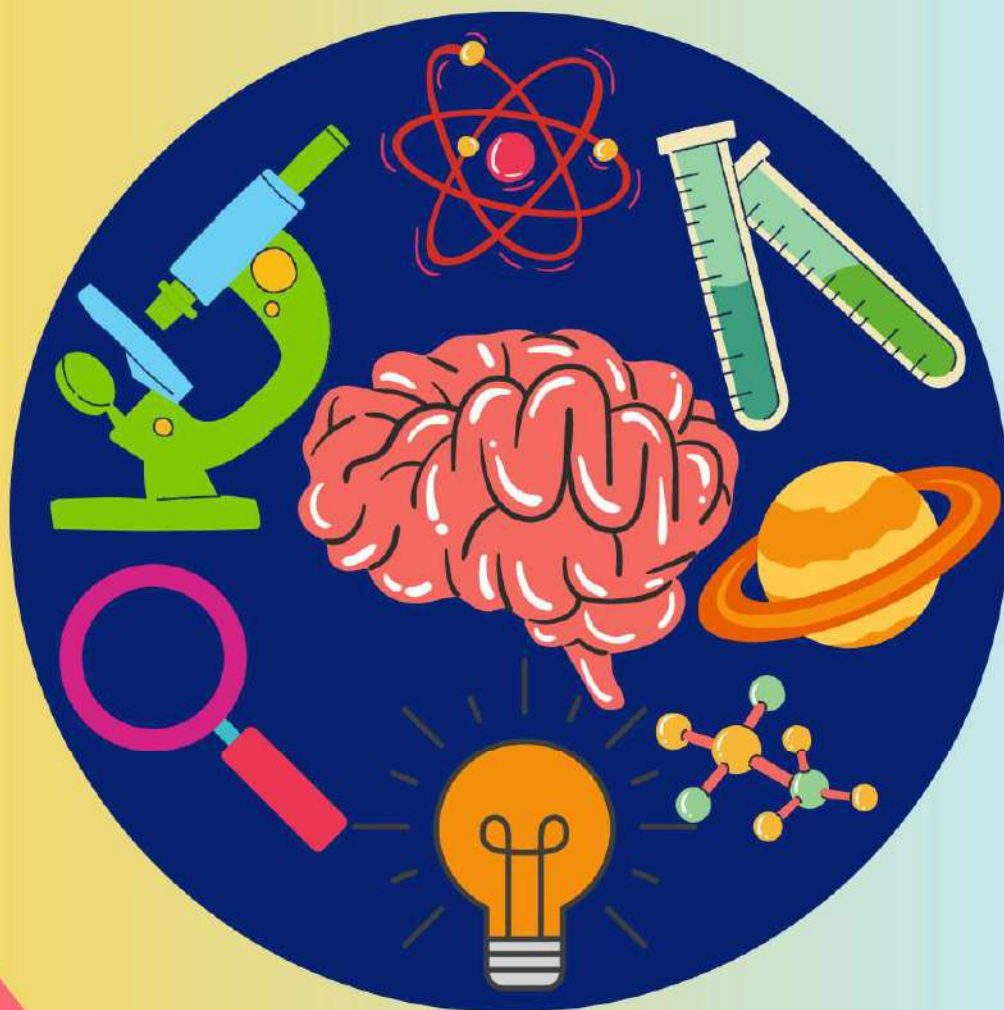


# SCIENCE WORKBOOK

7

For the preparation of National  
& International Olympiads



- Chapter-wise practice exercises
- Previous year paper

# Science Olympiad

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**Grade 7**



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## CREST Science Olympiad Workbook for Grade 7

Second Edition

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**Disclaimer:** The information in the Workbook is to give you the path to success but it does not guarantee 100% success as the strategy is completely dependent on its execution. And it is based on previous year papers of CSO exam.

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# Preface

We are pleased to launch a thoroughly revised edition of this workbook. We welcome feedback from students, teachers, educators and parents. For improvements in the next edition, please send your suggestions at [info@crestolympiads.com](mailto:info@crestolympiads.com).

CREST Olympiads is one of the largest Olympiad Exams with students from more than 25 countries. The objective of these exams is to build competitive spirit while evaluating students on conceptual understanding of the concepts.

