteria.

7.12 B

Option (2): Anaerobic respiration produces ethanol or lactic acid. These contain chemical energy. The products of aerobic respiration are water and carbon dioxide, which do not contain chemical energy.

7.13 D

Option C: Some living plant cells do not contain chloroplast.

7.14 C Krebs cycle produces carbon dioxide, NADH and $FADH_2$. NADH and $FADH_2$ then enter the oxidative phosphorylation reactions, using oxygen as the hydrogen acceptor.

7.15 D In glycolysis, two ATPs are used and four ATPs are produced. There is a net gain of two ATPs. Two ATPs are finally produced in Krebs cycle. 32 ATPs are produced in oxidative phosphorylation.

7.16 C There is only a small amount of dissolved oxygen in water. The root cells have to respire anaerobically. Option C is the anaerobic respiration of glucose in plant cells.

7.17 C In long-distance running, usually aerobic and anaerobic respirations occur at the same time. Option (2) is a wrong equation.

7.18 C Water is formed in the subsequent electron transport chain, not in the Krebs cycle.

End