

Comparison between NEW and OLD syllabuses

In the New Biology syllabus, some topics are newly added and some are removed. Moreover, the syllabus is divided into two parts: **core** and **extension**. Some difficult topics are grouped under the extension part and they will only be asked in Section B of both Papers 1 and 2.

(a) Topics added to the syllabus

| Sections | Topics added |
|---------------------------------|---|
| The Cell | <ul style="list-style-type: none"> • Discovery of cells • Functions of mitochondrion |
| Organisms and Their Environment | <ul style="list-style-type: none"> • Classification of organisms into five kingdoms • Virus as a non-cellular entity • Concept of sustainable development |
| Energetics | — |
| Obtaining Essentials for Life | <ul style="list-style-type: none"> • Using data logger to study: (P) <ul style="list-style-type: none"> – the effect of light on gas exchange; and – the change in breathing rate during exercise. • Test for glucose using Clinistix paper (P) • Test for protein using Albustix paper (P) • Health problems resulting from improper diet • Periodontal disease and its prevention |
| Coordination and Response | <ul style="list-style-type: none"> • General effects of glucagon • Similarities and differences between hormonal and nervous coordination • Feedback mechanism in homeostasis |
| Regulation and Defence | <ul style="list-style-type: none"> • Regulatory role of glucagon in blood glucose level |
| Reproduction and Growth | <ul style="list-style-type: none"> • Structure of ovum • Formation of identical twins and fraternal twins • Advantages of breast-feeding |
| Genetics and Evolution | <ul style="list-style-type: none"> • Down syndrome, colour blindness and G6PD deficiency • Human Genome Project • Genetic engineering • Evolution |

Key: (P) Practical work

(b) Topics removed from the syllabus

The following table shows the topics that are removed from the syllabus.

| Sections | Topics removed |
|---------------------------------|--|
| The Cell | — |
| Organisms and Their Environment | <ul style="list-style-type: none">• Man and micro-organisms• Monoculture |
| Energetics | — |
| Obtaining Essentials for Life | <ul style="list-style-type: none">• Biuret test for protein (P)• Smoking and health hazards• Blood groups and blood transfusion |
| Coordination and Response | <ul style="list-style-type: none">• Structure of ear and its auditory function• Function of ear in detecting movement• Support in mammal |
| Regulation and Defence | — |
| Reproduction and Growth | <ul style="list-style-type: none">• Budding in yeast• Spore formation in <i>Mucor / Rhizopus</i>• Conditions for seed germination |
| Genetics and Evolution | — |

Key: (P) Practical work

| Sections | Topics of the extension part | Practical works |
|---------------------------|---|--|
| Coordination and Response | <ul style="list-style-type: none"> • Causes and corrections of long sight, short sight • Causes of colour blindness • Hormonal coordination in human • Growth responses of plants | <p>—</p> <p>—</p> <p>—</p> <ul style="list-style-type: none"> • Study of phototropic and geotropic response of plants • Study of the relative effect of gravity and water on plant growth |
| Regulation and Defence | <ul style="list-style-type: none"> • Feedback mechanism in homeostasis • Structure, functions and operating principles of kidney • Regulation of glucose level in blood • Principle of vaccination | <p>—</p> <ul style="list-style-type: none"> • Examination of model or section of kidney <p>—</p> <p>—</p> |
| Reproduction and Growth | <ul style="list-style-type: none"> • Mitosis and meiosis • Asexual reproduction • Sexual reproduction in flowering plants • The advantages of breast-feeding • Growth and development | <ul style="list-style-type: none"> • Examination of the processes of mitosis and meiosis • Examination of binary fission in bacteria • Examination and cultivating a propagating organ • Examination of insect-pollinated flowers and wind-pollinated flowers <p>—</p> <ul style="list-style-type: none"> • Study of seed germination and growth of young seedlings |
| Genetics and Evolution | <ul style="list-style-type: none"> • Down syndrome, colour blindness and G6PD deficiency • Effects of ionizing radiations and chemicals on mutation • Use of genetically modified bacteria in production of insulin • Evolution | <p>—</p> <p>—</p> <p>—</p> <p>—</p> |