We strive to provide a superior learning experience, and this workbook is designed to complement the school studies and prepare the students for various competitive exams including the CREST Olympiads. This workbook provides a crisp summary of the topics followed by the practice questions. These questions encourage the students to think analytically, to be creative and to come up with solutions of their own. There's a previous year paper given at the end of this workbook for the students to attempt after completing the syllabus. This paper should be attempted in 1 hour to get an assessment of the student's preparation for the final exam.

*Publishers*

# Nutrition in Plants and Animals

## Nutrition

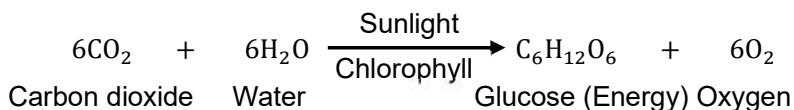
The process of taking in food by an organism and its utilisation by the body for various life process is called nutrition. The different components of food that provide nutrition to our body are called nutrients. Carbohydrates, fats, proteins, vitamins, minerals, roughage and water are various nutrients present in our food.

## Modes of Nutrition

- **Autotrophic Nutrition:** It is the mode of nutrition in which organisms makes their own food from the simple inorganic substances (such as carbon dioxide and water) by the process of photosynthesis. Such organisms are called autotrophs or producers. For example, green plants.
- **Heterotrophic Nutrition:** It is the mode of nutrition in which organism depend on other organisms for their food. Such organisms are called heterotrophs. For example, animals, non-green plants etc.

## Autotrophic Nutrition in Plants

- Green plants prepare their own food from simple inorganic substances (carbon dioxide and water) in the presence of sunlight and green pigment or chlorophyll by the process of photosynthesis.
- Photosynthesis takes place in the leaves of the plants. Therefore, leaves are called food factories or kitchen of the plant. Photosynthesis can also occur in green parts of the plants like stem.
- Leaves have specialised openings called stomata through which carbon dioxide from air enters the leaf and reaches chlorophyll. Stomata is generally present on the upper surface of the leaves.
- Water and minerals required for photosynthesis are from the soil are absorbed by the roots of the plants and are transported to the leaves through xylem vessels.
- Chlorophyll, the green pigment locked inside the chloroplast, helps the leaves to use the energy from the sunlight to prepare food using, carbon dioxide and water.
- The conditions necessary for photosynthesis are carbon dioxide, sunlight, chlorophyll and water.
- Photosynthesis process can be represented by the following reaction:



- During the process of photosynthesis, carbon dioxide is absorbed and oxygen is released in the air. The carbohydrates get converted into starch. The presence of starch indicates the occurrence of photosynthesis.

## Synthesis of Proteins and Fats by the Plants

Along with carbohydrates, plants can produce proteins and fats with the help of nitrogen. Although nitrogen is present in air in large amount, plants cannot absorb nitrogen directly from the air. They can get nitrogen in two ways:

- The soil contains some nitrogen fixing bacteria like Rhizobium bacteria that converts the nitrogen into water soluble nitrogenous compounds like ammonia and release them into soil. These compounds which can be absorbed by the plants along with water.
- Farmers add fertilizers into the soil that contain a high amount of nitrogen.

## Heterotrophic Nutrition in Plants

Non-green plants that do not contain chlorophyll cannot prepare their own food. Therefore, depend on other plants and animals for their food.

### Parasitic Plants

Plants that live in or on the body of other organism and derives nutrients from it are called parasites. The organism from which a parasite derives its nutrients is called as host.

- **Total Parasites:** These depend completely on their host for nutrition and no longer need green leaves. For example, Cuscuta.
- **Partial Parasites:** These possess green leaves and can synthesis carbohydrate food on their own. But are dependent on the host plant for water and minerals. For example, mistletoe which grown on trees like mango.

### Insectivorous Plants

These are green plants which obtain their nutrition partly from the soil and atmosphere and partly from small insects. These plants can synthesis their own food by photosynthesis but food on insects for their nitrogen nutrition. For example, Venus flytrap, pitcher plant, sundew etc.

Insectivorous plants exhibit both autotrophic and heterotrophic mode of nutrition.