Distribution of Exam Questions

| Topic \ Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|----------|------------------|----------------------|-----------------|-----------|-----------------|
| Chemicals of Life, Cell and Cell Activities | 1a | 3ciii | 1a | 4a | 1b | 4c |
| Diversity of Life and Classification of Organisms | — | — | — | 1ai | 3ciii | 1(ai-iii) |
| Ecosystem | — | — | — | 2bi, 4 (bi-iii) | 3(ci-ii) | 1aiv, 4bii |
| Man's Effect on the Environment and Environmental Protection | 4c | 2c, 3cii | 4c, 3ciii | 2biii | 3civ | 1av, 4(bi, iii) |
| Photosynthesis | — | 2bi | 4(ai-iii) | — | 4a | 2aii |
| Respiration | — | 1b | — | 3c | 4(bi-iii) | 3c |
| Nutrition, Gas Exchange, Water Relation and Transport in Plants | 3b | 2(biii), 4c | 2(ci, iii), 3(ci-ii) | 2a | 1a | 2(ai-iii) |
| Nutrition, Gas Exchange and Transport in Humans | 1(ci-ii) | 1a, 4(biv, ciii) | 3a | 2(cii-v) | 1b | 4(ci-iv) |

Demonstration

Section A

1. The diagram shows the feeding relationship between certain organisms found in a freshwater pond.

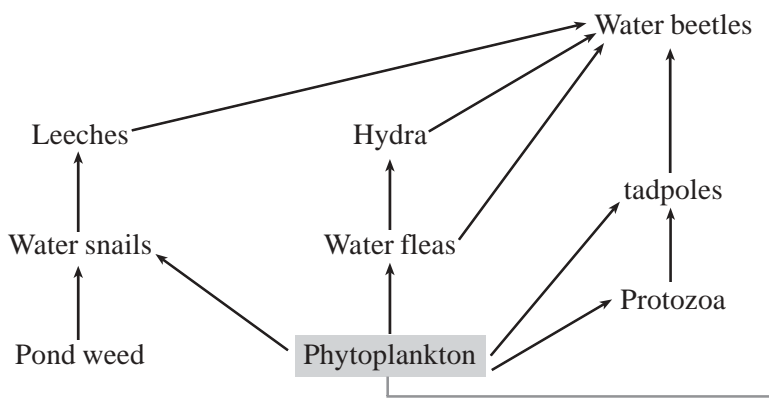




Figure 3.4

 **Guidelines**
 'phyto-' means 'plant';
 'plankton' means 'microscopic
 floating organisms'.

(a) Complete the following table which shows the roles of different organisms in the food web.

| Roles in the food web | Organisms |
|-----------------------|-----------|
| Producer | (i) |
| Herbivore | (ii) |
| Omnivore | (iii) |
| Secondary consumer | (iv) |

Table 3.7 (4 marks)

 **Guidelines**
 Herbivores feed on plants only
 while omnivores feed on both
 plants and animals.

(b) The diagram below shows the changes in the population size of water beetles over a period of time. At point X, the hydras were removed from the freshwater pond.

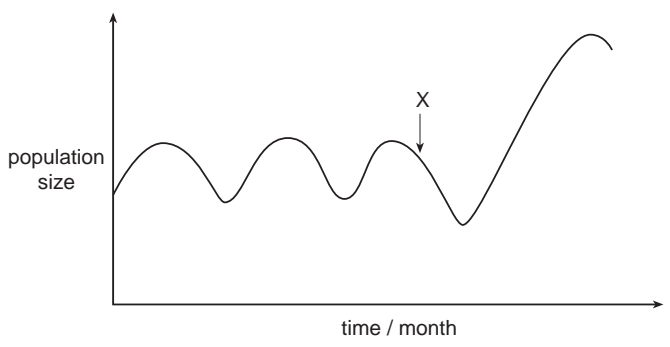


Figure 3.5

5 Photosynthesis

Review

Photosynthesis

- Photosynthesis is a synthetic process occurring in green plants. It converts light energy into chemical energy in the form of carbohydrates. Oxygen is released as a by-product.
- The word equation of photosynthesis is:



- The following table shows the four requirements for photosynthesis:

| Requirements | Functions |
|----------------|---|
| Water | It is a raw material of photosynthesis. |
| Carbon dioxide | It is a raw material of photosynthesis. |
| Light | It provides energy to drive photosynthesis. |
| Chlorophyll | It traps the energy in sunlight and converts it into chemical energy. |

Table 5.1

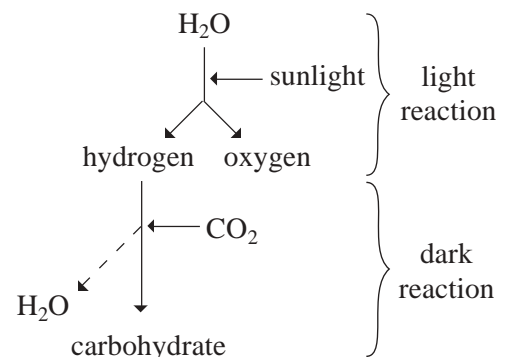
Processes of photosynthesis

1. Light reaction

- The splitting of water into hydrogen and oxygen by light.
- Chlorophyll is required.

2. Dark reaction

- The reduction of carbon dioxide by hydrogen to form carbohydrates.
- Chlorophyll is not required.



Practice

Section A

1. (a) Complete the table below which lists the differences between aerobic respiration and anaerobic respiration taking place in the human body:

| | Aerobic respiration | Anaerobic respiration |
|-----------------|---------------------|-----------------------|
| Raw materials | | |
| End products | | |
| Energy released | | |

Table 6.9

(5 marks)

- (b) When a man is doing vigorous exercise, state the type(s) of respiration taking place

(i) in his brain cells. Hint 1

(1 mark)

(ii) in his skeletal muscle cells. Hint 2

(1 mark)

Total: 7 marks

2. The diagram below shows the apparatus designed by a student which is used to study the oxygen consumption of an insect:

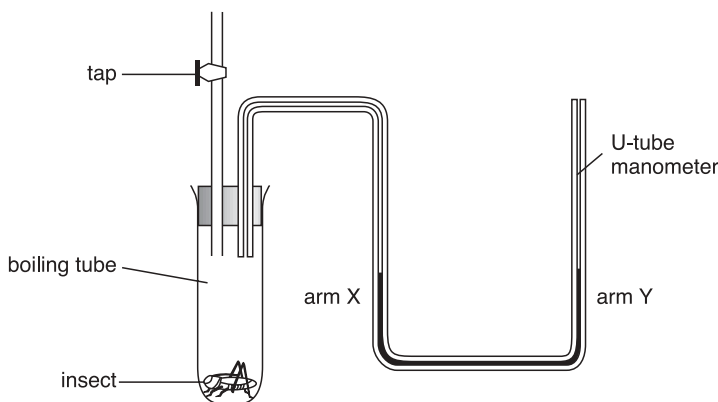


Figure 6.8

- (a) Suggest a suitable solution that can be used in the U-tube manometer. Hint 3 (1 mark)

- (b) Describe the change in the liquid level of the U-tube manometer during the experiment.

Explain your answer. Hint 4

(5 marks)

- (c) It is argued that the accuracy of the experiment would be easily affected by the environment.

Do you agree with this argument? If yes, suggest **two** possible environmental factors that would affect the result of the experiment. Hint 5

(3 marks)

Total: 9 marks

BIOLOGY PAPER 1

Question-Answer Book (Mock Examination)

$1\frac{3}{4}$ hours

This paper must be answered in English

1. This paper consists of TWO sections, A and B. Section A carries 58 marks, of which 4 marks are awarded for effective communication. Section B carries 38 marks, of which 2 marks are awarded for effective communication.
2. Attempt ALL questions in Section A, and any TWO questions in Section B. Write your answers in the spaces provided in this Question-Answer Book.
3. The diagrams in this paper are not necessarily drawn to scale.

Question Commands

The following table lists the question command(s) which showing the requirements of answering questions:

| Question commands | Examples | | | | | | |
|---|---|------------------------------------|-------|------------------------------------|----------------|------|------|
| <p>Account for * ... (Give reasons for, but do NOT calculate)</p> | <p>The table below shows the change in total dry mass in seeds before and after germination:</p> <table border="1" data-bbox="724 537 1372 674"> <thead> <tr> <th></th> <th>Seeds</th> <th>Seedlings formed after germination</th> </tr> </thead> <tbody> <tr> <th>Total dry mass</th> <td>39.2</td> <td>28.4</td> </tr> </tbody> </table> <p>Account for the difference in total dry mass between the seeds and the seedlings after germination. Correct answer: Some stored food in the seeds is used in respiration. Wrong answer: $39.2 \text{ g} - 28.4 \text{ g} = 10.8 \text{ g}$</p> | | Seeds | Seedlings formed after germination | Total dry mass | 39.2 | 28.4 |
| | Seeds | Seedlings formed after germination | | | | | |
| Total dry mass | 39.2 | 28.4 | | | | | |
| <p>Arrange in ascending order ... (The lowest first and the highest last) Arrange in descending order ... (The highest first and the lowest last)</p> | <p>Arrange the complexity of the following terms in ascending order : Tissue, cell, system, organ Correct answer: Cell, tissue, organ, system Wrong answer: System, organ, tissue, cell (Remarks: No mark will be awarded for descending order.)</p> | | | | | | |
| <p>Calculate ... (Show all the steps of calculation and give the answer with appropriate unit)</p> | <p>A boy breathes three times per ten seconds, calculate the rate of breathing of the boy. Correct answer: Breathing rate of the boy $= \frac{3}{10} \times 60$$= 18 \text{ breaths / min}$ Wrong answer: Breathing rate = 18</p> | | | | | | |
| <p>Compare ... (Point out the similarities and / or differences between two or more subjects)</p> | <p>Compare the chromosome number of the sperm with that of the fertilized egg. Answer: The chromosome number of the sperm is haploid (n) while that of the fertilized egg is diploid (2n).</p> | | | | | | |
| <p>Define / What is meant by ... (State briefly the meaning of the term)</p> | <p>Define 'dry weight' of germinating seedlings. Answer: The weight of germinating seedlings after removing all of the water from them.</p> | | | | | | |

1 Chemicals of Life, Cell and Cell Activities

Section A

1. (a) (i) Cell A 1
 (ii) Turgid 1
 (b) (i) Osmosis 1
 (ii) Water comes out from central vacuole of the cell A **by osmosis** since the **water potential of the surrounding solution is lower.** 1 + 1
 Hence, the **size of vacuole decreases.** 1
 As a result, cytoplasm will pull away from the cell wall / the cell becomes **plasmolysed.** 1
2. (a) If the land has been flooded with sea water, the soil water will contain a **lot of salt.** 1
 The crops will not be able to grow on this land since the concentration of salt in the soil is too high. 1
 Water will leave the root (hair cells) by **osmosis** since the **water potential** of the soil water is **lower.** 1
 Hence, causing **dehydration** of the plant. 1
 (b) Diffusion is used to describe the **movement of particles** of a substance **from a region of higher concentration of particles to a region of lower concentration.** 1
 Osmosis is used to describe the **movement of solvent / water molecules** from a **solution of higher water potential to a solution of lower water potential through a selectively permeable membrane.** 1
3. (a) It is used to transport oxygen. 1
 (b) Absence of nucleus 1
 Presence of haemoglobin 1
 (c) The absence of nucleus provides more space for haemoglobin. 1
 Presence of haemoglobin will increase the oxygen carrying capacity. 1
4. (a) The **shell of the egg** represents the cell wall of a plant cell. 1
 (b) The contents of an egg have a **lower water potential** than distilled water. 1
 Water enters the egg through the **small hole on the shell and the selectively permeable egg membrane by osmosis**, and hence the size of egg white will **expand and break the egg membrane.** 1
 The egg white will flow out through the hole. 1
 (c) Cell membrane and cytoplasm 1 + 1

 **Reminder**

The plasmolysed condition is normally found in laboratory conditions; it is extremely rare in nature. However, the cell is not harmed by plasmolysis, it will take up water again when water is available.

 **Reminder**

Transport of materials across membranes needs energy. The energy source for diffusion and osmosis is the kinetic energy of particles.

 **Reminder**

The haemoglobin content is almost equal to 90% of the cell's dry mass.

 **Reminder**

Do NOT accept nucleus and mitochondria as answers.