### Saprotrophs

Saprotrophs are the organism that obtain nutrition from dead and decaying plant and animal matter. This mode of nutrition is called saprotrophic nutrition. Examples of saprotrophs are fungi and bacteria.

Fungi secretes digestive juices on the dead and decaying matter and convert it into a solution. Then they absorb the nutrients from it. Fungi reproduces through spores.

## Symbiosis

When two organisms live together and share their shelter and nutrients, their association is called symbiosis or symbiotic relationship. For example, algae (autotroph) and fungus (saprophyte) live together in lichen. Fungus provides water and minerals to the cells of the algae while the algae prepare food for the fungus by photosynthesis.

## Nutrition in Animals

Animals depend on plants and other animals. Some animals directly eat plants and are called herbivores. Some animals feed on the other animals and are called carnivores. Some animals eat both plants and animals and are called omnivores.

Animal nutrition includes nutrient requirement, mode of intake of food and its utilization in the body. Holozoic nutrition involves:

**Ingestion:** Process of intake of solid or liquid food through mouth.

**Digestion:** Process of breakdown of food into simple soluble form with the help of digestive juices made in the body.

**Absorption:** Process by which soluble form passes into the body fluids such as blood.

**Assimilation:** Process of using absorbed nutrients by the blood cells for producing energy and for growth of the body.

**Egestion:** Process of removal of undigested food or waste matter from the body.

## Different Modes of Feeding

Name of animal	Kind of food	Mode of feeding
Snail	Leaves and insects	Scraping
Ant	Food particles	Chewing
Eagle	Small animals	Capturing and swallowing
Humming-bird	Nectar of flower	Sucking
Lice	Blood	Sucking
Mosquito	Blood	Sucking
Butterfly	Nectar of flower	Siphoning
Housefly	All most everything	Siphoning

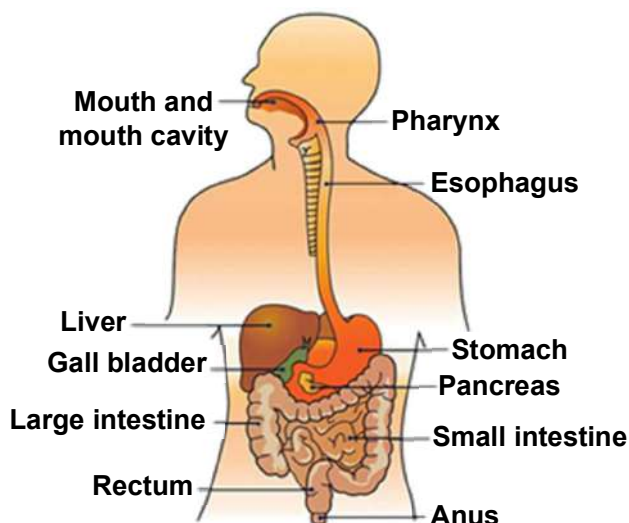
## Human Digestive System

The process of digestion in human beings involves both mechanical and chemical digestion.

- Mechanical digestion involves the physical breakdown of food by chewing and churning of food.
- Chemical digestion involves digestion with the help of enzymes secreted by different organs and glands of the digestive tract that can break down carbohydrates into glucose, fats into fatty acids and glycerol, proteins into amino acids.



## Parts of Human Digestive System



### Mouth

- Mouth or buccal cavity contains teeth, tongue, salivary glands, etc.
- Digestion begins in mouth. The food is chewed and broken down with the help of teeth.
- Food gets mixed with saliva with help of tongue.
- Saliva is produced by salivary glands. It contains a digestive enzyme called amylase which helps in digestion of carbohydrates.
- Tongue contains taste buds which help us to taste.

### Types of Teeth

- **Incisors:** These are 4 in each jaw and are situated at the front. These are flat and straight with sharp edges used for biting and cutting.
- **Canines:** These are 2 in each jaw and are situated on the either side of incisors. These are sharp and pointed and used for tearing food.
- **Premolars:** These are 4 in each jaw and are situated next to canines. These are specialized in crushing and grinding food.
- **Molars:** These are 6 in each jaw and are situated behind the premolars. These are used for crushing and grinding food.

### Oesophagus

- It is a long tube that connects the mouth to the stomach. The muscles of oesophagus contract and relax continuously this pushes down the food into the stomach. The contraction and relaxation of the oesophageal muscles is called peristalsis.
- No digestion occurs in oesophagus.

## Stomach

- Food enters the stomach from oesophagus.
- Stomach contains digestive juices and hydrochloric acid which helps in digestion.
- Acid activated the enzyme pepsin. Pepsin converts protein into simpler substance called peptones.
- Protein digestion starts in stomach.

## Small Intestine

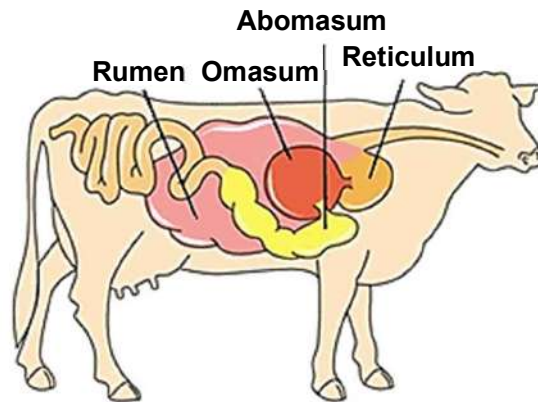
- After leaving stomach food enters the small intestine. It is a long tube of about 7.5 m.
- It has three parts duodenum, jejunum and ileum.
- Duodenum, upper part of the small intestine, receives the bile juice from liver and pancreatic juice from pancreas. Bile juice helps in fat digestion. Pancreatic juice helps in digestion of carbohydrates, proteins and fats.
- Jejunum, middle part of the small intestine, contains small finger-like projections called villi, which help in absorbing nutrients and energy into the blood after digestion.
- The walls of the small intestine absorb the digested food.

## Large Intestine

- Any food that is left undigested passes through the small intestine and enters the large intestine.
- It contains three regions caecum, colon and rectum.
- No enzyme is secreted here.
- It mainly absorbs water.
- The waste food which is now semi-solid is stored in the last part of large intestine called the rectum. It is then passed out of the body through rectum. This is called egestion.

## Digestion in Ruminants

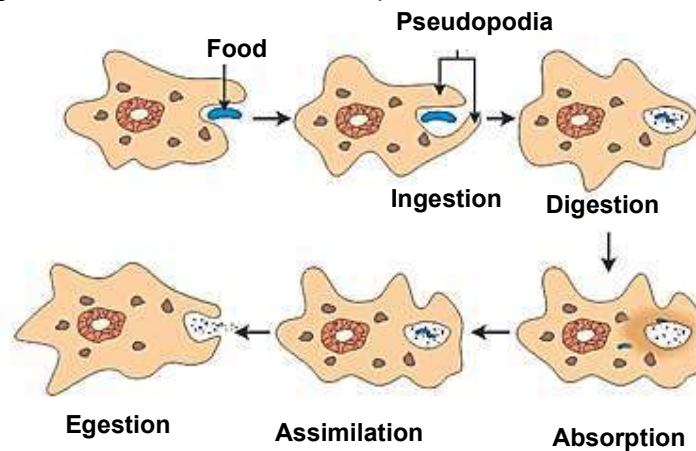
- Ruminants are grass-eating mammals like cow, buffalo, goat, sheep, deer etc.
- These animals swallow plenty of grass without chewing.
- The swallowed food goes to a chamber called rumen (large sac-like structure). Here, the partial digestion of food takes place with the help of anaerobic bacteria. The microorganism produces an enzyme that helps in the digestion of cellulose.
- This partially digested food is called cud. The cud is then pushed to the second chamber called reticulum.
- The cud is brought back to the mouth and the animal chews it again. This process is called rumination.
- After the complete chewing, food is sent to other parts of the stomach, abomasum and omasum, and then to intestine for complete digestion.



**Alimentary Canal of a Cow**

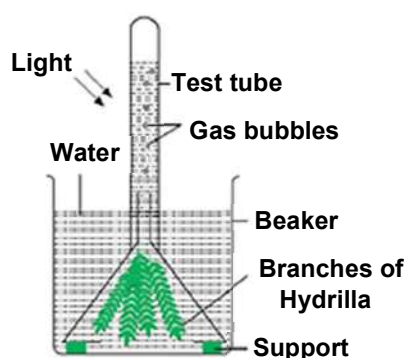
## **Nutrition in Amoeba**

- Amoeba ingests food by forming temporary finger-like projections called pseudopodia around it. The food is engulfed with a little surrounding water to form a food vacuole ('temporary stomach') inside the Amoeba.
- The food is digested in the food vacuole. Digestive juices are secreted into the food vacuole. These digestive juices break down the food into simpler substance.
- The digested food is absorbed. The absorbed substances are used for growth, to obtain energy through respiration, multiplication and maintenance.
- The undigested residue of the food is expelled out of the vacuole.



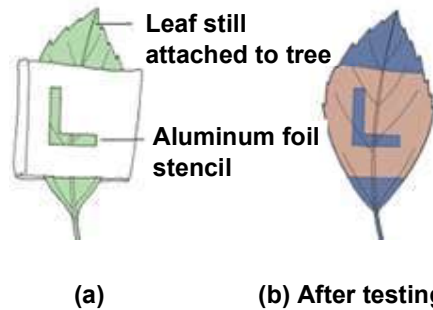
## Practice Questions

1. Consider the following statements and choose the correct option:  
Statement 1: Venus fly trap and pitcher plant cannot perform photosynthesis and therefore fulfil their nutritional requirement by trapping insects.  
Statement 2: All the plants can absorb nitrogen from the air.
  - a. Statement 1 is correct but statement 2 is incorrect.
  - b. Statement 1 is incorrect but statement 2 is correct.
  - c. Both the statements are correct.
  - d. Both the statements are incorrect.
2. Consider the experimental set-up shown below and answer the following question:



- Which of the following is the conclusion of the above experiment?
- a. Plants release carbon dioxide in photosynthesis.
  - b. Plants release oxygen in photosynthesis.
  - c. Plants require carbon dioxide for photosynthesis.
  - d. Plants require oxygen for respiration.
3. Which of the following changes take place in green plants, but not in human?
    - a. Glucose → Cellulose
    - b. Glucose → Glycogen
    - c. Starch → Glycogen
    - d. Starch → Glucose
  4. Which of the following statement is/are correct?
    - I. Chlorophyll is the green pigment present in leaves which traps sunlight energy.
    - II. Algae exhibit photosynthetic mode of nutrition.
    - III. Leaves send down food to the roots through phloem.
    - IV. Leguminous crops help to replenish nitrogen content of the soil.
    - a. Only I
    - b. Only III
    - c. Both I and II
    - d. I, II, III and IV

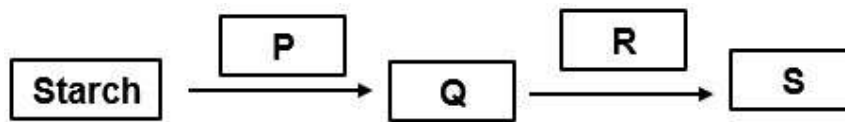
5. James performed the experiment to check if light is necessary for the photosynthesis or not. He obtained the following result.



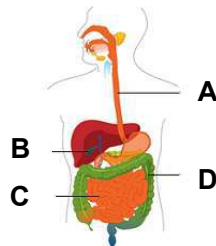
Which of the following can be interpreted from the above experiment?

- Starch is not formed in the areas that receive no light.
  - Starch is not formed in the areas that receive light.
  - Oxygen is required for the photosynthesis to occur.
  - Starch is formed in the area that receive no light.
6. Consider the following statements and choose the correct option:  
Statement 1: Partial parasitic plant like mistletoe depends on the host for water and minerals.  
Statement 2: The occurrence of photosynthesis can be tested by the presence of starch in the leaf.
- Statement 1 is correct but statement 2 is incorrect.
  - Statement 1 is incorrect but statement 2 is correct.
  - Both the statements are correct.
  - Both the statements are incorrect.
7. Which of the following statement is correct?
- Rate of photosynthesis increases with the increase in intensity of light.
  - Rate of photosynthesis decreases with the increase in intensity of light.
  - Rate of photosynthesis increases with the decrease in carbon dioxide concentration.
  - Both a and c
8. Consider the following statements and choose the correct option:
- Lichen is an example of a symbiotic relationship between an alga and fungus.
  - Bacteria and fungi are parasitic organisms.
  - A parasite lives in or on the body of the another living organism to derive nutrition.
- Only I is correct
  - Only II is correct
  - Only I and III are correct
  - I, II, III are correct

9. Which of the following gases is/are required by plants to perform photosynthesis?
- a. Oxygen only  
b. Carbon dioxide only  
c. Oxygen and nitrogen  
d. Nitrogen only
10. Why is light necessary for photosynthesis?
- a. It is a catalyst.  
b. It is a source of energy.  
c. It provides nutrients.  
d. It provides oxygen.
11. Fill in the boxes below with the correct products and enzymes to represent the digestion of the following substance:



- a. P – Amylase, Q – Maltose, R – Maltase, S – Glucose  
b. P – Lipase, Q – Maltose, R – Amylase, S – Glucose  
c. P – Amylase, Q – Amylase, R – Fatty acids, S – Glycerol  
d. P – Lipase, Q – Maltose, R – Maltase, S – Glycerol
12. Consider the following statements and choose the correct option:  
Statement 1: Liver helps to secrete bile juice for the digestion of fats.  
Statement 2: Pancreas secretes pancreatic enzymes to digest proteins, carbohydrates and fats.
- a. Statement 1 is correct but statement 2 is incorrect.  
b. Statement 1 is incorrect but statement 2 is correct.  
c. Both the statements are correct.  
d. Both the statements are incorrect.
13. Figure below shows the human alimentary canal:



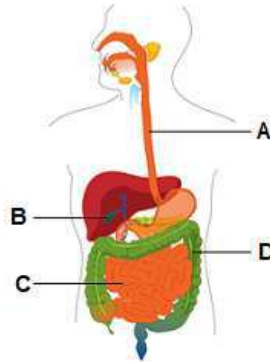
In case of a person suffering from diarrhoea, the process of absorption of water does not occur normally in which of the following region?

- a. A  
b. B  
c. C  
d. D

14. Which of the following statement is incorrect?

- a. The gall bladder stores bile.
- b. Bile juice is secreted by gall bladder.
- c. Bile juice breaks down fats during digestion.
- d. No fat digestion takes place in mouth.

15. The diagram below shows the part of the human alimentary canal:



Select the option which correctly shows the juice secreted by the organs:

- a. A – Gastric juice, C – Intestinal juice
- b. A – Pancreatic juice, D – Intestinal juice
- c. A – Gastric juice, D – Intestinal juice
- d. A – Amylase, D – Lipase

16. Which of the following statement is incorrect?

- a. Liver is the largest gland in human body.
- b. Digestion of proteins begins in buccal cavity.
- c. Liver does not produce any digestive enzymes.
- d. Chemical digestion of food is completed in small intestine.

17. Choose the correct option and complete the following sentence:

\_\_\_\_\_ I \_\_\_\_\_ digests fats into \_\_\_\_\_ II \_\_\_\_\_ and \_\_\_\_\_ III \_\_\_\_\_.

- a. I – Lipase, II – fatty acids, III – glycerol
- b. I – Amylase, II – fatty acids, III – glucose
- c. I – Lipase, II – protease, III – amino acid
- d. I – Amylase, II – protease, III – amino acid

18. Consider the following statements and choose the correct option:

Statement 1: Cud is the swallowed and partially digested food of ruminants.

Statement 2: Canines and molars are similar in structure but differ in function.

- a. Statement 1 is correct but statement 2 is incorrect.
- b. Statement 1 is incorrect but statement 2 is correct.
- c. Both the statements are correct.
- d. Both the statements are incorrect.

19. Which of the following statement is correct?
- Amoeba engulfs the food particles with the help of finger like projections called pseudopodia.
  - Digestive enzyme enters into the food vacuole in amoeba to break down the food.
  - Amoeba has no fixed place for egestion.
  - All of the above
20. Small intestine in herbivores longer than in carnivores.  
Which of the following is the correct reason for the above statement?
- To allow the cellulose present in the plants to be digested completely.
  - To allow the pepsin to act on the cellulose.
  - To provide the path for bile juice to act upon proteins.
  - None of the above

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